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Digitalisation, artificial intelligence and algorithmic management in the workplace: Shaping the future of work

Cost of non-Europe

STUDY

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This study investigates the integration and effects of artificial intelligence and algorithmic management (AM) technologies within European workplaces, extending beyond the realm of platform work. It thoroughly examines the European regulatory framework for the use of AM technologies, engages in stakeholder interviews, and analyses four case studies.

The study estimates that workers' exposure to AM could rise from 42.3 % to 55.5 % in the medium term, generating both productivity opportunities and challenges in employment relations, working conditions, and workers' wellbeing. It identifies key regulatory gaps in AM use at work and explores the role EU legislation could play in addressing the gaps. It develops three policy options: adopting a recommendation; amending a package of existing legislation; and adopting a new legislative instrument to regulate the use of AM.

The added value of acting at EU level has been identified in ensuring the same level of protection for all workers, improving working conditions and safeguarding fundamental rights. For companies, having a common set of rules would enhance the level playing field and increase legal certainty.

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Glossary

Acronym	Meaning
AI	Artificial intelligence
AI Act	Artificial Intelligence Act (proposed EU Regulation)
AIA	Algorithmic impact assessment
AM	Algorithmic management
CEC	Confédération Européenne des Cadres
CJEU	Court of Justice of the European Union
DGQ	German Association for Quality
DPIA	Data Protection Impact Assessment
EC	European Commission
EDPB	European Data Protection Board
EESC	European Economic and Social Committee
ESENER	European Survey of Enterprises on New and Emerging Risks
EU	European Union
EU-OSHA /OSHA	European Agency for Safety and Health at Work
EWCS	European working condition survey
FRIA	Fundamental Rights Impact Assessments
GDPR	General Data Protection Regulation (EU 2016/679)
GenAI	Generative AI
GPAI	General-purpose AI (Model)
HR	Human resources
HRM	Human resources management
IAO	Fraunhofer Institute for Industrial Engineering
ILO	International Labour Office
IPA	Fraunhofer Institute for Manufacturing Engineering and Automation
OECD	Organisation for Economic Co-operation and Development
OJ	Official Journal
OSH	Occupational safety and health
PWD	Platform Work Directive (COM/2021/762)
TFEU	Treaty on the Functioning of the European Union

Executive summary

This study is the result of a research commissioned to support the European Parliament's Committee on Employment and Social Affairs (EMPL) in preparing a legislative own-initiative report on digitalisation, artificial intelligence (AI) and algorithmic management (AM) in the workplace. The study reviews the use and impact of AI and AM systems on employment relations and identifies policy options to address emerging challenges relating to the use of AM in the workplace. The study methodology has relied on both desk research and stakeholder interviews to provide evidence-based input for future EU legislative action.

The study examines the deployment of AI and AM technologies across European workplaces. The integration of automation and AI into workplaces is transforming managerial practices, notably through AM, which automates core functions such as giving instructions, monitoring and evaluating workers. Once associated mainly with platform work, AM is now spreading widely across traditional sectors in the European Union.

Prevalence of algorithmic management (AM)

Most current AM applications assist or augment human managers rather than fully automate decisions, but often increase work intensity despite oversight. Even digital tools not designed for management may *de facto* function as AM.

EU-wide surveys reveal inconsistencies in the measurement of the adoption of AM. According to the 2024 European Working Condition Survey (EWCS), 42.3 % of EU workers are affected by AM, with country variation, from 27 % in Greece to 70% in Denmark. Eurobarometer reports higher averages (51.3 %), while the 2024 European Survey of Enterprises on New and Emerging Risks estimates only 14.5 % of firms use AM. The OECD survey shows even higher shares due to broader definitions. The above surveys differ in unit of observation, wording of questions, items covered and targeted respondent, and should be regarded with caution.

According to surveys, AM adoption patterns vary by firm size and worker characteristics. Large companies adopt AM more often, and full-time, permanent, and highly educated staff are more likely to be exposed to AM. Gender differences are modest but vary by country. Additionally, unionised workplaces often show higher AM exposure. At sector level, finance and transport report the highest prevalence of AM usage, while agriculture and construction show the lowest.

Health and safety implications

In general, health and safety implications of AI and AM present a complex scenario: while AI can enhance physical safety by performing hazardous tasks or facilitate the adoption of preventive measures, AM engenders considerable psychosocial risks. Continuous monitoring, performance pressure from automated metrics, and diminished human oversight may contribute to heightened stress, anxiety, and burnout risk. Notably, 27 % of managers surveyed by the OECD expressed concerns about insufficient protection of workers' physical and mental wellbeing.

Impact assessment modelling shows that overall AM exposure could rise from 42.3 % to 55.5 % EU-wide in the medium term. Statistical modelling suggests that such an increase in worker exposure to AM, without policy intervention, results in a slight increase in worker stress levels and measurable deterioration in work-life balance, autonomy, and rest periods.

Broader challenges related to AM and AI

The change driven by AI and AM presents both productivity opportunities and risks to worker autonomy, wellbeing and fundamental rights. While some technologies can enhance worker autonomy by alleviating demanding tasks, others may diminish discretion through strict instructions and continuous oversight. Stakeholder interviews validate these findings while highlighting emerging concerns about emotional surveillance tools; respondents emphasised that successful AM implementation requires early worker engagement, transparent system design, and meaningful human oversight, with training and consultation identified as essential elements.

From a regulatory perspective, the analysis shows that, although the EU has established a comprehensive digital acquis that alongside existing labour and occupational health and safety (OSH) legislation can be applied to AM, the unique characteristics of workplace organisation generate specific challenges that remain insufficiently addressed.

Several legal instruments already provide important safeguards. The General Data Protection Regulation (GDPR) guarantees robust data protection rights and restricts fully automated decisionmaking. However, its reliance on individual consent and its lack of collective dimension can be problematic in employment contexts. The EU Artificial Intelligence Act (AI Act) introduces transparency, human oversight and conformity assessment obligations for high-risk AI systems. However, its market-oriented design overlooks employment power imbalances and collective dimensions. The OSH acquis imposes binding duties on employers to ensure safe working environments, including protection against psychosocial risks arising from monitoring and algorithmic scheduling. However, the legal framework does not contain AM-specific duties. These challenges have partially been addressed by the Platform Work Directive (PWD). This Directive offers workplace-specific protections, but it remains limited to persons performing platform work, leaving the majority of the EU workforce without equivalent safeguards. Together, these instruments provide a baseline of protection, but they do not form a coherent, workplace-specific framework.

The regulatory mapping highlighted some key gaps (more details in Table 7):

- **Uneven personal coverage**: EU labour and OSH acquis generally apply to 'workers', a term which is defined differently by each Member State. The PWD addresses this issue in platform work, but its protections do not extend to the wider workforce.
- **Transparency, information and consultation rights**: While existing labour rules include generic duties to inform and consult, they do not clearly require disclosure about the deployment of AM systems and small undertakings are exempt from general information and consultation obligations. PWD and the AI Act introduce transparency obligations, with the former containing more detailed provisions, including a collective dimension.
- **Specific AM safeguards**: Although human oversight, explanation rights and impact assessments are embedded across instruments, they are fragmented and limited in scope. For example, GDPR Data Protection Impact Assessments (DPIA) only apply to companies above certain thresholds, AI Act Fundamental Rights Impact Assessments (FRIA) largely exclude private employers, and detailed safeguards (such as the right to human oversight, explanation and human review) are confined to platform work.

- **Organisation of working time**: Despite the universal application of core labour standards on working time and rest periods, there are no explicit protections against algorithmic scheduling, pace-setting or surveillance outside the PWD.
- **Data protection and privacy in the workplace**: The EU digital acquis provides general rules and guarantees for data governance and the protection of personal data. Specific protective mechanisms and risks identified in workplace contexts are in place only for platform work (PWD) or have been set out in national legislation.
- **Bias and discrimination**: EU equality law prohibits discrimination based on specific grounds (e.g. sex, age, ethnicity), but provides no safeguards against algorithmic bias related to socioeconomic status or employment type. The AI Act does not impose on employers any ongoing duties to detect bias. The PWD does so, but only for persons performing platform work.
- **Health and safety**: In principle, the OSH framework can cover psychosocial risks, but it contains no AI-specific duties, such as addressing AI-driven surveillance or pace-setting. The PWD has established more specific protection measures but is limited in its personal scope.
- **Social dialogue**: AM deployment often proceeds without adequate consultation with workers, except in the case of platform work. Consultation triggers under EU labour law do not explicitly cover the introduction of AM systems.
- **Unsymmetrical enforcement and remedies**: Enforcement is fragmented across data protection, market surveillance, labour and OSH authorities, with little coordination. Remedies are primarily individualised, and collective redress is limited outside the platform economy. This leaves workers without effective means of challenging AM practices.

Policy options

The study develops and evaluates three policy options (relative to the baseline) that would address the challenges relating to the use of AM in the workplace:

- Adopting a non-binding Council recommendation (policy option 1)
- Amending a package of labour and OSH instruments (policy option 2)
- Adopting a targeted legislative initiative on algorithmic management (policy option 3).

It finds that, soft-law approach (**policy option 1**) offers minimal worker protection improvements and reduced legal certainty. As Member States can decide whether to follow up on the recommendation by adopting a non-binding or binding measure, impacts would differ. Adopting a non-legislative measure could encourage some actors to implement protective measures, but the protection would be uneven, especially for workers in smaller businesses. In case of a legislative measure, diverging protection across the EU also persists as different countries might adopt different measures, addressing different sets of challenges.

Policy option 2 would entail amending a package of existing legislation such as the OSH Framework Directive, the Information and Consultation Directive, the Working Time Directive, the Directive on Transparent and Predictable Working Conditions and finally, the Platform Work Directive (currently under transposition). Such amendments would entail legal complexity, as well as introducing uncertainty and compliance costs, not only for companies deploying AM, but also for third parties

(not involved in AM), due to changes in long-standing legislation. Amending existing legislation may also fail to regulate AM proportionally to its impact in different use cases, potentially negatively affecting SMEs.

A new legislative initiative on AM (**policy option 3**) could address all the above concerns. While both policy options 2 and 3 have the potential to cover most or all identified gaps and decrease negative impacts on workers, option 3 could be better targeting the AM use in the workplace without risking affecting third parties not involved in AM. Policy option 3 offers the highest increase of legal certainty for companies across the EU. Similar to policy option 2, compliance costs will occur but could be mitigated to a certain extent, for example by avoiding the need to adapt to diverging rules across the EU. This approach would likely be more proportional and incur lower costs for public administration and companies compared to option 2. For more details on the assessment, see Table 10 in section 4.2.4.

Responsible AM use in the workplace: balancing opportunities and risks

The labour market changes driven by AI and AM present both productivity opportunities and risks to worker autonomy, wellbeing, and fundamental rights. The use of AM could increase productivity (e.g. through streamlining processes), efficiency (e.g. through an automatic scheduling, for example) and enhance compliance with labour law (e.g. through enforcing working time requirements). While some technologies can enhance worker autonomy by alleviating demanding tasks, others may diminish discretion through strict instructions and continuous oversight. Realising benefits while minimising drawbacks requires a human-centred approach incorporating robust data protection measures, worker consultation, and collective bargaining to ensure ethical deployment of these technologies across European workplaces.

European added value

Not acting at EU level would negatively impact both workers and companies as the use of AM is expected to increase. Workers will likely experience worsening of some negative impacts relating to AM use such as increased stress levels or a loss of autonomy. Some Member States have been already taking action to address the risks relating to the use of AM but their approaches differ. Diverging national rules could contribute to additional fragmentation of the single market and imply additional compliance costs for companies. Such costs would mostly impact companies doing business across several Member States and small and medium enterprises.

Acting at EU level would therefore bring benefits compared to action at national level. The added value of acting at EU level has been identified in ensuring the same level of protection for all workers, improving their working conditions and fundamental rights (such as privacy and mental health) on the one hand and enhancing level playing field and increased legal certainty for companies on the other hand.

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1. Task 1 – Use of AM in the workplace

1.1. Framework, definitions and literature review

The increasing integration of artificial intelligence (AI) into the workplace is reshaping traditional managerial roles, giving rise to the nuanced concept of algorithmic management (AM). This section of the report explores the extent to which AM technologies are used in traditional workplaces across the European Union, moving beyond platform work, and aims to design a theoretical framework for understanding their widespread use in the workplace. It will specifically investigate the types of tools being used, such as instruction, monitoring, or evaluation tools, and the level and nature of human-robot interaction, categorised by EU-OSHA as co-existence, cooperation, and collaboration. The literature sources for this desk review include publications from various EU-level bodies, such as the European Commission, Eurofound, Cedefop, EU-OSHA, and the European Parliament, as well as international organisations like the ILO and OECD. Additionally, the review draws upon academic research, including peer-reviewed journal articles and prominent working paper series, and various sector-specific reports. As a starting point we recall a preliminary overview of key definitions[1]:

- An **AI system** is defined as a machine-based system that, for explicit or implicit objectives, infers from its input how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. This definition is aligned with the final version adopted in the EU Artificial Intelligence Act (AI Act)[2] . AI systems are designed to operate with varying levels of autonomy and may exhibit adaptiveness after deployment.
- **Algorithms** are automated instructions for performing tasks, ranging from simple 'if...then' statements to complex mathematical equations. They are the building blocks of AI and facilitate machine learning, allowing digital systems to learn through experience and autonomously improve task performance over time. Eurofound provides a simpler definition of algorithms as 'a set of precisely defined steps and rules to accomplish a task'[3].
- **Generative AI (GenAI)** models are a category of deep-learning models trained on extensive datasets that can be directed to generate new content in various formats, including text, images, sounds, and videos. The AI Act also includes provisions for general-purpose AI (GPAI) models, which are AI models trained with large amounts of data, displaying significant generality, and capable of competently performing a wide range of distinct tasks, and able to be integrated into various downstream systems or applications. Frontier AI is a related but narrower class of AI systems with general-purpose functionality, whose capabilities are relatively advanced and novel.
- **Algorithmic management (AM)**, is the use of AI to partially or fully automate traditional managerial functions like giving instructions, monitoring, or evaluating workers. This transformative process extends to the automation of core managerial

1 OECD 2025, ILO 2024, Eurofound 2024.

2 Regulation (EU) 2024/1689.

3 Eurofound, 2018.

> functions, including, but not limited to, the issuance of instructions to the workforce, the continuous monitoring of employee activities, and the formal evaluation of their performance. This pervasive reorientation of managerial practice is observable across a diverse spectrum of economic sectors, exerting a significant impact on both conventionally employed individuals and those operating as self-employed professionals.

While artificial intelligence (AI), as a broader concept, involves a set of technologies that enable computers to perform a variety of advanced functions, including the ability to see, understand and translate spoken and written language, analyse data, perform operational activities and make recommendations, thus simulating human intelligence in different tasks and fields. The focus of the study is to assess the use of AI impact in management related activities in the workplace, namely on algorithmic management (AM). In order to avoid misunderstandings and confusions, in the following paragraphs we will use the term AM, implying an implicit reference to involved AI technologies. AI will be used only when referring to technologies other than AM having an impact in the workplace and when needed to better explain technical implications of AM definition.

Recent documents from EU-level bodies, international organisations, and academic research indicates that AM, is increasingly prevalent beyond the gig economy in conventional workplaces. Studies by the OECD, ILO, and Eurofound, show that AM tools are widespread in Europe (average 79 % of firms surveyed) and the United States (90 %), though less so in Japan (40 %), with varying intensity of use across countries[4]. The functions automated by AM systems include direction, evaluation, and discipline, often described by 'six Rs' like recommending/restricting, recording/rating, and replacing/rewarding. These tools can be specific-purpose or general-purpose digital technologies, such as AI-powered route planning or even instant messaging apps, which can indirectly influence work organisation. The advent of machine-readable behavioural data, machine learning, and online labour platforms has spurred academic interest in algorithm-driven human resource management across various domains, including staffing, performance management, compensation, workforce planning, and job design[5]. This application of HR management algorithms is also termed 'algorithmic management,' signifying the use of digital data processed by software algorithms to enhance or automate HR management decisionmaking[6].

Nearly a decade has passed since Lee et al.'s (2015) foundational study on Uber's use of algorithms for managing remote 'gig' workers. Since then, similar trends have emerged in traditional work environments, with 'standard' employees (e.g., full-time, employed) increasingly managed by HRM algorithms with minimal human oversight[7]. Consequently, scholars have investigated the implementation and impact of HR management algorithms in diverse empirical settings using various conceptual frameworks[8].

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4 OECD, 2025; ILO, 2024; Eurofound, 2024.

5 Cheng and Hackett, 2021; Leicht-Deobald et al., 2019; Meijerink and Bondarouk, 2023; Strohmeier and Piazza, 2015.

6 Meijerink et al., 2021.

7 Cheng and Hackett, 2021; Jarrahi et al., 2021.

8 Kellogg et al., 2020; Leicht-Deobald et al., 2019; Meijerink and Bondarouk, 2023; Parent-Rocheleau and Parker, 2022.

These developments have led to the growth of the algorithmic management literature in several ways: the volume of scholarly publications on AM has surged in recent years and has evolved conceptually; scholars have drawn upon theories such as labour process theory and the job demands-resources model to elaborate on how AM embody rational control[9], normative control mechanisms[10], or function as work designers[11]. The maturity of this field is evident in review studies[12] that synthesise empirical findings on algorithmic management and its consequences.

These reviews highlight the impact of algorithmic management on worker-related outcomes like autonomy[13], personal integrity[14] , dignity[15], and job quality[16]. For a chronological overview over the last 10 years of the definition of algorithmic management, see Annex A.

Within this rapidly evolving operational landscape, AM emerges as a 'third element' that actively engages with both workers and employers, fundamentally reshaping, as we will see, the dynamics of the employment relationship[17]. This emergent digital intermediary possesses the capacity to influence the very definition of contractual terms, the systematic assignment of tasks, and the intricate processes of dispute resolution, often interacting synergistically with pre-existing legal frameworks. Given that AM frequently exercise powers that closely mirror those traditionally vested in the employer, a rigorous academic inquiry into this phenomenon necessitates a simultaneous and integrated consideration of the AI legal framework at the European Union level, the broader labour legal framework also at the EU level, and the specific domestic labour orders prevalent across Member States (as shown in Task 3).

AM involves replacing management functions with machines that exercise at least some level of decisionmaking authority over workers. This includes the full or partial automation of direction, evaluation, and discipline or rewards. It is a diverse set of technological tools and techniques to remotely manage the workforce, relying on data collection and surveillance of workers to enable automated or semi-automated decisionmaking. AM concerns the use of digital data for continuously tracking and evaluating worker behaviour and performance, and the automatic implementation of algorithmic decisions. It also refers to the use of computer-programmed procedures for the coordination of labour input in an organisation.

The degree to which AI capabilities enable AM can be understood through different levels of autonomy and functional sophistication.

The following points outline distinct levels based on AI's autonomy and the sophistication of its functions within AM.

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9 Kellogg et al., 2020.

10 Galière, 2020.

11 Parent-Rocheleau and Parker, 2022.

12 Cheng and Hackett, 2021; Malik et al., 2022; Parent-Rocheleau and Parker, 2022.

13 Meijerink and Bondarouk, 2023; Rahman et al., 2023; Shapiro, 2018.

14 Leicht-Deobald et al., 2019.

15 Lamers et al., 2022.

16 Goods et al., 2019; Wood et al., 2019.

17 Faioli, 2025.

AI-assisted management (lower AI autonomy)

- Description: AI tools primarily serve to provide data and insights to human managers, thereby supporting their decisionmaking processes without directly automating managerial tasks. The human manager retains full interpretative and decisionmaking authority.
- Example: An AI-powered analytics dashboard displays worker performance metrics, which a human manager then interprets and uses to inform their decisions.

AI-augmented management (medium AI autonomy)

- Description: AI systems actively participate in managerial tasks by generating proposals, recommendations, or initial actions. However, this participation is consistently coupled with essential human oversight and the explicit possibility for intervention and final approval. The AI acts as a sophisticated collaborator.
- Example: An AI scheduling tool proposes optimised work shifts, but a human manager reviews and approves the suggested schedule before it is finalised and implemented.

AI-automated management (higher AI autonomy), the core of AM

- Description: AI systems independently perform managerial tasks with minimal or, in specific instances, no direct human intervention. This level constitutes the core of algorithmic management, where algorithms autonomously issue instructions, monitor performance, or conduct evaluations. This level is significantly enabled by advanced AI capabilities:
    - Embodied AI: AI agents with a physical presence or operating within physical environments (e.g., robots in warehouses) can autonomously manage tasks in physical workspaces, assigning duties to human workers, monitoring their progress via sensors, and providing real-time instructions.
    - Agentic AI: AI systems capable of pursuing tasks independently of human control can autonomously set goals for teams or individuals, dynamically allocate resources, and adjust strategies based on performance metrics, requiring minimal human oversight.
    - Frontier AI/General-Purpose AI (GPAI): highly capable AI models trained on vast datasets and displaying significant generality across a wide range of tasks. GPAI provides the advanced capabilities necessary for complex and sophisticated autonomous managerial functions.
- Examples: Automated task allocation in platform work, or AI systems autonomously evaluating job applications based on predefined criteria. A GPAI system could analyse worker skills and project needs to autonomously form optimal teams, provide personalised feedback, or identify skill gaps for training recommendations.

1.2. Types of AM, diffusion in Europe, AM–humans interactions, challenges and future

The widespread adoption of AM technologies in European workplaces is driven by the promise of significant productivity gains and the automation of managerial functions, though it also raises concerns about worker wellbeing and control. This phenomenon is part of the broader

'platformisation of work' or 'data-driven workplace' trend, where practices initially prevalent in digital labour platforms are expanding into conventional employment settings like warehouses, manufacturing, retail, and healthcare. While algorithms can automate internal processes, many do not necessarily involve advanced AI learning, instead assisting decisionmaking or handling predefined situations[18].

Recent OECD research covering four EU countries (France, Germany, Italy, and Spain) found that 79 % of firms use at least one AM tool[19]. This figure is higher than previously understood and suggests a significant evolution in managerial roles through automation. However, the intensity of use varies, with European firms typically demonstrating moderate usage, adopting three to five tools. This contrasts with the United States, which shows a higher adoption rate (90 %) and more intense use (ten or more tools), while Japan has a lower adoption rate (40 %) and intensity (typically one tool). The growth of these systems in the EU is continuous, with a positive relationship found between the number of AM technologies a firm currently uses and its plans for future increased usage[20]. Tools are generally categorised into three main types based on their managerial functions.

Instruction tools. These are relatively common in EU firms, with a 69 % adoption rate for at least one instruction task. They include software to allocate work schedules, work activities, and provide instructions on how to perform tasks[21].

Monitoring tools. These show varied adoption patterns, with 33 % of European firms using basic monitoring tools, such as software to track working time (44 % of EU firms) and the completion of work activities (40 % of EU firms). Less prevalent, but raising more concerns, are tools that monitor the speed of work (15 % in EU firms), content and tone of conversations/emails (6 % in EU firms), worker health and safety (15 %), worker fatigue or alertness (5 %), or track location (12 %). OSHA reports that workers in the EU indicate digital technologies are used to determine speed of work (52 %), increase surveillance (37 %), and supervise/monitor work or behaviour (25 %)[22].

Evaluation tools. These are less common than instruction tools in Europe, with a 35 % adoption rate. These tools are used for functions like setting targets for workers, rewarding good performance, sanctioning poor performance, and providing ratings or leaderboards. They are considered more likely to result in biased treatment if not carefully implemented[23].

Beyond these categories, specific tools include robotics in logistics for storage and picking operations, where robots are managed by algorithmic software to navigate warehouses and interact with workers. AI-powered route planning tools are used in logistics to synthesize information for informed decisions on travel routes, though they can also lead to extensive monitoring of drivers. Instant messaging apps like WhatsApp are also noted as general-purpose digital technologies that can exert strong control and pressure over workers.

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18 ILO, 2024.

19 OECD, 2025.

20 OECD, 2025; OSHA, 2024; ILO, 2024; Eurofound, 2024.

21 OSHA, 2024.

22 OSHA, 2024.

23 OSHA, 2024.

EU-OSHA classifies human-robot interaction in the workplace into three categories[24]:

- **Co-existence.** This represents minimal engagement, where humans and robots briefly cross paths without shared objectives or synchronised activities. An example given is a transport robot passing a warehouse supervisor.
- **Cooperation.** This involves a deeper level of interaction with common goals but separated responsibilities, where humans and robots perform different subtasks that contribute to the same outcome.
- **Collaboration.** This constitutes the most integrated form of interaction, featuring simultaneous work on identical tasks or objects with ongoing coordination and dynamic task allocation based on situational needs.

While AM has the potential for full automation, where AM systems independently perform managerial tasks with minimal human intervention, many AM systems currently deployed in companies do not fully automate decisionmaking. Instead, they are primarily used to assist decisionmaking processes or to handle specific situations where parameters are predefined. This suggests that much of the interaction falls within the 'AI-assisted' or 'AI-augmented' management levels, where AI provides data and insights to human managers or actively participates with human oversight and intervention possibilities. For instance, in some logistics and healthcare settings, human decisionmaking remains prominent, even where tasks are automated or supported by AM. However, the push for efficiency often leads to these systems increasing work intensity, even if human oversight is present.

The ILO emphasises that technologies not explicitly designed for work coordination can still significantly influence work organisation and digital monitoring, regardless of their primary intended purpose[25]. This means that 'even if these digital tools or algorithmic systems are not explicitly intended to manage work processes, de facto they can be considered as part of, or at least equivalent to, algorithmic management systems that produce effects on work organisation'.

The use of AM in EU traditional workplaces aims to streamline processes and achieve efficiency gains. However, this also presents significant challenges and risks, particularly concerning job quality and worker wellbeing. Key concerns may include:

- **Work intensification and psychosocial risks**. Digital technologies are linked to increased work intensity and time pressure. Workers report increased stress, reduced work autonomy, and poor communication where these technologies are present. Continuous surveillance and performance pressure can lead to burnout and mental health issues.
- **Monitoring and surveillance**. AM tools embed a strong potential for worker monitoring and surveillance, potentially shifting the power balance towards management and raising privacy concerns. This can result in workers feeling constantly watched and a lack of transparency about how their data is used.
- **Autonomy and control**. While some technologies can increase worker autonomy by freeing them from strenuous tasks or enabling more intellectually challenging work,

[24] OSHA, 2024.

[25] ILO, 2024.

others, through precise instructions and constant monitoring, can reduce discretion and flexibility.

- **Trustworthiness concerns**. Managers themselves report concerns regarding unclear accountability, difficulty understanding the tools' logic (explainability), and inadequate protection of workers' physical and mental health. There is also a notable discrepancy, with many managers believing employees are aware of AM use, while worker surveys suggest a lack of awareness.

Establishing the extent of AM usage across EU countries is difficult due to the broad definition of AM. There are four data sets collected during 2024 available that are informative of the prevalence of AM usage in the EU: European Working Conditions Survey (EWCS2024, from Eurofound), the Special Eurobarometer 554 (EB2024, European Commission) the European Survey of Enterprises on New and Emerging Risks 2024 (ESENER2024, from EU-OSHA) and the OECD survey on AI 2024 (OECD2024, from OECD)[26]. The OECD2024 survey only covers four EU countries (DE, ES, FR, IT), whereas the other three surveys cover all EU-27 countries. The EWCS2024 and EB2024 survey workers, while ESENER2024 and OECD2024 are surveys at the company level.

The surveys allow for an analysis of the prevalence of AM across the EU (Table 1). However, it is clear from Table 1, that establishing a clear benchmark for the prevalence of algorithmic management across the EU is not feasible based on the available survey evidence, as they differ considerably in levels and variation among countries. Differences are to be expected since the four 2024 sources differ in unit of observation (workers in EWCS and Eurobarometer vs establishments in ESENER and the OECD survey), and question wording, items covered, as well as targeted respondents in the case of ESENER2024 and OECD2024 (Annex C). For example, EWCS asks workers whether their performance is monitored by 'a computer programme', while ESENER asks firms whether they use 'machines, systems or computers' to monitor performance, and the OECD survey refers to 'software to partially or fully automate' monitoring, a broader concept that is likely behind the higher shares of firms reporting the use of AM in the OECD2024 survey. Moreover, comparing surveys targeting company-level respondents is not directly comparable to surveys targeting workers. For example, company-level adoption does not imply that all employees within that firm are subject to the AM tool.

Further complexity in interpreting the survey outcomes is added by the fact that country rankings are not correlated across surveys. Consider Denmark, where 70.1 % of workers self-report being subjected to AM in the EWCS2024 survey, the largest reported number in that survey. In the EB2024 survey, only 47 % report AM being used in their workplace, which is below the EU average of 51.3 % for that survey. For these reasons, the estimates in Table 1 should be interpreted with caution, highlighting the need for a robust definition of AM.

[26] See Annex B for a description of the surveys.

Table 1 – Measure of AM prevalence (%)

COUNTRY	SHARE OF WORKERS (%), EWCS 2024	SHARE OF WORKERS (%), EB2024	SHARE OF COMPANIES (%), ESENER 2024	SHARE OF COMPANIES (%), OECD 2024
EU	42.3	51.3	14.5	
AT	50.5	65.6	20.6	
BE	58.6	58.9	16.7	
BG	35.6	44.4	18.5	
CY	34.9	62.7	15.2	
CZ	43.8	38.7	13.6	
DE	38.1	47.5	16.5	78
DK	70.1	47	17.6	
EE	43.1	53.3	20.1	
EL	27.2	36.1	6.0	
ES	41.9	51.8	12.0	78
FI	41.7	69.1	31.2	
FR	37.1	53.1	19.9	81
HR	48.9	41	11.6	
HU	33.4	54.6	13.2	
IE	52.5	56.6	15.1	
IT	47.3	52.8	7.7	76
LT	31.0	47.6	21.6	
LU	58.4	66.2	13.9	
LV	40.9	52.7	16.9	
MT	39.5	63.3	18.6	
NL	65.9	41.3	10.7	
PL	39.4	52.2	10.8	
PT	26.8	41.3	11.2	

COUNTRY	SHARE OF WORKERS (%), EWCS 2024	SHARE OF WORKERS (%), EB2024	SHARE OF COMPANIES (%), ESENER 2024	SHARE OF COMPANIES (%), OECD 2024
RO	41.9	68.8	14.6	
SE	50.9	55	12.6	
SI	40.0	49.9	12.1	
SK	40.0	46.4	13.0	
US				90
Japan				40

Source: Authors' calculations based on EWCS2024, ESENER2024, Eurobarometer2024 and OECD2024.

According to the EWCS2024, 42.3 % of workers in the EU have their work influenced by AM. There is a significant variation among countries, from 27.2 % (GR) to 70.1 % (DK), and also between countries considered similar on other labour market related parameters, such as BE (58.6 %) and DE (38.1 %). The EB2024 survey generally report higher numbers of AM usage among workers with an EU wide average of 51.3 %. There is considerable variation across EU, with the highest recorded prevalence of AM usage in Finland (69.1 %) and the lowest in Greece (36.1). Looking at the numbers from a company angle, the share of firms using AM (ESENER2024) is considerably lower at 14.5 %. This reflects, to some extent, that these systems are more prevalent in large companies. Again, there is a large variation among countries, ranging from 6.0 % (EL) to 31.2 % (FI). As noted above, the share of companies does not correlate well with the share of workers across countries. The OECD2024 survey reports much higher usage of AM than the ESENER survey (most comparable) and the EWCS2024. While 16.5 % of German companies report using AM, 78 % of firms report the use of AM in the OECD2024 survey. These differences are likely due to a broader question in the OECD survey.

In the following section, the results reflect the EWCS2024, as this is the largest survey with worker-level characteristics. Where feasible and relevant, comparisons are made with the three other surveys.

Larger companies are more likely to use AM. For all countries, except the Netherlands, usage is much more prominent in medium and large companies compared to micro and small companies. In most countries, large companies (those with more than 250 employees) tend to have higher AM usage rates than medium-sized companies, although this pattern is not universal. The same pattern is observed in the ESENER2024 survey of companies (not reported). Here, large companies are more than twice as likely to use AM compared to micro companies (28 % vs. 13 %). In the OECD2024, this pattern is only found in France. In Germany, Italy, and Spain, there is little difference in size between large and small companies (micro companies are not covered by the survey).

In terms of employee characteristics, in most countries, men are more likely to experience AM at the workplace, though the difference is not large (44 % for men versus 41 % for women, Annex C, table C2). This holds for most individual countries, with a few exceptions (BG, CY, DK, FI, HR, IT, NL). Women are particularly overexposed to AM in Cypress (8 ppt., more likely), Croatia, and the

Netherlands (both 5 ppt.). Men are particularly overexposed in the Czech Republic (16 ppt.), Luxembourg (10 ppt.) and France (9 ppt.).

There is a clear educational gradient in exposure to AM in the workplace. People with low educational attainment are less likely to work alongside AM. In most countries, those with the highest educational attainment are also most likely to be exposed to AM. Sweden is a notable exception. At the aggregate EU level, exposure to AM decreases with age. However, there is a lot of variation among countries and the age pattern is sometimes non-monotonous. In four countries, AM exposure increases with age (DK, FI, FR, IT).

Exposure also varies across other worker characteristics (Figure C1, Annex C). Workers in establishments with a union or OSH representative are consistently more exposed than those without (EU: 47 % vs 32 %), a pattern visible in almost all Member States and strongest in Austria, Finland and France. A pattern which likely reflects the fact that represented workplaces tend to be larger and more formalised, where AM tools are more common. The Netherlands is the main outlier, with similarly high exposure regardless of representation. Exposure is generally higher among workers with a permanent contract than among those without (EU: 44 % vs 35 %). This difference is sizeable in Austria, Malta, Luxembourg and Estonia. A few countries deviate, with the Czech Republic, Croatia, Romania and Slovakia showing higher exposure among non-permanent workers, and Germany showing little difference. A similar pattern holds for working time: full-time workers are more exposed than part-time workers (EU: 44 % vs. 34 %), with large gaps in Bulgaria, Lithuania, and Austria. Exceptions include Cyprus, the Czech Republic, Portugal and Romania, where part-time workers report higher exposure. By migrant background, there is no EU-wide gap (migrants 41 %, natives 43 %), but heterogeneity is pronounced. Migrants are markedly more exposed in Bulgaria, Hungary, Luxembourg and Denmark, while natives are more exposed in Malta, Greece and Spain. These contrasts likely mirror country-specific sectoral sorting of migrant and native workers. Sectoral differences in AM exposure are pronounced (Figure C1, Annex C). Workers in financial services report the highest exposure (69 %), followed by transport (56 %) and industry (45 %), all above the EU average (42 %). Public administration, other services and health are close to the average. Exposure is lower in commerce and hospitality (39 %) and education (34 %), falling further in construction (30 %) and lowest in agriculture (24 %).

Exposure to AM also varies by occupation. Clerical support workers report the highest exposure (55 %), followed by technicians and associate professionals (49 %), managers (47 %) and both professionals and plant/machine operators (45 %), all above the EU average (42 %). Service and sales workers and craft trades are lower (both at 35 %), with elementary occupations at 25 % and skilled agricultural, forestry and fishery workers lowest at 16 %.

AM tools are already prevalent in EU countries, with an average adoption rate of 79 % of firms using at least one such tool. This is a higher prevalence than previously understood, indicating a significant shift in managerial roles through automation. However, the intensity of use varies significantly by country and by sector (OECD 2025, ILO 2024, Eurofound 2024). In particular, as mentioned, United States shows the highest adoption (90 %) and intensive use, with over three-quarters of firms using ten or more of the 15 surveyed tool categories. U.S. firms commonly use all types of tools, including monitoring and evaluation and European Countries (France, Germany, Italy, Spain) exhibit high prevalence (averaging 79 %) but moderate intensity, with most firms using three to five tools. Instruction tools are relatively common (69 %), followed by basic monitoring tools (33 %, e.g.,

tracking working time). Tools with higher potential risk, such as those for sensitive data monitoring or comprehensive evaluation, are less common. Beyond these, traditional workplaces also employ robotics in logistics, AI-powered route planning in transport, and even general-purpose digital technologies like instant messaging apps (e.g., WhatsApp), which can exert significant control and pressure on workers. Paradoxically, despite the often-precarious nature associated with these roles, many workers in algorithmically managed jobs report liking their work and feeling they have choices. This 'choice-based consent' allows individuals to make frequent, albeit narrow, choices, fostering a sense of mastery that can mask the structurally problematic aspects of the work, contributing to the growing appeal of what's been termed the 'good bad job'[27] .

Employers that have not adopted AM technologies may face with several barriers[28], in particular:

- **High Cost.** This is the most common barrier universally, reported by 79 % of firms across all surveyed countries.
- **Staff Resistance.** In France, Germany, Italy, Japan, and Spain, staff resistance is the second-most important reason for non-adoption, ranging from 56 % to 67 %. This suggests that in these regions, workers' attitudes significantly influence adoption, potentially making non-adopting firms less likely to adopt in the future.
- **Concerns for Workers.** Managers in European countries and Japan frequently cite concerns for workers' safety and health as a reason for not adopting.
- **Lack of Skills and Data.** In the United States, the primary barrier is a lack of employee skills (68 %), followed by a lack of high-quality data (33 %) and IT infrastructure (33 %). Interestingly, despite these barriers, non-adopting U.S. managers are more likely to anticipate future adoption of AM tools.
- **Confidentiality.** A qualitative challenge is the reluctance of establishments to transparently share their experiences with AM, especially in sectors like logistics, due to confidentiality concerns and the potentially sensitive nature of research findings.

The rise of AM, while promising in many ways, casts a long shadow over the future of work. It poses significant challenges to the quality of jobs and the wellbeing of employees, a concern highlighted by the International Labour Organization[29]. Even the managers tasked with implementing these systems voice considerable apprehension. One of their biggest worries, cited by 28 % of managers, is unclear accountability. When an AM system makes a poor decision, who is responsible? This ambiguity persists despite regulations, like those in the EU, stressing the importance of human oversight. Closely following this concern, 27 % of managers struggle with the lack of explainability or opacity of these systems. It's often incredibly difficult, sometimes even for the AI's creators, to understand the logic behind an algorithm's decisions or recommendations. This makes it nearly impossible for workers or their representatives to challenge or even comprehend how these systems are impacting their jobs. Another significant concern, also reported by 27 % of managers, is the inadequate protection of workers' physical and mental health. This issue is particularly acute in the US, where AM adoption is more widespread and potentially more intrusive. Interestingly, there is a disconnection regarding workers' awareness. While many managers believe their employees are well

[27] Cameron, 2024.

[28] OECD 2025, ILO 2024, Eurofound 2024.

[29] ILO, 2024.

aware of AM's presence, surveys suggest that a substantial number of employees remain in the dark. Finally, though less frequently reported by managers (10 %), the potential for bias and discrimination within AM systems is a serious underlying issue. If these algorithms are trained on historical data that reflects existing societal stereotypes, they can inadvertently perpetuate and even amplify those biases.

Beyond managers' perceptions, direct impacts on workers may include[30]:

- **Work intensification and time pressure.** AM systems are linked to increased workload, pace, and time pressure. This can lead to increased stress, exhaustion, burnout, and related physical and mental health issues, as workers may feel compelled to meet performance targets without adequate breaks.
- **Reduced autonomy and control.** Algorithmic systems can limit worker discretion and flexibility by providing precise instructions and constant monitoring. This can centralise knowledge and reduce workers' involvement in problem-solving, potentially degrading work content.
- **Monitoring and surveillance.** AM systems have a strong potential for continuous worker monitoring and surveillance, including tracking location, keystrokes, and even biometric data like voice and facial expressions. This shifts the power balance towards management and raises significant privacy concerns, leading to anxiety and distrust.
- **Erosion of work-life balance.** The demand for constant availability and continuous connectivity blurs the boundaries between work and personal life, increasing unpaid labour (e.g., time spent waiting for tasks) and making it difficult for workers to disengage from work.
- **Skill transformation and potential deskilling.** While AM can create demand for new roles (e.g., data managers, robot technicians) and skills (e.g., analytical, problem-solving, communication skills), it can also automate routine tasks, potentially reducing the demand for specific skills and leading to deskilling as algorithms perform more complex functions.
- **Challenges to Industrial Relations.** There's often a lack of awareness and limited involvement of trade unions in decisions regarding technological change and AM implementation. This weakens workers' collective bargaining power and their ability to shape the terms of technology adoption, making it difficult to contest issues like working hours or monitoring.

[30] OECD 2025, ILO 2024, Eurofound 2024.

2. Task 2 – Impact on employment relations

2.1. Methodological approach

The impacts of AM are multifaceted, presenting both benefits and significant challenges. While managers, particularly in the US, perceive improvements in managerial decision quality, speed, and their own job satisfaction, there are growing concerns regarding trustworthiness, such as unclear accountability, difficulty understanding the algorithm's logic, and inadequate protection of workers' physical and mental health. For workers, AM often leads to increased surveillance, work intensification, reduced autonomy and discretion, and potential deskilling, contributing to a paradox where time needed for paid work shrinks but availability for work expands. This can centralise knowledge and weaken high-involvement approaches. Some research suggests that workers surprisingly report liking AM and finding choice, leading to a phenomenon of 'choice-based consent' that can mask structural problems, extending agency beyond mere resistance or compliance[31].

Our methodology involves a two-phase approach, an initial desk review followed by stakeholder interviews. The desk review will define the full spectrum of impacts of AM in the workplace. We examine the effects on:

- **Employment relationships**. Covering contracts, work arrangements, and collective bargaining.
- **Employment structure**. Including workforce skillset evolution, potential shortages, and shifts in demand.
- **Working conditions.** Such as working hours, work organisation, training needs, and work-life balance.
- **Health and safety**. Addressing work intensity, mental health concerns, and other relevant aspects.

The review also identifies broader impacts on productivity, working hours, health, safety, and fundamental rights. We draw upon a variety of sources, including academic literature, industry reports from organisations like OSHA, Eurofound, ILO, and unions, policy and regulatory documents, case studies, media and news for current trends and emerging concerns. We collected and organised this data to assess key impact areas, compare findings across sources, and identify trends, contradictions, and knowledge gaps. The desk review qualitatively defines and assesses these impacts.

Following the desk review, we conducted five interviews—one with each type of stakeholder: EU-level social partners (unions and company organisations), EU associations of managers, and AI Ethics experts, plus an additional interview with a US academic focusing on future trends and challenges. These interviews served to validate the desk review's findings, gather nuanced feedback, and identify emerging trends and challenges not yet analysed[32].

[31] ILO, 2024; Eurofound, 2024.

[32] See Annex D, Interviewed stakeholders and scheme for interviews.

2.2. AM impacts on the workplaces

AM has expanded significantly from digital labour platforms to conventional workplaces. This widespread adoption is driven by the promise of productivity and efficiency gains. Managers surveyed by the OECD, for instance, often perceive that AM tools improve the quality, speed, and autonomy of their decisionmaking due to increased information availability, thereby enhancing firm productivity. However, this comprehensive review identifies broader impacts on productivity, working hours, health, safety, and fundamental rights[33].

Working hours are significantly transformed by AM, which enables highly precise matching of workloads and workers in real-time, often leading to 'atomised and punctuated time' where paid work is offered in increasingly shorter and scattered units[34]. Despite this efficiency, workers often experience pressure for 'incessant availability' to secure these small, scattered tasks, blurring work/non-work boundaries and leading to an expansion of uncompensated work-related activities such as waiting for shifts or planning fragmented time units. This can also result in work intensification as algorithms push for maximum output, as seen in sectors like logistics where continuous monitoring of pick-rates and breaks aims to maximize efficiency and can remove workers' ability to control pace[35].

Regarding health and safety, AM systems pose significant psychosocial risks, which are increasingly recognised as workplace hazards. Constant monitoring, such as speech analytics or keystroke tracking, is linked to worker stress, anxiety, and distrust, especially when metrics are perceived as unfair or opaque[36]. While some technologies like robots can improve physical safety by performing hazardous tasks, studies indicate that human-robot interaction is associated with a faster pace of work and increased surveillance. The reduction or absence of human intervention in decisionmaking and diminished interactions with managers and peers can further lead to stress, social isolation, reduced autonomy, and de-skilling, negatively affecting mental health and job satisfaction. For example, a Swedish case study in transport found that a ride scheduling system that optimises pick-up and drop-off schedules increases stress and pressure, neglecting basic worker needs like food and bathroom breaks. Managers themselves report concerns about the inadequate protection of workers' physical and mental health due to AM tools[37].

From the perspective of fundamental rights, AM introduces critical challenges related to data protection, privacy, transparency, and non-discrimination[38]. Algorithmic systems collect vast amounts of personal data on worker behaviours, locations, performance, and even emotional states, raising privacy concerns and increasing information asymmetry where workers often lack access to how algorithms work or what data is used.

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33 OECD, 2025.

34 Piasna, 2024.

35 OECD, 2025; Doellgast, Wagner, O'Brady, 2023.

36 OSHA, 2024; Piasna, 2024.

37 OSHA, 2024; Piasna, 2024.

38 HAI Stanford, 2025; Ciucciovino, 2024; Faioli, 2025; Gent, 2024; Peruzzi, 2024; Adams-Prassl et al., 2023; De Stefano and Wouters, 2022; Aloisi, 2022.

Reports from organisations like OSHA and Eurofound, alongside academic literature and case studies, frequently highlight these challenges and the need for a human-centred approach, strong data protection guarantees, worker consultation, and collective bargaining to mitigate negative impacts and ensure ethical deployment of AM[39]. At the forefront of these concerns is a noticeable intensification of work and a rise in psychosocial risks. AM systems can push employees work harder and faster. This often translates into increased workloads, an accelerated pace, and an unrelenting demand for performance, which, in extreme cases, can even lead to accidents and musculoskeletal disorders. Studies paint a clear picture: workers under intense digital monitoring and AM are significantly more likely to experience increased monotony and stress[40]. Beyond the immediate workload, AM can subtly pressure individuals into extended availability, demanding more labour effort without necessarily increasing paid time. This blurs the line between professional and personal life, sometimes leading to a state of perpetual working. The constant digital surveillance, the pressure from automated metrics, and a perceived lack of human oversight can culminate in serious stress, burnout, and significant mental health issues. Tellingly, even managers recognise this danger, with a notable 27 % reporting inadequate protection of workers' physical and mental health when AM tools are in play.

Another pervasive challenge is the threat of surveillance, intrusion into privacy, and a troubling lack of transparency. AM tools inherently carry a substantial risk of monitoring employees, often leading to deep intrusions into their private lives by potentially accessing very personal information. Electronic monitoring, for instance, can feel profoundly invasive[41]. Compounding this is a widespread lack of transparency about how these AM systems actually function and how they are being used. This opacity severely hinders meaningful worker participation and constructive social dialogue. Managers themselves are frequently troubled by this, with 27 % expressing concerns about the lack of explainability of algorithmic decisions and 28 % citing unclear accountability when an algorithmic recommendation is made. What is more concerning is that many workers remain entirely unaware that AM tools are even being used. And even when they are, they often have no option to opt out of data collection, access the data gathered on them, or request corrections[42]. AM can also gradually chip away at a worker's autonomy and potentially degrade the richness of their job. AM systems can directly dictate tasks with such precision that they leave little room for human discretion or individual judgment. This means less freedom in how one approaches their work.

Furthermore, the implementation of AM can inadvertently centralise knowledge within the company, potentially making an individual worker's problem-solving activities feel superfluous. This can diminish the inherent richness and complexity of a job, weakening traditional 'high-involvement' management styles that thrive on active worker participation and optimisation[43]. Algorithms, while seemingly objective, are not immune to human flaws. They can, in fact, reinforce existing forms of gender and racial inequality because they often learn from historical data that carries inherent societal biases. Evaluation tools, in particular, appear more susceptible to resulting in biased

[39] Eurofound, 2024; OSHA, 2024; HAI Stanford, 2025; Treu, 2024; Peruzzi, 2024; Piasna, 2024; Doellgast, Wagner and O'Brady, 2023; Aloisi, 2022.

[40] OECD, 2025; OSHA, 2024.

[41] OSHA, 2024.

[42] OSHA, 2024.

[43] OSHA, 2024.

treatment. This is a recognised concern, with 10 % of managers reporting that algorithmic decisions are not entirely free from bias and discrimination, and this concern is notably higher in regions like the US and Japan compared to Europe[44]. Finally, a significant and thorny issue is accountability. A notable concern among managers is the profound lack of clarity regarding who is responsible when an algorithmic decision or recommendation turns out to be incorrect.

The cross-analysis may determine the following results. However, the outcomes vary, and there is a need for a human-centred approach, robust data protection, active worker consultation, and strong collective bargaining to mitigate negative impacts and ensure ethical deployment. Here's a qualitative assessment of AM's impacts on productivity, working hours, health, safety, and fundamental rights, alongside key trends, contradictions, and knowledge gaps, based on previous literature review[45] .

Table 2 – Impacts of algorithmic management on workers and workplaces

IMPACTS ON PRODUCTIVITY	
Efficiency	A primary motivation behind AM's introduction is to maximize profit, increase productivity, and foster efficiency gains. Case studies in logistics and healthcare generally show a positive impact on productivity through the streamlining and simplification of work processes. For instance, a logistics company saw technology provide an overview of inbound and outbound volumes, aiding worker planning and ensuring sufficient coverage during peak times. In healthcare, data analytics improved productivity and streamlined information flows, optimising internal processes and automating manual tasks. Managers often perceive AM tools as leading to improved quality of managerial decisionmaking, increased information availability, and faster decisionmaking
Work intensification	While direct evidence of job losses resulting directly from these technologies is limited in some European cases, AM may pave the way for future labour displacement by facilitating efficiency gains. The quest for efficiency frequently leads to work intensification, driving workers to operate at higher speeds and for longer periods, often without proportional increases in paid time.
IMPACTS ON WORKING HOURS AND WORK ORGANISATION	
Pressure	AM systems frequently lead to increased work intensity, performance pressure, stress, and exhaustion. This can manifest as increased workload, faster pace, and higher demand for a job, potentially leading to accidents and musculoskeletal disorders. In some cases, like South Africa[46], workers reported being forced to go outside premises for toilet breaks, with biometric records monitoring their time, making the workplace feel like a 'prison'.

[44] OSHA, 2024.

[45] OECD, 2025; OSHA, 2024; ILO, 2024; Litardi, Adăscăliței, Widera, 2024.

[46] Digital technologies for worker management: implications for safety and health. A comparative study of two automotive companies in Belgium and Italy – EUOSHA 2024.

Atomised time	AM fosters a model where employers can organise and purchase labour input in shorter, discontinuous time units, shifting risks and costs associated with inefficiency to workers. This results in tasks being precisely timed, and workers being paid only for 'active' periods, often leaving unpaid gaps. Automated systems require incessant availability from workers to access small, scattered units of paid activity, blurring work/non-work boundaries. This continuous availability can lead to a state of perpetual working and make it difficult for workers to enjoy free time.
Skill degradation	AM systems can directly impact workers' job autonomy and lead to a reduced level of discretion in tasks. Precise algorithmic instructions often leave minimal room for human manoeuvre. The implementation of AM can contribute to the centralization of knowledge within the company, potentially making workers' problem-solving activities superfluous and thus reducing the richness of work content and leading to de-skilling.
Work-life balance	The blurring of boundaries between paid work and personal life, driven by pressures for extended availability, can result in stress, burnout, and mental health issues.
IMPACTS ON HEALTH AND SAFETY	
Psychosocial risks	This is a major concern. AM is linked to increased stress, anxiety, exhaustion, and mental health problems due to constant surveillance, performance pressure from automated metrics, lack of human oversight, and reduced human interaction. The emphasis on productivity can lead to an unhealthy competitive environment and social isolation among colleagues, weakening team spirit and support. Reduced interactions with supervisors, when AM systems replace them, can also increase stress.
Physical safety	While advanced robots can enhance physical safety by performing hazardous tasks, and some case studies show improved safety by reducing physical strain and fatigue, other research suggests that human-robot interaction can be associated with increased work intensity and surveillance, which may indirectly affect physical safety.
IMPACTS ON FUNDAMENTAL RIGHTS	
Surveillance	AM tools present a significant risk of worker surveillance and can lead to serious intrusions into workers' private lives by accessing intimate or personal information. This constant monitoring can cause anxiety and distrust. For example, cameras in trucks monitoring drivers' seatbelt use and every movement highlight the lack of privacy.
Lack of transparency and explainability	There is a pervasive lack of transparency about how AM systems operate and are used, hindering worker participation and social dialogue. Many workers are unaware that AM tools are being used, and even when aware, they often cannot opt out of data collection, access their collected data, or request corrections.
Discrimination	Algorithms can reinforce existing forms of gender and racial inequality as they often rely on historical data, which may contain inherent biases.
Accountability	A significant concern among managers (28 %) is the lack of clarity regarding who is responsible when an algorithmic decision or recommendation is incorrect. Establishing liability for harm caused by AI systems, especially for psychological harm, can be complex.
Freedom of association and	The pervasive control and individualization of the employment relationship can weaken workers' bargaining positions and hinder collective representation and social dialogue.

collective bargaining	
QUALITATIVE ASSESSMENT, TRENDS, AND CONTRADICTIONS	
Varying impacts	The impact of AM is far from homogeneous, with similar technologies yielding very different effects depending on the country, sector, and existing institutional and regulatory frameworks. For instance, European countries (Italy and France) tend to show milder negative impacts due to stronger regulatory safeguards and union presence, while other countries may show more direct evidence of negative impacts like worker monitoring and surveillance.
Human involvement	Despite the automation, human agency, negotiation, and oversight remain critical. Managerial goals can be process-oriented (focusing on systemic problem elimination) rather than solely workforce-oriented (focused on work intensification), influenced by the regulatory context and worker voice.
Contradiction in perceptions	There is a notable contrast between managers' perceptions and workers' experiences. Managers often report benefits and an awareness of AM tool use, yet other research and worker surveys reveal significant negative impacts on job quality, mental health, and often a lack of awareness or understanding from the workers' side. This highlights a knowledge gap between management and the workforce regarding the full implications of AM.
Research gaps	The phenomenon of AM is still relatively new, and there is limited empirical evidence, particularly quantitative data and in-depth qualitative studies beyond the gig economy and warehousing. Further research is needed to understand the long-term impacts, how outcomes vary by tool type, and the effectiveness of different governance measures.

Source: Authors' elaboration.

The impacts of AM can be also structured into a matrix covering the three key dimensions above mentioned. The following table provides a synthesis of impacts and examples and is based on the outcomes mentioned above.

Table 3 – Dimensional analysis of AM workplace impacts

DIMENSION	IMPACT DESCRIPTION	KEY EXAMPLES
Employment relationship: This dimension concerns the legal and contractual aspects of work, including employment contracts, and types of work arrangements	AM introduces a 'third element' into the traditional worker-employer relationship, influencing how contracts are defined, tasks are assigned, and disputes are managed, often interacting with existing legal frameworks.	**Recruitment and selection processes:** explicitly classified as high-risk under the AI Act due to their potential to significantly impact future employment opportunities. For example, an AM system might screen resumes or conduct initial interviews. A 'case' could involve a candidate alleging discrimination based on factors like gender or age because the AI system was trained on biased data. **AM-driven performance evaluation and termination:** AM systems can monitor worker performance, efficiency, or behaviour to inform evaluations or decisions about contract renewal or termination. A 'case' here could involve a worker

DIMENSION	IMPACT DESCRIPTION	KEY EXAMPLES
		being dismissed based on metrics generated by an opaque AM system without understanding the criteria used.
Employment structure: This element focuses on the composition and characteristics of the workforce, including skill sets, potential shortages, and changes in job demand	AM tools can automate tasks, changing the skills required for existing jobs and creating demand for entirely new roles. This impacts workforce planning, potentially creating skill gaps or surpluses. AM systems used for hiring and task assignment directly shape the workforce composition.	**Skill set transformation**: The deployment of AM, including broadly capable models like GPAI, can automate routine tasks, reducing the demand for specific manual or administrative skills. Simultaneously, it increases the need for skills related to managing, maintaining, and interacting with AM systems. A 'case' might involve a company rapidly adopting AM tools, leading to a significant portion of its workforce lacking the necessary digital skills, creating an internal 'skill shortage'. This highlights the need for substantial investment in training and reskilling programs. **Changes in job demand**: Certain jobs or tasks may become obsolete due to AM, while new roles (e.g., AI trainers, data curators) emerge. A 'case' could involve a logistics company implementing AM for route optimisation and scheduling, reducing the need for human dispatchers but requiring new roles for monitoring and managing the AM system. The concept of 'high-impact systems' affecting employment decisions is relevant here, as these systems can reshape entire segments
Working conditions: This includes the practical aspects of work, such as working hours, work organisation, training, and work-life balance	AM systems directly influence daily work through automated scheduling, task allocation, and continuous monitoring. This can affect work intensity, autonomy, and the boundary between work and personal life.	**Algorithmic scheduling and task allocation**: AI-powered systems can automate scheduling, assigning tasks to workers based on algorithms optimising for efficiency. This is common in platform work or logistics. A case could involve a delivery driver whose schedule is constantly altered by an algorithm based on real-time demand, leading to unpredictable working hours and difficulty planning personal life (impacting work-life balance). This automation can also lead to increased work intensity as algorithms push for maximum output. **Performance monitoring and surveillance:** AM systems can track keystrokes, location, speed, or interactions to monitor worker performance. A 'case' might involve customer service representatives whose conversation patterns are analysed by AM to evaluate empathy or adherence to scripts, leading to stress or a feeling of being constantly watched. Transparency about what data is collected and how it is used for evaluation is

DIMENSION	IMPACT DESCRIPTION	KEY EXAMPLES
		critical, with tools like model cards potentially offering some level of clarity.
Health and safety: This dimension covers risks to workers' physical and mental wellbeing, including work intensity, mental health, and physical safety.	AM can introduce new psychosocial hazards like increased work intensity, stress from surveillance, or mental health problems. Conversely, AM could potentially be used for safety monitoring. Addressing these impacts often involves liability frameworks and specific safety regulations.	**Physical injuries:** AM-controlled machinery or robots in industrial settings can cause physical harm if they malfunction. A classic 'case' involves a worker injured by a robotic arm that did not stop as expected. Establishing liability can be complex due to the AM system's complexity and the difficulty in proving a 'defect' or causal link. **Mental health and psychosocial risks**: Continuous algorithmic surveillance, pressure to perform based on automated metrics, and lack of human oversight can lead to increased stress, burnout, and mental health issues. The prohibition of emotion recognition systems in the workplace, except under strict conditions, is a direct regulatory response to the potential psychosocial harms of AM surveillance. A case could involve a worker experiencing severe anxiety or depression attributed to constant monitoring and performance pressure from an AM system. **Work intensity and fatigue**: AM-driven optimisation of tasks and schedules can lead to excessive work intensity without adequate rest, increasing the risk of fatigue-related accidents or long-term health problems. This is an inherent risk of AM focused purely on efficiency. The need to adapt safety regulations implies addressing issues like work-rest cycles and monitoring intensity under algorithmic control.

Source: Authors' elaboration.

Estimating the impact of AM

Using the EWCS survey, it is possible to analyse the potential impacts of AM, though with cross-sectional data, it is difficult to establish causality. However, by comparing workers with and without AM exposure within the same country, sector and occupation, and controlling for age, sex, education, migrant background, firm size, contract type and part-time status, we approximate the association between AM and outcomes 'all else equal'. The coefficients can be read as percentage-point differences relative to otherwise similar workers (Table 4).

Table 4 – Estimated effects of AM on selected outcomes (EU, EWCS2024)

MEASURE	INDICATION	PREVALENCE 2024 (%)	IMPACT OF AM ON MEASURE (p.p.)	ABOVE STATISTICAL UNCERTAINTY ('STATISTICALLY SIGNIFICANT')	SIGNIFICANT IMPROVEMENT OF HAVING 'PROCEDURE'
Stress	Negative	23.9	6.2	Yes	No
Autonomy at work	Positive	49.6	-2.0	No	No
Good work-life balance	Positive	84.1	-2.4	Yes	No
Able to get hour off	Positive	67.7	-6.3	Yes	Yes
Sufficient rest between workdays	Positive	82.6	-2.3	Yes	No
Work bad for health	Negative	26.9	4.8	Yes	No

Source: Authors' estimations based on EWCS2024.

The estimates indicate that AM exposure is associated with higher rates of stress (+6.2p.p. compared to the population prevalence of 23.9 %) and a greater share reporting work is bad for health (+4.8p.p.), both estimates beyond statistical uncertainty. On dimensions linked to time and flexibility, AM is associated with a lower likelihood of good work–life balance (–2.4p.p.), reduced ability to get an hour off when needed (–6.3p.p.), and less frequent sufficient rest between workdays (–2.3p.p.); all three gaps are beyond statistical uncertainty. By contrast, perceived autonomy at work shows a small, non-significant (within the statistical uncertainty range) difference (–2.0p.p.). The EWCS2024 survey asks workers subjected to AM if their employer has a 'formal procedure' to contest or review AM decisions. The last column of Table 4 indicates whether it makes a difference for the outcomes (e.g. stress, autonomy at work) if the worker/respondent has access to a formal complaint procedure as indicated in the EWCS survey. The only clear improvement appears for the ability to get an hour off, where the negative association disappear in firms with such a procedure; for the other outcomes, the presence of a procedure does not materially change the estimated effects.

2.3. AM and interviews results, validation of the approach and future trends

This summary draws on the interviews conducted with representatives from five different stakeholders: **Confédération Européenne des Cadres (CEC)** representing EU managers**, Wipro** a company providing digital transformation services**, industriAll Europe** a global Union federation**, the European Economic and Social Committee (EESC), and New York University (NYU)**, with the contribution of a researcher dealing with algorithmic management and digital transformation**.** The

goal was to assess the real-world implications of AM in the workplace. The following synthesis identifies cross-cutting themes, shared concerns, and noteworthy divergences, supported by institutional references.

General perceptions and validation of desk review

All respondents broadly validated the desk review's key findings regarding the impact of AM on work. A common theme was the intensification of pre-existing dynamics, such as productivity tracking, decision opacity, and blurred managerial responsibilities (CEC, Wipro, EESC). Several highlighted the cumulative effect of algorithmic exposure over time, with constant surveillance becoming more intrusive and less transparent (industriAll Europe, Wipro). Some organisations acknowledged benefits such as increased safety or reduced repetitive tasks (Wipro, NYU), while all agreed that such advantages are conditional on worker agency, transparent design, and human oversight (industriAll Europe, CEC).

In addition, one of the stakeholders (industriAll) shared the result of a recent study on the deployment of AI in manufacturing and energy sectors confirming that AI is already widely integrated across value chains from R&D to after-sales. The research highlights that AI adoption tends to be more positive when workers are involved through their representatives and receive appropriate training.

Emerging tools and real-world applications

Interviewees referenced various new AM tools, including wearables for posture tracking and tools claiming to detect emotional states or 'micro-stress' (Wipro, industriAll Europe). While these technologies may offer health and safety benefits, stakeholders noted concerns about their contribution to a culture of emotional surveillance and data misuse. Respondents observed that compared to earlier generations of automation, these tools do not merely replace physical labour but actively govern behaviours and decisions, creating new power asymmetries (CEC, Wipro). In this context, one respondent (industriAll Europe) emphasised that algorithmic systems must be auditable and contestable throughout their lifecycle, not just at initial deployment, to ensure accountability and transparency.

Employment structures and industrial relations

There was strong alignment across interviews that AM is reshaping employment relationships, especially in platform work and hybrid settings. Respondents warned of the growing mismatch between legal status and managerial control, with some workers managed like employees but lacking corresponding rights (EESC, Wipro). All respondents criticised the absence or erosion of social dialogue, with AI tools introduced unilaterally and outside traditional consultation frameworks (industriAll Europe, EESC). New bargaining demands are emerging, but institutional responses remain underdeveloped (Wipro, CEC).

Work organisation and working time

Most respondents observed that AM is transforming work organisation, making decisionmaking more top-down and diminishing the role of middle managers (Wipro, NYU). Scheduling and performance monitoring tools are disrupting work-life balance, with constant alerts and unpredictable shifts (industriAll Europe, CEC). There was consensus that workers are experiencing

increased mental stress due to continuous monitoring and vague performance metrics. This contributes to surveillance anxiety and reduced informal interaction, which is essential to workplace wellbeing (NYU, Wipro).

Given these evolving workplace dynamics, one stakeholder suggested that information and consultation mechanisms should be systematically updated to reflect evolving systems and uses (industriAll Europe).

Skills, training and workforce adaptation

All interviewees pointed to a widening digital literacy gap, both among workers and managers. Beyond technical upskilling, there is a need for critical awareness of how AI systems function and can be challenged (Wipro, NYU, EESC). This was seen as a prerequisite for fairness and accountability in digital workplaces. In line with this training and early consultation are key to mitigating risks and ensuring positive impact from AI technologies in workplaces (industriAll Europe).

Economic impacts and fundamental rights

Respondents largely agreed that productivity gains from AM are unequally distributed, with most benefits accruing to capital while workers face intensified demands and reduced autonomy (CEC, Wipro). Several mentioned a lack of rights-based design, particularly concerning privacy, bias, and human dignity (Wipro, EESC). Bias in recruitment and evaluation was cited as a persistent problem. Emotion detection and voice analysis tools were strongly criticised for pseudoscientific claims and discriminatory impacts (Wipro, industriAll Europe).

Social inclusion and unforeseen implications

There was broad agreement that older workers, migrants, racialised groups, and those with lower digital skills are disproportionately affected by AM systems (Wipro, NYU). These groups are often underrepresented in training datasets, leading to misclassification or exclusion (EESC, Wipro). A few respondents warned of 'cultural colonisation' the export of Western designed tools into contexts that lack local regulatory safeguards (Wipro).

Policy recommendations and future outlook

All interviewees called for stronger regulatory frameworks, enforceable standards, and institutionalised worker consultation rights. Ethical guidelines alone were deemed insufficient (industriAll Europe, NYU, CEC). These perspectives echo recent OECD findings and underline the urgent need to go beyond the current AI Act in ensuring that the transition to AM respects rights, promotes fairness, and protects the wellbeing of all workers.

2.4. Analysis of case studies

During the study, four case studies have been implemented to investigate more in depth the impact of AM in the workplaces. The case studies show how AM is used in different industries and in different countries. In all cases AM systems have changed the way people work by lowering the need for direct human supervision and raising the need for algorithm-based tasks allocation. Employment structure changes are evident in all sectors, with traditional roles being transformed and new technical positions emerging. However, the German automotive case shows a more organised way

of getting workers' input during implementation. There is a clear trend towards algorithm-driven task management in the workplace. This often leads to more efficient work but also less freedom for workers and more monitoring. There are two sides to the health and safety effects: AM can lower physical strain and make some safety aspects, but all cases report more mental stress and work. Governance challenges appear universal, with transparency and explainability remaining problematic despite varying regulatory frameworks. Stronger data protection rules support the French healthcare system, while the German automotive case shows that formal consultation processes can help stakeholders get involved more actively, suggesting that regulatory context and implementation approach significantly influence outcomes.

2.4.1. Case studies

The report presents a selection of four case studies to see more in depth the impact of AM in the workplaces.

Algorithmic management in the Italian logistics sector

Description of sector main characteristics

The logistics sector in Italy is a critical infrastructure that connects supply chains across Europe. It comprises a range of operators—from multinational carriers to small regional couriers—operating in a fragmented yet highly dynamic environment. The sector is characterised by high-volume, time-sensitive deliveries that rely heavily on digital tools for planning, routing, and coordination. These characteristics make logistics a prime sector for the adoption of algorithmic management (AM)[47].

Description of most recent/innovative AI/AM methodologies adopted

AM in Italian logistics typically involves platforms like Kronos, Hubstaff, and bespoke AI systems developed in-house. These tools automate decisions concerning delivery scheduling, task allocation, and route optimisation. Companies have implemented real-time dashboards to visualise driver location, monitor performance metrics, and adjust delivery workflows on the fly. AI applications often include machine learning models that predict delays and reallocate resources proactively[48].

Description of changes on:

a) Employment relations:

Employment relations have evolved under AM. Workers receive instructions directly from mobile apps and algorithms, bypassing traditional supervisors. Human interactions have been replaced by digital commands and automated feedback loops. The resulting disintermediation weakens opportunities for negotiation and introduces uncertainty about how performance is judged[49]. **ns**

b) Employment structure:

In terms of employment structure, the rise of AM has led to job polarisation. While there is demand for IT specialists, data analysts, and platform technicians, low-skilled delivery roles have become

47 ILO, 2024.

48 ILO, 2024.

49 Baiocco and Fernández-Macías, 2022.

more precarious, and are often outsourced. AM facilitates platform-based work models, leading to a shift from standard employment to gig-like arrangements, even within traditional firms[50].

c) Working conditions

Working conditions have become increasingly algorithm driven. Task pacing is tightly controlled, with little room for worker discretion. Algorithms assign routes that maximise efficiency but often overlook human factors such as breaks, traffic stress, or urban navigation challenges. This intensification of labour is compounded by constant performance monitoring and disciplinary triggers for low scores[51].

d) Health and safety

Health and safety are impacted in both physical and psychological terms. On one hand, optimised routes can reduce fuel consumption and driver fatigue. On the other, rigid task execution and digital surveillance create anxiety, stress, and mental overload. Companies seldom include AM risks in their safety assessments, and workers report insufficient training on system usage[52].

Governance frameworks vary. Although many firms report having ethics guidelines, internal audits, and consultation protocols, workers often lack clarity on algorithmic processes. The opacity of AM systems limits accountability, and collective bargaining frameworks struggle to adapt. Legal instruments regulating transparency and fairness in AM are still under development [53].

Algorithmic management in the French healthcare sector

Description of sector main characteristics

France's healthcare system comprises public hospitals, private clinics, and independent practitioners. The sector is heavily regulated and operates under strict professional codes and data protection norms (e.g. GDPR). Following the COVID-19 pandemic, digital health tools saw rapid expansion. Electronic health records, digital shift systems, and triage algorithms have become commonplace in clinical settings, creating fertile ground for AM[54].

Description of most recent/innovative AI/AM methodologies adopted

Hospitals increasingly use AM platforms for staffing, task distribution, and operational triage. Software such as Kronos supports automated scheduling and performance dashboards. In emergency departments, real-time allocation of medical staff to cases is done via AI-based triage. AM is also employed to track treatment compliance, patient throughput, and administrative KPIs[55].

50 ILO, 2024.

51 Baiocco and Fernández-Macías, 2022.

52 Baiocco and Fernández-Macías, 2022.

53 Urzì Brancati et al., 2022.

54 ILO, 2024.

55 Baiocco and Fernández-Macías, 2022.

Description of changes on:

a) Employment relations

Employment relations are shaped by the logic of AM. Task assignments, shift rotations, and even leave approvals are determined algorithmically. Staff members often lack insight into how these decisions are made. Union representatives have flagged AM systems for undermining collaborative scheduling practices and introducing opacity in workload distribution[56].

b) Employment structure

Employment structure has evolved to include new roles like digital operations officers, data privacy managers, and AI system supervisors. Medical professionals are also expected to adapt to dashboards, alerts, and digital input mechanisms. This shift requires reskilling and new competencies in data interpretation and platform usage[57].

c) Working conditions

Working conditions are influenced by real-time alerts, performance indicators, and system-based time management. While such systems improve scheduling efficiency and transparency, they reduce the worker's ability to pace tasks or make discretionary decisions. Staff often report feeling micromanaged and unable to engage with patients in a holistic way[58].

d) Health and safety

Health and safety are affected in multiple ways. Improved task allocation can enhance emergency responsiveness and reduce overlapping duties. However, the cognitive load from managing both patients and digital expectations leads to burnout. Alarm fatigue, screen overuse, and constant monitoring contribute to mental stress, particularly among nurses and junior staff[59].

Governance mechanisms in French hospitals include staff councils, internal audits, and ethical boards. These are supported by national regulations on digital tools. Nevertheless, many AM systems operate as 'black boxes', with limited explainability. Transparency, explainability, and worker input into system design remain central challenges[60].

Algorithmic management in the German automotive sector

Description of sector main characteristics

The automotive sector in Germany is a critical pillar of the country's industrial landscape and export economy, with approximately 779 700 reported workers employed in the factories of manufacturers of motor vehicles and motor vehicle parts in 2023[61]. Given the numerous challenges confronting the car industry, particularly the rapid technological advancements, the progression of digitalisation in

56 Baiocco and Fernández-Macías, 2022.

57 ILO, 2024.

58 Baiocco and Fernández-Macías, 2022.

59 Baiocco and Fernández-Macías, 2022.

60 Baiocco and Fernández-Macías, 2022.

61 *Verband der Automobilindustrie,* 2024.

this sector is inevitable. The transition towards electrification and autonomous vehicles has led to a significant increase in the use of digital technologies. Although the application of AI is a more recent development, with only around 9 % of German automotive companies declaring their use of AI in 2023[62], it has many promising potential applications in the sector. Some German companies, such as Volkswagen, Mercedes-Benz as well as the multinational Stellantis, have explored the potential of AI in various segments of the value chain, including customer experience, research and innovation, and, most notably, the manufacturing process[63]. This gradual introduction of AI necessitates the adaptation of workplaces. While AI can increase productivity and efficiency, reduce workload and improve working conditions, it can also pose risks, such as reduced work autonomy, changes to the required skillset of workers and transparency challenges[64].

Description of most recent/innovative AI/AM methodologies adopted

Audi has implemented an AI-based quality control system for spot welding during the automated body-in-white assembly stage at its Neckarsulm plant in Germany. The transition from manual ultrasound checks of approximately 5 000 welds per vehicle to automated inspection of around 1.5 million welds over 300 vehicles each shift represents a significant enhancement in efficiency. The AI system swiftly identifies anomalies, allowing human operators to focus on more complex tasks, rather than conducting extensive manual checks[65]. The data generated through use of the AI can be used to optimise other processes in the future, for example, as a basis for predictive maintenance down the road. Even though there are currently no standards or certifications for AI applications, the process was designed to be audit- and certification-proof through coordination with the German Association for Quality (DGQ), the Fraunhofer Institute for Industrial Engineering (IAO) and the Fraunhofer Institute for Manufacturing Engineering and Automation (IPA)[66].

Description of changes on:

a) Employment relations

In order to enable workers to be involved in the process when using AI in production in the future, Audi commissioned the Fraunhofer Institutes IPA and IAO to carry out an accompanying study with recommendations for action. The IAO experts interviewed various Audi staff – specialists in production, quality assurance, IT and managers about the potential and wishes they associate with the use of AI. External certification bodies supplemented the internal Audi interviews. The functionality and transparency of the safety of the AI system were seen as particularly important[67].

b) Employment structure

Before AI was introduced, production staff would use ultrasound to manually monitor the quality of spot welds based on random sampling. Now, AI software detects anomalies in real time and engineers can monitor the weld data on a dashboard. Manual checks are only performed if a fault is

62 Bundesministerium für Wirtschaft und Klimaschutz & Bundesministerium für Digitales, 2024.

63 Ait Larbi et al., 2024.

64 European Commission, 2025.

65 Wirtschaftskraft, 2023.

66 Metrology.news, 2023.

67 Fraunhofer IPA, 2023.

detected. This may indicate a shift in the automotive sector, as automation is expected to reduce employment in production while creating opportunities in monitoring, programming, and data analysis. This could lead to a significant change in the required skill set, also for qualified workers, with IT and electronics knowledge becoming more important than traditional automotive qualifications, consequently leading to 'deskilling' or job cuts. Although some tasks may become simpler with digital interfaces, many roles will become more complex and diverse, with AI potentially replacing human expertise in quality control and evaluation[68].

c) Working conditions

Quality control, which used to be manually supervised by a specialist, was considered a tedious process. In future, AI will support this process by evaluating the quality of spot welds based on certain process parameters, suggesting a preselection of conspicuous spots for ultrasonic inspection. This should eliminate the time-consuming ergonomic assessment process and save a considerable amount of time[69].

d) Health and safety

Using AI to automate manual processes can free up workers from repetitive and sometimes physically demanding tasks that affect their physical and mental wellbeing. As AI works with gathered data and conducts analyses that pinpoint specific issues, it can simplify the workload and free up time for tasks that require innovative thinking. In this context, the wider introduction of automation in manufacturing processes promises to reduce health and safety risks for factory workers. For instance, Audi has also introduced 5G wireless technology into its production process, as part of a pilot project involving the use of 5G in a safety network for robotic assembly. 5G is particularly well-suited to connecting sensors, machines, and devices operated by people, because it is both quick and reliable. Therefore, 5G can now perform tasks that could pose a risk to workers wirelessly, thus eliminating the danger. However, it should be noted that the digitalisation of the manufacturing processes may create new risks for workers. These include work intensification, reduced worker autonomy, and constant connectivity pressures. These factors can lead to elevated stress levels and psychosocial concerns. Additionally, constant screen exposure may result in digital fatigue. This would require new OSH strategies to be implemented in workplaces[70].

Algorithmic management in the Danish telecom sector

Description of sector main characteristics

The Danish telecommunications sector is a highly developed and competitive industry, comprised mainly of four large operators, alongside international firms like Telia, Telenor, and Three[71]. This high level of digitalisation means telecom companies are at the forefront of adopting new technologies[72]. In this context, AM is increasingly being introduced to optimise processes. The Danish telecom

68 Meil, 2020.

69 Ait Larbi et al., 2024.

70 EU-OSHA and JRC, 2021.

71 WIK consult, 2019.

72 IFS News, 2024.

sector faces a well-organised labour force and a policy environment that emphasises collaboration between employers and unions in managing change.

Description of most recent/innovative AI/AM methodologies adopted

Telecom firms in Denmark have begun implementing a range of AI and algorithmic management tools to improve efficiency and service quality. One notable innovation is in field service management to optimise scheduling of field technicians[73]. The system automatically assigns the best-suited technicians to jobs and dynamically routes them based on real-time data like location and traffic. In customer service and call centres, companies are using advanced software for scheduling, monitoring, and assisting staff. For example, Telia deployed an automated Workforce Management system integrated with its contact centre platform, enabling smarter shift scheduling and intraday adjustments[74]. Danish telecom operators are also embracing AI for quality control: calls to customer support may be recorded and transcribed by machine-learning *speech analytics* systems. For instance, TDC's policy notes that customer calls can be automatically transcribed to analyse conversations, identify root causes of problems, and improve service quality[75].

Description of changes on:

a) Employment relations

The rise of algorithmic management is altering employment relations in the Danish telecom sector, prompting both concerns and collaborative responses. One major change is a shift in trust and transparency between workers and management[76]. Many telecom customer service workers report feeling that decisions are made by opaque computer systems rather than through dialogue[77]. In response, Danish social partners have started negotiating guardrails for AI's use. Across the Danish labour market, trade unions and employers included discussions on AM/AI in the 2023 collective bargaining round[78]. Principles of transparency and co-determination are likely to be adopted.

b) Employment structure

AI and algorithmic management are gradually reshaping job roles and skill needs in Denmark's telecom sector. For example, Telenor's virtual assistant now resolves many incoming customer service requests[79]. As entry-level service tasks are digitised, companies are shifting focus toward higher-skilled positions in data analytics, AI development, and IT. While there are no explicit reports in the Danish context, Telia Sweden is upskilling its workforce to meet these new demands[80]. Algorithmic management is introducing a more data-driven hierarchy in telecom organisations. Danish unions are vigilant about this trend. A 2023 union-led conference, '*Når din chef er en*

[73] IFS News, 2024.

[74] Calabrio, 2025.

[75] TDC, 2025.

[76] FEPS, 2024.

[77] FEPS, 2024.

[78] Larsen et al., 2024, Ilsøe et al., 2024.

[79] Vux.world, 2025.

[80] Telecoms, 2022.

algoritme'[81], highlighted the need for oversight: labour leaders discussed ensuring that algorithms serve as support tools rather than autonomous bosses[82].

c) Working conditions

Algorithmic management is affecting day-to-day working conditions for Danish telecom employees. A 2024 survey of Danish customer service workers (including telecom support staff) found that many report that this digital oversight has eroded job quality – citing lower trust, less autonomy at work, and higher stress levels under algorithmic control[83]. Likewise, 40 % of Danish union representatives (representing a share of Telecom workers) say that electronic monitoring or algorithmic management is negatively affecting their colleagues' work environment, and one in five reps have handled employee complaints about on-the-job surveillance[84]. These findings indicate a change in working conditions as AI-driven systems become embedded in telecom operations.

d) Health and safety

While there is no explicit documentation of changes in health and safety in the Danish telecoms sector, a Nordic survey found 76 % of workers in customer service and telemarketing roles (call centres), including in the telecoms sector, experience algorithmic management and report heavier workloads, higher stress, and lower autonomy[85].

81 'When your boss is an algorithm'.

82 FHO, 2023.

83 csr.dk, 2024.

84 HK, 2024.

85 FEPS, 2024.

3. Task 3 – Regulation of AI and AM

The use of AM tools in the workplace bears significant potential to support workers' productivity, improve their working conditions and physical safety and enhance health risks management. However, as highlighted above, these systems may also pose numerous challenges and risks for employment relations.

From a legislative perspective, these opposing interests call for a **balanced approach** between limiting regulatory interventions to encourage innovation and economic growth, in line with the objectives of the European Competitiveness Compass and ensuring a higher level of workers' protection to safeguard their fundamental rights, wellbeing and participation in an increasingly digitalised workspace.

The EU 2018 AI Strategy[86] and the Platform Work Directive[87] (PWD) set out two objectives in relation to the deployment and use of AI/AM: increasing the European market's competitiveness through new technologies while upholding fundamental rights and EU values through trustworthy technologies that are safe and reliable for individuals.

In the 2020 White Paper on Artificial Intelligence[88], the Commission endorsed the seven principles for the regulation of trustworthy AI outlined by the High-Level Expert Group[89]: technical robustness and safety; privacy and data governance; transparency; diversity, non-discrimination and fairness; societal and environmental wellbeing; and accountability. A feedback process on the High-Level Expert Group's draft Guidelines on Trustworthy AI organised by the same indicated that, while many these principles are reflected in existing legal or regulatory regimes, others are not specifically covered in many economic sectors[90]. Consequently, the AI Act[91] gives legal effect to many of these principles.

This section analyses the existing regulatory framework for the use of AI/AM technologies in the workplace, with the aim to assess whether existing legal acts and social partner agreements provide sufficient protective mechanisms and safeguards for workers, and where gaps may exist. Section 3.1 provides an overview of relevant EU legislation and ongoing legislative initiatives for regulating AI and AM technologies in the workplace. Starting with the digital acquis (Section 3.1.1.), the section also maps the existing EU labour and occupational safety and health (OSH) acquis (Section 3.1.2.), before concluding by focusing on the Platform Work Directive – the only existing piece of EU legislation to bridge the two legal frameworks (Section 3.1.3.). Section 3.2. provides an analysis of these mapped legal instruments to show how they address specific impacts and risks connected to the deployment of AM technologies in the workplace. Section 3.2. also explores the regulatory framework and case-law at national level in the six selected Member States for which country-

86 Communication on Artificial Intelligence for Europe, COM/2018/237 final, European Commission, April 2018.

87 Directive (EU) 2024/2831 of 23 October 2024 on improving conditions in platform work.

88 European Commission, 2020, On Artificial Intelligence.

89 EC High-Level Expert Group on AI, Ethics Guidelines for trustworthy AI, 2019.

90 European Commission, 2020, On Artificial Intelligence.

91 Regulation (EU) 2024/1689.

specific research has been carried out in the context of this study: France, Germany, the Netherlands, Poland, Spain and Sweden.

3.1. Regulatory framework applicable to AI and AM in the workplace

3.1.1. EU digital acquis

Background to the EU digital acquis

The EU digital acquis is primarily marker oriented, regulating the removal of barriers to cross-border digital trade and services, often combined with the need to protect specific fundamental rights. The following paragraphs present a selection of legislation from the EU digital acquis setting out protective mechanisms (see Section 3.2), in line with some of the above-mentioned guiding principles, that are relevant, due to their general scope, to the use of AM systems in the workplace. These instruments are:

First, the General Data Protection Regulation (GDPR)[92,93] and the e-privacy Directive[94] which set out safeguards for the protection of privacy and personal data in line with Article 16 of the Treaty on the Functioning of the European Union (TFEU).

Second, the EU AI Act, providing for a general and uniform legal framework for the development, the circulation, and the use of AI systems within the internal market, including in workplaces[95]. The Commission has announced the withdrawal of its proposal for an AI liability directive[96], which aimed to harmonise the legal framework for civil liability claims relating to AI[97].

In the same vein, the recent Framework Convention on Artificial Intelligence of the Council of Europe[98] aligns with the EU regulation's risk-based approach to AI and its seven guiding principles.

The box below outlines the provisions in the Treaty that grant the EU the authority to adopt the listed legal documents (i.e. the legal basis).

92 Regulation (EU) 2016/679.

93 As part of the fourth Simplification Omnibus package, the Commission has proposed exempting small mid-caps (SMCs) and organisations with fewer than 750 employees from GDPR record-keeping obligations, with the aim of streamlining rules and reducing administrative burdens. See: Simplification measures to save EU businesses €400 million annually.

94 Directive 2002/58/EC.

95 Recital 1 of the AI Act.

96 European Commission, COM/2022/496 final.

97 See: AI liability directive.

98 Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law, 2024.

Legal basis for EU digital acquis

There is no legal basis establishing a special EU competence to regulate digital tools as such in the Treaties. However, as the influx of technologies has the potential to affect all aspects of the EU economy, including forms of employment and work relationships, several existing legal bases can support the adoption of specific or sectoral legislation affected by those technologies.

Based on the selected legislation constituting the leading instruments of the EU digital acquis described below, two legal bases particularly stand out: Article 16 TFEU, on the protection of personal data, and Article 114 TFEU on the approximation of laws for the fulfilment of the internal market. Both these bases are grounded on the ordinary legislative procedure (Articles 289 and 294, TFEU) involving both co-legislators.

Some instruments of the EU digital acquis contain provisions suggesting the possibility for the EU to further regulate the deployment of AM through tertiary legislation or to adopt more detailed acts and guidelines. Finally, although the GDPR and the AI Act are generally directly applicable in Member States, national legislators have limited discretion to specify additional rules and mechanisms, including in work-related matters.

The box below lists a few of the provisions that give the EU or the Member States further regulatory options.

Regulatory choice provisions in the GDPR

- Article 88(1) of the GDPR allows Member States to adopt, by law or collective agreements, more specific rules on a non-comprehensive list of employment matters to secure employees' rights and freedoms when their personal data are processed in a working context. This list expressly includes the processing of personal data for the purpose of management, planning and organisation of work, the performance of the employment contract, health and safety at work, and the termination of the employment relationship.

Regulatory choice provisions in the AI Act

- Article 2(11) of the AI Act establishes a no-prejudice clause for current or future EU or national legislation or collective agreements that are more favourable to workers and workers' rights in relation to the of use of AI systems by employers.
- In the light of the AI Act risk-based approach, Article 6(2) qualifies certain AI systems as 'high-risk' by reference to Annex III. This Annex lists the different AI systems considered as high risks for safety, health and fundamental rights. Point 4 of this Annex identifies certain AI systems in the field of employment, workers management and access to self-employment as high-risk AI systems.
- Articles 7(1) and 97 of the AI Act give the Commission a delegated competence to amend Annex III to add or modify the list of use-cases of high-risk AI systems if (a) the AI systems are intended to be used in any of the areas listed in Annex III, including employment, workers management and access to self-employment; and (b) the AI systems pose a risk of harm to health and safety, or an adverse impact on fundamental rights, and that risk is equivalent to, or greater than, the risk of harm or of adverse impact posed by the high-risk AI systems already referred to in Annex III.
- Article 6(7) and 97 of the AI Act also give the Commission a delegated competence to amend and delete any of the conditions laid down in Article 6(3) regulating the derogation to the qualification of high-risk AI system listed in Annex III.
- Articles 6(5) and 96 AI Act allow the Commission to adopt guidelines on various practical aspects of the AI Act's implementation. Article 6(5) particularly focuses on high-risks AI systems by requiring the Commission, after consulting the European Artificial Intelligence Board, and no later than 2 February 2026, to adopt guidelines on the practical implementation of the conditions under which AI systems listed in Annex III can be exceptionally considered non-high-risk. Recital 53 further clarifies that these guidelines should be completed by a comprehensive list of practical examples of high-risks and non-high risks use cases.

Scope and definitions

Personal scope: As previously mentioned, this selected set of legal acquis establishes frameworks tailored to digital markets or the use of digital components in economic activities. Although some of these acts contain references to workers or employment aspects, none of the measures apply to, or define workers. However, as employers and their service providers are business operators, they can be subject to the obligations laid down in these legal acts under their specific terminology. Similarly, workers may benefit from protective mechanisms or be affected by the regulated operations.

The table below outlines the variations in terminology that can affect workers and employers when AM tools are used in a working environment.

Table 5 – Overview of the terminology relevant to determine the scope

SELECTED LEGISLATION	WORKERS	EMPLOYERS	OTHER INTERMEDIARIES	SOCIAL PARTNERS
AI Act	The Regulation does not define the terms of 'workers' or 'affected persons'. However, all categories of workers, including solo self-employed can be considered 'affected persons' (Article 1) in the context of an employment relationship where the employer uses AM systems.	All employers in both the public and private sectors using AI systems for the management of workers can be qualified as 'deployers of AI systems' (Article 3(4)). Employers may also qualify as 'providers' if they develop their own AI systems or a General-Purpose AI Model (GPAI model) and put it into service (Article 3(3) and (11)).	Depending on their activities, employers' service providers can qualify as any of the 'operators' listed in the regulation, other than deployers (Article 3(8)). These include: provider, product manufacturer, authorised representative, importer, and distributor of AI systems.	While the AI Act insists on workers' rights to information and consultation (Recital 92), it does not define 'social partners', 'trade unions' or 'workers' representatives' as such in its personal scope and does not set out direct obligations applicable to social partners.
European Framework Convention on AI	The Framework Convention broadly applies to '*the activities within the lifecycle of artificial intelligence systems that have the potential to interfere with human rights, democracy and the rule of law*'. It does not define or specifically apply to workers. However, it requires its Parties to set out provisions that could affect workers, given that the use of AM	The Framework Convention broadly applies to '*the activities within the lifecycle of artificial intelligence systems that have the potential to interfere with human rights, democracy and the rule of law*'. It does not define or specifically apply to employers. However, it requires its Parties to set out provisions which can generate obligations for	The Framework Convention broadly applies to '*the activities within the lifecycle of artificial intelligence systems that have the potential to interfere with human rights, democracy and the rule of law*'. It does not define or apply specifically to intermediaries. However, it requires its Parties to set out provisions that could generate obligations for	The Framework Convention does not directly define or apply to 'social partners', 'workers' representatives' or 'trade unions'. However, it requires its Parties to set out provisions on multistakeholder public consultation (Article 19).

SELECTED LEGISLATION	WORKERS	EMPLOYERS	OTHER INTERMEDIARIES	SOCIAL PARTNERS
	has the potential to interfere with their rights.	employers, given that the use of AM has the potential to interfere with employees' rights.	intermediaries, given that the use of AM has the potential to interfere with users' and employees' rights.	
GDPR	The Regulation does not define the term 'worker'. However, workers, including solo self-employed, qualify as 'data subjects' when their employer processes their personal data in the context of their employment relationship.	All employers, in both the public and private sectors, can qualify as 'controllers'[99] of their workers' personal data (Article 4(7)).	Depending on the relationship between employers and their service providers, the latter may qualify as 'processors' if they process data on behalf of the employer (Article 4(8))[100] or even 'joint controllers' (Article 26)[101], if they would participate in the determination of the purposes (and means) of the processing of workers' personal data[102]. Joint controllership can also exist if the AI providers would have their own economic interest in providing specific AM	The Regulation does not directly define or refer to 'social partners', 'workers' representatives' or 'trade unions'. However, the GDPR gives Member States the possibility to develop more specific rules for personal data processing in the employment context through social dialogues and collective agreements (Recital 155 and Article 88).

99 A controller is a natural or a legal person, public authority, agency or other body who alone or jointly with others determines the purposes and means of the processing of personal data (Article 4(7) GDPR).

100 A processor is a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller (Article 4(8) GDPR).

101 For the explanation of these concepts please see EDPB Guidelines 07/2020 on the concepts of controller and processor in the GDPR.

102 See, for example, Judgment of the Court (Grand Chamber), 5 June 2018, Wirtschaftsakademie Schleswig-Holstein, Case C-210/16, ECLI: EU:C:2018:388.

SELECTED LEGISLATION	WORKERS	EMPLOYERS	OTHER INTERMEDIARIES	SOCIAL PARTNERS
			tools[103] and even regardless of any formal agreements or direct access to data[104].	

Source: Authors' elaboration.

Digital technologies covered: As market legislation, the selected legislation listed above covers a wide range of technologies, including AI tools and AM systems.

The AI Act is the primary legal framework for regulating AI. It broadly applies to all types of AI[105] and general-purpose artificial intelligence (GPAI)[106] systems, including those used in employment matters. The definitions laid down in Article 3 of the AI Act ensure a broad coverage of all types of AI technologies that can be deployed in workplaces, as described in Sections 1 and 2. Moreover, neither the AI Act nor the PWD envisage direct overlap between each other as none of these legal instruments contain a specific non-prejudice clause in favour of the other. However, the PWD sets out that it shall be without prejudice to any other rights conferred on persons performing platform work by other legal acts of the Union[107]. This suggests that the safeguards laid down in the AI Act will also apply in cases where platform work involves AM systems. It follows that the AI Act leaves very few gaps in its material scope as it is broad enough to cover all sorts of AM tools used in a working context.

The AI Act is rooted in a risk-based approach laying down different sets of rules for prohibited practices (Chapter II), high-risk AI systems[108] (Chapter III) and AI systems presenting more limited risks for safety health and fundamental rights (Chapter IV). It also contains rules on GPAI (Chapter V). In this taxonomy, AM systems used in the context of employment, workers management and access to self-employment are explicitly considered as high-risk AI systems[109], subject to more stringent rules and oversight when they are used for the recruitment, the selection and the evaluation of candidates for a position, to analyse and filter job applications, to make decisions

103 See, for example, Judgment of the Court (Second Chamber), 29 July 2019, Fashion ID, Case C-40/17, ECLI:EU:C:2019:629.

104 See, for example, Judgment of 7 March 2024, IAB Europe, Case C-604/22, ECLI:EU:C:2024:214.

105 Broadly defined under Article 3(1) of the AI Act as machine-based systems, designed to operate with varying levels of autonomy and adaptiveness, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments.

106 Defined under Article 3(6) of the AI Act as AI models, including those that are trained with a large amount of data using self-supervision at scale, that displays significant generality and can perform a wide range of distinct tasks regardless of the way the model is placed on the market. Those tools can, by definition, be integrated into a variety of downstream systems or applications.

107 Article 26(3) of the PWD.

108 Note that the AI Act refers to the term high-risk AI systems (in short, AIS). For legal accuracy, this term is therefore used in this chapter when directly referring to the provisions of the AI Act.

109 See Article 6(2) and Annex III, point 4 of the AI Act.

affecting terms of work-related relationships, for the promotion or termination of an contractual employment relationship, to allocate tasks based on individual behaviour or personal traits or characteristics or to monitor and evaluate the performance and behaviour of persons in such relationships. The scope of the AI Act also closes potential gaps by covering AI systems used in high-risk areas, even when released under free or open-source licenses[110]. Although this category of AI systems is, in principle, excluded from the scope of the regulation, its deployment in high-risk areas such as AM systems at work means it falls within the scope of the regulation[111].

In the same vein, the European Framework Convention on AI aligns its definition of AI with the EU AI Act[112] and broadly covers '*the activities within the lifecycle of artificial intelligence systems that have the potential to interfere with human rights, democracy and the rule of law*'[113]. This Framework Convention has been signed by sixteen contracting parties, including the European Union[114]. However, it has not entered into force yet. As a framework convention, it lays down key obligations and principles that contracting parties are required to implement effectively through legislative, administrative or practical measures. These obligations aim to safeguard fundamental rights and democratic processes throughout the conception and deployment of AI systems. It also encourages contracting parties to take a 'graduated and differentiated' approach based on the severity and probability of adverse human rights impacts arising from AI systems[115].

Aside from these AI-centred legal frameworks, the other selected regulations do not focus on specific AI systems or AI-powered technologies *per se*, remaining technologically neutral. Instead, they rather provide for additional safeguards and mechanisms in the context of the provision of AI-powered services or AM systems provided to employers for their deployment in the workplace. For instance, the GDPR applies broadly to all processing operations, whether by automated means or not (Article 4(2)). However, it only applies to operations performed on personal data[116], and not to anonymous data[117] such as aggregated data and statistics, which are usually used for model learning[118,119]. Non-personal data are not governed by the GDPR, but are instead regulated by several EU instruments, such as Regulation (EU) 2018/1807 on a framework for the free flow of non-personal data, the Data Governance Act and the Data Act, among others. The aim of these instruments is not to protect fundamental rights, but rather to ensure that non-personal data can circulate freely, be shared safely, and fuel innovation.

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110 Article 2(12) of the AI Act.

111 See Article 2(12) of the AI Act.

112 See Article 2 of the Framework Convention.

113 Article 3(1) of the Framework Convention.

114 For a complete list of signatories see: Council of Europe, The Framework Convention on Artificial Intelligence.

115 Article 1(2) of the Framework Convention.

116 Article 4(1) GDPR defines personal data as information relating to an identified or identifiable natural person.

117 Anonymous data is any information relating to a natural person where the person can no longer be identified.

118 European Economic and Social Committee, A guide to Artificial Intelligence at the workplace, 2022, p. 8.

119 The EDPB states that AI models can be trained using personal and non-personal data. However, when AI models are trained using personal data, they cannot always be considered anonymous. See EDPB, Opinion 28/2024.

In conclusion, while the EU digital acquis applies to the deployment and use of AI and AM systems in the EU, as internal market instruments, they do not focus on regulating employment contexts. While the AI Act classifies AM systems as high-risk AI systems and the GDPR provides privacy safeguards, neither instrument defines workers nor establishes direct labour law protections. Also, social partners are not recognised as actors under these legal instruments.

3.1.2. EU labour and OSH acquis

While the use of digital technologies in the workplace leads to the automation of employers' functions, this change may not necessarily require legal amendments, provided that existing protective mechanisms can be interpreted to encompass this change. This section explores to what extent the existing EU labour law acquis could be used in situation of AM in the workplace.

Background to the EU labour and OSH acquis

The European Union's competence in the field of employment policy finds it legal foundation in Article 3(3) of the Treaty on European Union (TEU), establishing the Union's objective to work towards full employment and social progress.

Legal basis for EU labour and OSH acquis

Complementing Article 3 of the TEU, Article 9 of the TFEU introduces a horizontal clause requiring that the definition and implementation of EU policies must aim to achieve high levels of employment. In line with Article 145 TFEU, both the EU and the Member States are called upon to pursue a coordinated employment strategy, with a particular focus on fostering a skilled, trained, and adaptable workforce, and on developing labour markets that can respond effectively to economic change. In addition, Articles 151 to 153 TFEU provide the legal basis for EU action in supporting and complementing Member States' efforts on social rights, dialogue with social partners, living and working conditions, protection of workers' health and safety, equality between men and women in employment and others, thereby reinforcing the Union's commitment to promoting inclusive and sustainable labour markets. Finally, Article 157 TFEU enables EU to guarantee equality between men and women at work and in pay.

Core labour rights forming the basis of the Union's social and employment policy are also contained in the Charter of Fundamental Rights (Charter). Key provisions include the prohibition of discrimination (Article 21), the equality between women and men (Article 23), the right of workers to be informed and consulted within the undertaking (Article 27), the right to collective bargaining and action (Article 28), and protection in the event of unjustified dismissal (Article 30). The Charter also affirms the right to fair and just working conditions (Article 31), reinforcing the EU's commitment to promoting dignity, equality, and protection for all workers across Member States.

The EU labour acquis comprehends a number of EU legal instruments that lay down common minimum standards for employment across the EU. In that sense, it acts as the basic legal framework that national labour law provisions shall meet while Member States have the possibility to adopt rules that provide a higher level of protection to workers. It mainly consists of directives and regulates aspects such as working conditions, health and safety at work, information, consultation and employee participation, and non-discrimination in relation to employment.

A first cluster of EU labour law directives sets out minimum rights in relation to, for instance, working time, mandatory rest periods, leave and contractual arrangements. It also includes provisions on

transparency and minimum wage. A second set of directives regulates information, consultation and the participation of employees, e.g. in European Works Councils or in relation to collective redundancies. In relation to occupational safety and health (OSH) the OSH Framework Directive[120], adopted in 1989, remains the cornerstone of EU law in this area as it establishes EU minimum OSH requirements across different sectors. Under Article 16(1) of the OSH Framework Directive, a series of 'daughter' directives focusing on specific aspects of health and safety (e.g., protective measures such as personal equipment), or risks (e.g., exposure to noise or vibrations), or targeting sectors (e.g., constructions sites or mineral extraction) have been subsequently enacted. OSH directives are centred on the principle of prevention of risks[121], forming the basis of the employers' obligations to take measures necessary to anticipate and prevent risks, provide information and training to workers[122], as well as conducting regular risks assessment and take tailored protective measures as needed[123].

Finally, the labour acquis also integrates legislation on equality and non-discrimination in relation to employment, which prohibits discrimination on grounds of religion, race or ethnicity, disability, age or sexual orientation. For the overview of the most relevant labour and OSH instruments in relation to AM at the workplace, see the table below.

Table 6 – Overview of selected EU labour instruments

EMPLOYMENT RELATIONSHIP	EMPLOYMENT STRUCTURE	WORKING CONDITIONS	HEALTH AND SAFETY AT WORK (OSH)
• Working Time Directive (2003/88/EC) • Directive on Collective Redundancies (98/59/EC) • European Works Council Directive (2009/38/EC) • Information and Consultation Directive (2002/14/EC)	• No specific EU instruments[124]	• Directive (EU) 2019/1152 on Transparent and Predictable Working Conditions • Work-Life Balance Directive (EU) 2019/1158 • Pay Transparency Directive (EU) 2023/970 (transposition deadline 7 June 2026) • Platform Work Directive (EU)	• OSH Framework Directive 89/391/EEC • Workplace Directive (89/654/EEC) • Display Screen Directive (90/270/EEC) • Work Equipment Directive (2009/104/EC)

120 Council Directive 89/391 EC.

121 Article 6 of the OSH Framework Directive.

122 See note 38, page 34.

123 Article 10.

124 Though it is important to note that several policy initiatives exist in relation to workforce skill evolution and other aspects of employment structure, such as the European Skills Agenda and the recent 2025 'Union of Skills' package, focused on developing skills adapted to future needs, lifelong learning and skills portability, among others. For more information, see, for instance, Union of skills - Investing in people for a competitive European Union.

• Platform Work Directive (EU) 2024/2831 (transposition deadline 2 December 2026)		2024/2831 (transposition deadline 2 December 2026)	
EQUAL TREATMENT AND ANTI-DISCRIMINATION			
• Employment Equality Directive (2000/78/EC) • Gender equality in employment and occupation Directive (2006/54/EC)			

Source: Authors' elaboration.

These legal acts are complemented by social partners' initiatives such as the collective agreement on digitalisation[125], improving workers' collective bargaining strengths in line with their rights to consultation and participation as well as by non-binding instruments[126]. Finally, effective guaranties and safeguards to protect workers rights could also be put in place under national and international law.

Scope and definitions

Personal scope. The EU legislation on working conditions typically applies to 'workers'. The definition of a worker is largely left to Member States' legal labour traditions. As a result, the concepts of 'employee', 'employment relationship' and 'employment contract' can differ across jurisdictions. This can result in certain types of workers outside of standard employment relationships being excluded from the scope of EU directives on working conditions[127].

The CJEU has significantly contributed to determining what constitutes a 'worker' under EU law, determining, for instance, that the defining characteristics of that relationship are that 'for a certain period of time, a person performs services for and under the direction of another person in return for remuneration'[128]. Based on the case law of the CJEU, a person is a worker if all three of the following elements are present: (i) the performance of services; (ii) subordination; and (iii) remuneration.

More recent legal instruments, such as the Work-Life Balance Directive[129] and the Pay Transparency Directive[130], reflect the effort to enlarge the scope of protection provided by the EU legislation on working conditions. These legal instruments cover *'all workers, men and women, who have an*

[125] BusinessEurope, SMEunited, CEE, ETUC (and the liaison committee EUROCADRES/ CEC), European social partners framework agreement on digitalisation, 2020, European social partners framework agreement on digitalisation | BusinessEurope.

[126] For example, the 2023 ILO Digital Employment Diagnostic Guidelines provide a roadmap for policymakers, researchers, statisticians and practitioners to gather accurate and reliable data, measure the impact of digitalisation on employment and develop evidence-based policies that can effectively address emerging issues and ensure decent working conditions for all workers.

[127] Szpejna and Boudalaoui-Buresi, 2020.

[128] CJEU C-66/85, *Lawrie-Blum v Land Baden-Württemberg,* para. 17.

[129] Directive (EU) 2019/1158 .

[130] Directive (EU) 2023/970 .

employment contract or employment relationship as defined by the law, collective agreements or practice in force in each Member State, taking into account the case-law of the Court of Justice'[131]. Moreover, the Platform Work Directive[132] provides a rebuttable presumption of a labour relationship with the person providing work through a digital platform, even where the relationship is not designated as such by the parties involved[133]. Still, it is important to note that genuinely **self-employed persons** are **not covered** by the EU labour acquis. Provided that the above three criteria are fulfilled, (solo) self-employed could fall within the scope of the relevant directives.

Conversely, OSH directives set out a definition of 'workers' as 'any person employed by an employer, including trainees and apprentices but excluding domestic servants'[134]. This term is a broader one, encompassing a wide range of employment situations and it is aimed at covering a wider group of individuals in the workplace. Still, genuinely self-employed persons are in principle not covered.

Digital technologies covered. As for their material scope, the EU labour and OSH directives do not regulate digital technologies nor AM systems[135]. This is logical, given that the core EU directives were adopted before digital technologies such as AI became widespread in the workplace.

While these directives do not explicitly regulate the use of technological tools to automate tasks traditionally carried out by human managers, they do contain several provisions or interpretations that can be applied to digital or electronic monitoring and communication. For example, Recital 24 of the Directive on Transparent and Predictable Working Conditions[136] recognises the increasing use of digital communication tools and confirms that when information should be communicated in writing, this would also include communication by electronic means. Likewise, the OSH Framework Directive requires the employer to draw up a risk assessment, systematically assessing potential OSH risks in the workplace and to keep such assessments up to date[137]. This includes an assessment of the consequences on workers' health and safety resulting from the planning and introduction of new technologies, as required by Article 6(3) OSH Framework Directive[138].

3.1.3. Platform Work Directive (PWD)

The distinct challenges of the use of AM in the workplace have led to calls for sector-specific regulation, which led in 2024 to the adoption of the Directive (EU) 2024/2831 on improving working conditions in platform work (also commonly referred to as the Platform Work Directive or the PWD).

131 For example, see Article 2 of the Work-Life Balance Directive.

132 Directive (EU) 2024/2831.

133 Article 5 of the Platform Work Directive.

134 Article 3(a) of the OSH Framework Directive.

135 Except for the Platform Work Directive, see below section.

136 Directive (EU) 2019/1152.

137 Article 6 of the OSH Framework Directive.

138 The EU Strategic Framework on Health and Safety at work 2021-2027 explicitly recognises robotisation and AI as providing great opportunities for OSH implementation, but also presenting a number of risks.

Background to the PWD and specific issues related to AM in the context of platform work

The Platform Work Directive regulates working conditions for a specific group of workers performing platform work through a digital labour platform (i.e. persons performing platform work), with a view to address some of the challenges they face as a consequence of the digital transition. The group of workers that work through digital labour platforms are increasingly rapidly and were, already at the time of the adoption of the Directive proposal, estimated to reach 43 million in 2025[139].

The PWD aimed to tackle a number of issues, such as the employment status of different types of persons performing platform work, in particular under which circumstances they could be considered self-employed or rather in an employment relationship, but also aspects related to AM. According to Recital 5 of the PWD, '*[b]y means of the algorithms, the digital labour platforms organise, to a lesser or greater extent depending on their business model, the performance of the work, the remuneration for the work and the relationship between their customers and the persons performing the work*'. Among others, PWD intended to address the insufficient transparency regarding the use of such AM systems by digital platforms as well as little access to remedies against the decisions taken by such systems.

Legal basis for PWD

The Platform Work Directive was adopted on the basis of Article 153(1)(b) TFEU which allows the EU to establish minimum standards with the objective of improving working conditions and Article 16(2) TFEU on data protection.

Scope and definitions

Personal scope. The PWD applies specifically to people providing work through platforms. Platform work is defined as work organised in a triangular relationship 'through a digital labour platform on the basis of a contractual relationship between the platform or an intermediary, the individual and a recipient of the service'[140]. The relationship between the individual performing the work (often a solo self-employed) and the intermediary can be identified as a labour relationship when certain elements are present, irrespectively of the nature of the contractual relationship or how the parties designate the relationship between them. Despite widespread deployment of AM at the workplace, the personal scope of the PWD remains limited to the digital platform economy.

Digital technologies covered

According to the PWD, AM systems are systems powered by algorithms, which increasingly replace managerial functions by taking or supporting relevant decisions, such as allocating tasks, pricing individual assignments, determining working schedules, giving instructions, evaluating the work performed, providing incentives or applying adverse treatment[141]. These systems customarily

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139 Proposal for a Directive on improving working conditions in platform work, COM(2021)762 final.

140 Article 2(1)(b) of the PWD.

141 Recital 8 of the PWD.

process personal data of persons performing platform work. The PWD sets out a number of limitations and requirements regarding AM, defined in the context of the Directive as automated monitoring and decisionmaking systems. To that end, it establishes a number of specific protection mechanisms and enforcement provisions, including remedies, aiming to protect the working conditions of persons working through a platform and protecting their personal data.

3.2. Key provisions and mechanisms to protect workers related to AM in the workplace

3.2.1. Information provisions and transparency

Workers subject to AM often do not have access to information on how such digital technologies work, which personal data and other information are used or how their behaviour affects decisions taken by such tools. Further, such information is very often not available to workers' representatives, labour inspectorates or other competent authorities. Mechanisms that increase the transparency in the use of AM at workplace, such as the right to information and the right to explanation help to mitigate this risk.

Labour law and OSH obligations

The general framework for workers' right to information is regulated in the following instruments:

The **Information and Consultation Directive**[142] focuses on the collective right to information (and consultation) that should in principle be given to employees' representatives[143] in undertakings employing at least 50 employees, or to establishments employing at least 20 employees. Employees should be informed on significant developments affecting (i) the undertaking's activity and economic situation, (ii) situation, structure and changed of employment, in particular where there is a threat to employment, (iii) decisions likely to lead to substantial changes in work organisation or contractual relations[144].

The **Directive on Transparent and Predictable Working Conditions**, on the other hand, focuses on the individual right to information about the essential aspects of the employment relationship[145]. Its broad scope covers all workers, who have an employment contract or employment relationship, as defined by the law, collective agreements or the practices in force in each Member State,

142 Directive 2002/14/EC.

143 Article 2(e) gives no specific definition of the term 'employees' representatives' but refers to definitions provided by national laws and/or practices. Such representative body can take form of trade union representation or the works council model. See: Commission staff working document accompanying the Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the review of the application of Directive 2002/14/EC in the EU {COM (2008) 146 final}. In Member States with a unionised single-channel tradition, information and consultation provided directly to employees should be considered an ultima ratio. See: Studies on the implementation of Labour Law Directives in the enlarged European Union – Directive 2002/14/EC establishing a general framework for informing and consulting employees in the European Community. Synthesis report, p. 9.

144 Article 4 of the Information and Consultation Directive.

145 Article 4(2) lists the minimum information that should be provided to all workers, while Article 7 lists information that should be provided to workers sent to another EU Member State or to a third country.

considering the case law of the CJEU[146]. This could include domestic workers, on-demand workers, intermittent workers, voucher-based workers, platform workers, trainees and apprentices, provided they fulfil the CJEU's criteria for being classed as a worker. Article 4(2) contains a non-exhaustive list of the aspects of the employment relationship about which the employers are required to provide written information to the worker[147].

An important occasion where it is essential for workers to receive information is when the employer decides to carry out collective redundancies, as laid down in the **Directive on Collective Redundancies**[148]. In such cases, all relevant information must be communicated to workers and their representatives in a timely manner, as this is crucial for enabling them to put forward constructive proposals.

Information obligations are also important cornerstone of the **OSH legislation**[149]. For example, pursuant to the OSH Framework Directive, workers and their representatives have the right to be informed about all safety and health risks and protective and preventive measures adopted by the employer[150]. The duty of information extends also to workers from any outside undertakings engaged in work in the employer's undertaking[151]. Another crucial right guaranteed under the OSH Framework Directive is the right to adequate training[152], which should be provided, among other situations, when new work equipment or new technology is introduced.

Although the legislation does not explicitly stipulate that workers or their representatives must be informed about the deployment of AM systems, it could be argued that they should receive this information on a case-by-case basis. For instance, although the Directive on Transparent and Predictable Working Conditions does not cover the use of digital tools, one could argue that the use of AM, particularly when it affects workers' rights, constitutes an essential element of the employment relationship. In the *Lange* case[153], for instance, the CJEU ruled that employers must inform workers of the obligation to work overtime, even if this was not stipulated in the directive, since this aspect constitutes an essential element that affects working conditions[154]. Furthermore, under Article 4(2)(c) of the Information and Consultation Directive, any decision likely to lead to substantial changes in work organisation must be the subject of prior information and consultation. Recent reports by Eurofound and EU-OSHA argue that this obligation should be understood as including the introduction of significant changes in work organisation through AM systems.[155] Still,

146 Article 1(2) of the Directive on Transparent and Predictable Working Conditions.

147 In certain circumstances other information may be deemed essential. De Wispelaere, F., Pacolet, J. and De Smedt, L., 2021.

148 Council Directive 98/59/EC.

149 See, for example, Article 6 of the Workplace Directive and of the Display Screen Directive (see below for more details).

150 Article 10 of the OSH Framework Directive.

151 See note 68, page 39.

152 Article 12(1) of the OSH Framework Directive.

153 CJEU C-350/99, Wolfgang Lange v Georg Schünemann GmbH.

154 This ruling however refers to the Written Statement Directive (91/533/EEC), which was repealed by the Directive on Transparent and Predictable Working Conditions.

155 Eurofound, 2024; EU-OSHA, 2022.

some legal authors highlight the need to explicitly regulate information and consultation obligations in the context of AM systems and emphasise certain obligations that are already implicit in the current wording of the Information and Consultation Directive.[156] In this context, it is also important to note that the Information and Consultation Directive applies in undertakings with more than 50 employees or in establishments with more than 20 employees, unless Member States have adopted a lower threshold. As such, the obligations would not set out similar information rights for workers in smaller undertakings.

Similarly, the OSH Framework Directive guarantees relevant measures to address risks emerging from the application or use of AM systems, such as the right to information and consultation and the right to adequate training[157]. Finally, these directives are minimum harmonisation directives, meaning that they do not prevent Member States from applying higher standards.

Digital law

EU digital acquis, such as the GDPR, the European Framework Convention on AI and the AI Act provide for a more comprehensive right to information provision and transparency.

The principle of fairness and transparency is a long-established principle of EU data protection law that applies irrespective of the legal basis for processing and throughout the life cycle of processing [158]. Within the context of the GDPR, transparency is an overarching obligation applying to three central areas: (i) the provision of information to data subjects about the processing of their personal data as an expression of fairness of that processing[159]; (ii) how data controllers communicate with data subjects in relation to their data protection rights; and (iii) how data controllers facilitate the exercise by data subjects of their rights[160]. In line with Articles 13 and 14 of the GDPR, a controller needs to provide the data subjects with several information, including the existence of automated decisionmaking[161]. In line with the principle of fairness and accountability the controller should be able to explain to data subjects the likely impact of such processing on their rights and should not deceive the reasonable expectations of data subjects. The GDPR also introduced the right to data portability (Article 20 GDPR), which enables data subjects to receive the personal data concerning them in a structured, commonly used, machine-readable format and to transmit these data to another controller without hindrance from the controller to which the personal data have been provided[162].

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156 Cefaliello, Moore and Donoghue, 2023; Adams-Prassl et al., 2023.

157 European Commission, 2023.

158 Article 5(1)(a) of the GDPR.

159 The rules concerning the controller's information obligations are set out in Articles 12–14 of the GDPR. Article 12 sets out the general rules on providing information to data subjects, which apply where data are obtained from the data subject (Article 13) or from other sources (Article 14).

160 Article 29, Data Protection Working Party, Guidelines on transparency under Regulation 2016/679 (WP260 rev.01), revised and adopted on 11 April 2018.

161 Article 13(2)(f) and Article 14(2(g) of the GDPR.

162 Article 29, Data Protection Working Party, Guidelines on the right to 'data portability' (WP242rev.01), revised and adopted on 5 April 2017.

This principle of transparency is also emphasised in the legislation regulating AI. Article 8 of the European Framework Convention on AI sets out a general principle of transparency and oversight which must be tailored to the context and risks induced by the use of a given AI system. Article 14(2)(a) of the Convention further requires the Parties to adopt or maintain adequate measures to ensure that AI systems that have the potential to significantly affect human rights are properly documented. This information must also be made available to affected individuals, enabling them to exercise their right to seek a remedy in the event of a violation.

In this respect, the AI Act explicitly acknowledges the necessity to compensate any gap in employees' right to information and participation in the context of planned deployment of high-risk AI systems in the workplace. Recital 92 indeed states that '*it remains necessary to ensure information of workers and their representatives on the planned deployment of high-risk AI systems at the workplace where the conditions for those information […] and consultation obligations in other legal instruments are not fulfilled*'. The AI Act addresses this absence of specific obligation in the EU employment acquis through several layers of transparency and disclosure obligations. First, in the context of high-risks systems, it establishes a principle of 'transparency by design' for deployers, such as employers, to be sufficiently informed by their providers of AI solutions on the system's characteristics to fulfil their own transparency obligations. Article 13 indeed requires a set of instructions to be disclosed to the deployer on the AI system' ownership, its appropriate uses and characteristics. These instructions shall include, *inter alia*, information on the AI systems' characteristics, capabilities and limitations; their level of accuracy, robustness and cybersecurity; details on the human oversight measures developed by the provider, including the technical measures in place to facilitate the interpretation of AI system' outputs by the deployer; as well as information on any known or foreseeable circumstance related to the use or reasonably foreseeable misuse of the high-risk AI system which may lead to risks to the health and safety or fundamental rights[163].

A second layer of transparency applies specifically to the deployment of AI in the workplace. In line with Recital 92, Article 26(7) indeed requires employers that intend to deploy a high-risk AI system to inform both affected workers and workers' representatives, before putting such AI system into service or using them. This obligation applies in accordance with the national and EU rules and practices on workers' rights to information[164]. It can also be mentioned that certain AI systems are also subject to specific transparency requirement towards their users in order to ensure an adequate level of literacy and informed use of such tools (Article 50).

Platform Work Directive (PWD)

Lastly, the PWD bridges the gap between the general transparency rules of the digital acquis and the labour law specifics of providing information to workers. The PWD introduces more detailed requirements regarding transparency on the use of AM systems and provision of information for persons working through digital labour platforms. These more detailed information requirements are limited in terms of their personal scope to persons performing platform work, and do not apply to AM systems used in other types of undertakings. Nevertheless, they provide specific legal

[163] See Article 13(3) of the AI Act.

[164] See Article 26(7), 2nd sentence.

protection for the use of AM systems at work, ensuring that workers are adequately informed about the use of such systems, which may be extended to other workers in future legislative initiatives. For instance, Article 9 of the PWD contains a legal obligation for Member States to determine in their legislation that digital labour platforms must inform persons performing platform work and national authorities about the use of automated monitoring and decisionmaking systems, in accordance with Directive 2002/14/EC on information and consultation. Specifically, such platforms need to disclose whether such systems are in use or being introduced and details about their operation.

For automated monitoring systems, platforms are required to provide information about the introduction of such systems, the types of data being monitored (such as categories of data), the objectives of the monitoring, and how it is conducted. They must also clarify who the recipients of this data are, including any data transfers within corporate groups. For automated decisionmaking systems, platforms must inform workers about their existence, the types of decisions supported or made by these systems (such as suspensions, terminations, or payment decisions), the categories of data and parameters used, including how personal data and worker behaviour influence these decisions, and the grounds for decisions that adversely affect workers' contractual status or compensation.

The PWD also contains formal requirements about how this information is to be provided to the persons performing platform work, namely in a written, accessible, and plain language format, on the first day of work and before any significant changes affecting work conditions or monitoring methods are implemented. Workers can also request more detailed information at any time. Similar information obligations also apply to selection and recruitment processes. Importantly, workers have the right to data portability, meaning they can receive a copy of personal data generated through these systems, including reviews and ratings, in a way that protects their rights under EU data protection laws. Platforms must facilitate this process by making tools available to this end, free of charge, and, upon request, transmit the data directly to third parties.

Finally, Articles 13 and 14 contains specific obligations for platforms to provide information to persons performing platform work, in line with the obligations set out under EU law, tailored to them.

Generally, EU Member States regulate information and consultation obligations in line with the above-mentioned Directives. Works councils in the Netherlands have the right to be consulted and to provide advice to the employers on the introduction of mayor technological innovations (Article 25 of the Works Council Act). A specific mention to be informed about the use of AM systems is contained in the French Labour Code. Art. L. 2312-38 requires employers to inform work councils of the introductions of such automated systems and of any methods or techniques supporting recruitment procedures.

Spain is the first EU Member State to set out information obligations on AI/AM in a dedicated law. The Rider's Law (2021) specifically recognises the right of the work council to be informed by the company of parameters, rules and instructions of the algorithms of artificial intelligence systems that affect labour decisionmaking and may have an impact on working conditions, access to and maintenance of employment.

A draft amendment bill to the Trade Union Act is currently in the process of adoption in Poland. The draft bill regulates the obligation of the employer to provide information, upon request from a company trade union, on the parameters underlying the algorithms used int eh workplace to make decisions concerning employees.

To enhance transparency, the Dutch government introduced an algorithm register in 2022 where government agencies can, on a voluntary basis, enter the information about the algorisms they use. The register is accessible to everyone and signals the government's commitment to promote accountability in the use of AM systems. Although it is not complete yet, as of 2025 the publication of high-impact algorithm has become mandatory, setting a strong transparency precedent.

Another example of soft law tool which encourage a transparent and informative use of AM systems in the workplace is the Spanish Ministry of Labor and Social Economy's guide on algorithmic information in the workplace. The guide illustrates and provides practical guidance on the obligation of businesses to provide information on the use of algorithms in the workplace.

In France, a think tank called LaborIA, supported by the Ministry of Employment has been established. The latter issued guidelines on the deployment of AI at work for microenterprises and SMEs. Those guidelines not only insist on employees' involvement and training in AI/AM systems deployment process at work but also on how to approach workers' role and interactions with AI tools when working. This guide provides a detailed process to accompany AI/AM systems deployment as well as a list of key legal provisions applicable to workers' protection at work in this context. However, the guide does not particularly insist on OSH risks and prevention.

No other examples or initiatives were identified in the other selected Member States.

3.2.2. Specific safeguards for AM (e.g. human oversight, right to explanation, ex-ante assessment and continuous monitoring)

As mentioned above, none of the labour or OSH instruments provide specific mechanisms for the use of AM. Such mechanisms are however present in the European Framework Convention on AI, the AI Act, the GDPR and the Platform Work Directive.

Human oversight and the right to explanation

Both the European Framework Convention on AI and the EU AI Act lay down detailed rules on human oversight, both for the use of AI systems, AM in general and AM in particular. In line with Article 8 of the Framework Convention on AI, Articles 14 and 26 of the AI Act lay down rules on the application of an adequate level of human oversight applicable to AI-generated decisions affecting individuals. Although the regulation does not state it explicitly, it has been argued that this provision may allow

workers' representative bodies to play a role in this supervision[165]. Pursuant to Article 14(2), the purpose of human oversight is to prevent, mitigate and minimise the risks caused by the use, or reasonably foreseeable misuse, of AI systems on individuals' safety, health and fundamental rights. Such obligation mainly falls on AI system providers, with deployers' support. High-risk AI system provider must develop two types of measures to ensure its AI system is subject to human oversight: measures built into the AI system itself; and measures identified by the provider to be implemented by the deployer[166]. Providers shall also ensure that the deployer (i.e. the employer) or the person appointed to carry out such oversight are adequately informed of the risks, capabilities and limitations of the AI system; are aware of the risk to automatically rely or over-rely on the high-risk AI system' outputs (so-called '*automation bias*') as well as their possibility to neutralise the AI system by interpreting its output correctly, set aside its proposed solution or disactivate it when necessary[167]. The AI Act also requires high-risk AI system, such as AM tools, to be designed to achieve an appropriate level of accuracy, robustness, resilience and cybersecurity to prevent errors throughout their lifecycle[168]. Deployers of AI systems are required to assign human oversight responsibilities to natural persons who are competent, trained and have sufficient authority and support to exercise their task effectively[169]. They shall also inform their AI system providers when the operation of a high-risk AI system in accordance with the providers' instructions may lead to risks for persons' health and safety or fundamental rights[170].

These due diligence obligations must also be accompanied by an appropriate level of transparency and information for the persons subject to automated decisions. Article 26(11) of the AI Act specifically provides that a person concerned by a decision, taken or assisted by a high-risk AI tool such as those deployed in a working environment in line with point 4 of Annex III of the AI Act, shall be informed of such use. In this context, the European Social Partners Framework Agreement on Digitalisation (the Framework Agreement on Digitalisation)[171] outlines that any AI system used at work must be adequately transparent and explainable to ensure effective oversight and checks to prevent erroneous AI output[172].

The AI Act also guarantees the right of individuals, subject to a decision supported or resulting from a high-risk AI system adversely affecting their safety, their health or their fundamental rights, to request clear and meaningful explanations from the deployer (i.e. the employer) (Article 86). Such right to explanation covers both the role of the AI system in the decisionmaking process and the main elements taken into consideration to reach said decision.

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165 industriALL, 2024.

166 Article 14(3) of the AI Act.

167 Article 14(4) of the AI Act.

168 Article 15.

169 Article 26(2) of the AI Act.

170 Article 26(5) of the AI Act.

171 European Trade Union Confederation (ETUC), European Centre of Employers and Enterprises providing Public Services (CEEP), SMEunited, and BusinessEurope, Framework Agreement on Digitalisation, 22 June 2020, available at ETUC, accessed August 2025.

172 See European Framework Agreement on Digitalisation, Point 3 – Artificial Intelligence (AI) and guaranteeing the human in control principle.

Although the GDPR does not refer to any particular AM tools, it provides rules that are adaptable to future digital challenges. In this vein, it provides data subjects (i.e. workers) with the right not to be subject to a decision based solely on automated processing, including profiling, that produces legal effects for them or significantly affects them (Article 22(1) GDPR). However, this right is not absolute and does not apply if: (a) the decision is necessary for entering into or performing of a contract; (b) the data subject has given explicit consent; or (c) the decision is authorised by EU or Member State law (Article 22(2) GDPR). In cases referred to in points (a) and (c), where automated decisionmaking is permitted, the data subjects should have the right to obtain human intervention, express their own point of view, and contest the decision (Article 22(3))[173]. In addition, data subjects should also be informed of the existence of automated decisionmaking and provided with meaningful information about the decisionmaking logic involved (algorithmic transparency)[174], as well as the significance and the envisaged consequences of such processing (Article 15(1)(h))[175].

Problems surrounding the notions of 'solely automated' and 'meaningful human intervention', as well as the obligation to provide explanations under Articles 15 and 22 of the GDPR, however present interpretive challenges, as demonstrated by the case law of the CJEU and the national administrative and judicial decision[176]. In parallel with the obligations relating to provision of information, Article 10 of the PWD establishes a requirement to ensure human oversight over AM systems used by platform providers. It requires platform operators to implement measures that guarantee human intervention where necessary, particularly in decisionmaking processes that significantly affect workers' rights and working conditions. The article aims to prevent automated systems from making critical decisions without human review, thereby safeguarding workers' rights and ensuring transparency, fairness, and accountability in the use of AM systems. More generally, it mandates platform companies to maintain sufficient human check and oversight concerning AM algorithms, to ensure these mechanisms do not infringe on workers' rights or result in unfair treatment.

Article 11 of the PWD sets out safeguards for human review of automated decisions, in particular in decisionmaking processes that significantly affect workers' rights or working conditions. This includes the possibility to discuss and clarify any facts that have led to a decision taken by an automated system with a contact person designated by the platform, and the obligation to rectify any decisions that have infringed the rights of the person working through the platform.

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173 Recital 71 goes even further and requests that such safeguards should also include the right to obtain an explanation of the decision reached and the right to challenge the decision.

174 This includes '*a right to an **explanation of the procedure and principles** actually applied in order to use, by automated means, the personal data of the data subject with a view to obtaining a specific result*'. Such 'relevant information' must be 'concise, transparent, intelligible and easily accessible'. See CJEU C-230/22, Dun & Bradstreet Austria.

175 For more information, see Article 29 Data Protection Working Party, Guidelines on Automated individual decision-making and Profiling for the purposes of Regulation 2016/679 (WP251rev.01), revised and adopted on 6 February 2018.

176 Hießl, C., Case Law on Algorithmic Management at the Workplace: Cross-European Comparative Analysis and Tentative Conclusions, 2025.

While the PWD covers a wide range of AM tools, including semi-automated decisions, the GDPR only protects fully automated and high-impact outcomes. Another difference between the GDPR's and the PWD's safeguards is that the GDPR provides an ex-post individual remedy, whereas the PWD imposes ex-ante organisational duties. Compared to the PWD, the AI Act only requires deployers to inform subjects of automated- or AI-assisted decisions without requiring certain decisions to be taken by humans only[177]. This creates a distortion between the rights of persons performing platform work subject to the PWD and other workers where AM systems are deployed.

In its National Collective Agreement of May 2023, Spain established that the deployment of AI systems in companies must follow the principle of human control, security, and transparency. Similarly, although limited to a single sector, the Spanish 24th Collective agreement of the banking sector of 2021 protects employees from decisions based solely on automated decision and against bias and discrimination.

In the Netherlands, on occasion of court proceedings in the case *Uber B.V. and Uber Technologies* Inc., the Amsterdam Court of Appeal ruled on grounds of national data protection law that platforms hiring workers shall provide information about the functioning of their algorithms and ensure meaningful human intervention in decisions based on automated processing (See also Section 3.2.4 below).

In France, a dual regime applies differently to fully automated individual decisions taken by private and public entities. Pursuant to Article 47 of the French data protection law, private entities, such as private employers, are prohibited to take any individual decision based on a fully-automated data processing system whereas, public authorities, including public employers, are allowed to do so under the following conditions: The decision shall not process sensitive data; it explicitly informs the person concerned that it is grounded on algorithmic processing and that information on the characteristics and rules applicable to that algorithmic processing can be requested (transparency) and, that the data processor exercises human oversight on the algorithmic processing and its evolutions and is able to explain that processing, in details and understandably, to the person concerned. Although this regime is laid down in the general data protection law, it applies to employment settings and creates a distinction between public and private workers.

No other examples or initiatives were identified in the other selected Member States.

Ex-ante assessment and continuous monitoring

AI Act, GDPR and PWD all require ex-ante impact assessment before rolling out an AM tool, which might need to be performed cumulatively, depending on circumstances of the case.

The AI Act provides for several types of risk assessment throughout the market chain. These include those conducted by certain AI deployers (i.e. employers using the AM tools), who are obliged to conduct a fundamental rights impact assessment (FRIA)[178]. However, the scope of such a FRIA is limited to the deployment of high-risk AI systems, such as AM tools, by public entities and private entities providing public services[179]. Therefore, excluding private employers from the scope of this obligation. At providers' level, a continuous risk management system (RMS) shall be established to

[177] See Article 10 of the PWD and Article 26(11) of the AI Act.

[178] Article 27 of the AI Act.

[179] Article 27(1) of the AI Act. See also, Opinion of the European Economic and Social Committee – Pro-workers AI: levers for harnessing the potential and mitigating the risks of AI in connection with employment and labour market policies (own initiative opinion).

identify, estimate, evaluate and address risks throughout the entire lifecycle of high-risks AI systems[180]. These RMSs shall be developed, implemented and maintained through a continuous iterative process including regular systematic reviews and updates as necessary[181]. While this suggests a possibility for social partners to be regularly informed of the risks[182], no participation to the evaluation process can be foreseen by workers' representatives or employers (i.e. deployers) as this exercise only falls on AI system providers.

Meanwhile, employers deploying AM tools may also be required to carry out a data protection impact assessment (DPIA). The AI Act explicitly states that its FRIA 'shall complement'[183] the DPIA, which usually involves a more detailed analysis of these processing activities in order to identify, evaluate and mitigate the risks associated with the processing of such data[184]. Whether or not a DPIA is required for the use of AM depends on a case-by-case assessment[185]. In principle, Article 35 of the GDPR requires a controller to carry out such an assessment when processing data is likely to result in a high risk to the rights and freedoms of data subjects. This is the case, for example, when controllers (i.e. employers) use new technologies to track workers' location or behaviour, or when data processing is used to make automated decisions about workers that could have legal (or similarly significant) effects. The EDPB guidelines aim to clarify when the preparation of a DPIA is necessary by providing criteria for national lists of processing operations requiring such an assessment[186]. Article 8 of the PWD ensures that any processing of personal data by a digital labour platform using such automated systems is considered high-risk processing under the GDPR, requiring a DPIA. Moreover, Article 12 PWD requires an assessment of physical, psychosocial and ergonomic risks resulting from an AM tool to be carried out prior to the deployment and whenever circumstances change. As mentioned earlier, the personal scope of the PWD is, however, limited to persons performing platform work and would not extend to workers in other workplaces. In addition, ex-post monitoring of the AM deployment is required by the AI Act and, in the context of persons performing platform work by the PWD but no such safeguard exists in the GDPR.

Article 26(5) of the AI Act requires AI deployers to monitor the operation of the high-risk AI system on the basis of the instructions for use and, where relevant, inform providers in accordance where they have reason to consider that the use of the high-risk AI system in accordance with the instructions may result in that AI system presenting a risk and the relevant market surveillance authority, and shall suspend the use of that system. Where deployers have identified a serious incident, they shall also immediately inform first the provider, and then the importer or distributor and the relevant market surveillance authorities of that incident. Article 10(1) PWD requires a

180 Article 9 of the AI Act.

181 Article 9(1) and 9(2) of the AI Act.

182 industriALL, 2024.

183 Article 27(4) of the AI Act.

184 Article 35(1) GDPR.

185 In line with the risk-based approach in the GDPR, carrying out a DPIA is not mandatory for every processing operation.

186 In line with Article 35(4) GDPR, national data protection authorities must establish a list of processing operations for which a DPIA should be prepared, while Article 35(5) GDPR gives provides an option to also establish a list of activities for which no DPIA is required.

periodic follow-up to take place of the risk assessments related to OSH required by Article 12. Regularly and in any event every two years, digital platforms are required to carry out an evaluation of the impact of individual decisions taken or supported by automated systems on persons performing platform work, including, where applicable on their working conditions and equal treatment at work.

In the Netherlands, a non-binding supporting document has been developed to support responsible AI systems deployment. The AI Impact Assessment (AIIA) is soft law instrument designed to help organisations identify and mitigate ethical and societal risks associated with AI deployment. While not specifically focusing on AI/AM deployment in workplaces, it facilitates FRIA including non-discrimination principles where algorithmic management tools are used, particularly within public institutions. It also provides a structured reflection on transparency, human oversight, and potential societal harms.

No other examples or initiatives were identified in the other selected Member States.

3.2.3. Organisation of working time

AM systems may be used to better organise working time, leave and other work arrangements or schedules across employees, in a number of ways. For instance, AM systems can be used to create optimal work schedules based on availability of employees, demand forecasts and regulatory or individual requirements, such as daily working hours, minimum rest periods, and specific working arrangements of an employee. AM systems can also be implemented to monitor working time, including for reporting to national authorities. Data gathered by AM systems could be used by undertakings to optimise productivity or planning.

A number of legal instruments have been adopted over the years in relation to the organisation of working time, including at EU level. In particular, the Working Time Directive[187], and more recently the Directive on Transparent and Predictable Working Conditions[188] and the Work-Life Balance Directive[189], regulate aspects of working time and working conditions that could potentially be impacted by the use of AM systems.

For instance, rules on daily working hours, weekly rest periods, maximum weekly working time, are set out in detailed terms in the Working Time Directive and need to be respected both in traditional employment relationships and in those employing AM tools as they are generally applicable to workers. The CJEU had the occasion to deal with the use of a digital tool recording working time in *CCOO* case and has clarified that the failure to ensure compliance with the right to a limitation on maximum working time and minimum rest period is incompatible with the objective of the Directive[190]. These elements are essential for the health and safety of workers, and given the fundamental nature of these rights, they should not be subordinated to purely economic considerations[191]. The CJEU also considered, in *Rudy Matzak*, that 'stand-by' time, during which the

187 Directive 2003/88/EC.

188 Directive (EU) 2019/1152.

189 Directive (EU) 2019/1158.

190 CJEU, C-55/18, Federación de Servicios de Comisiones Obreras (CCOO) v Deutsche Bank.

191 See note 103, page 48.

worker's opportunities to carry out other activities are significantly restricted, is to be regarded as working time[192].

The Directive on Transparent and Predictable Working Conditions sets out legal requirements for the provision of information to workers about employment conditions and predictability of work schedules. The Directive, for instance, requires workers to be provided with their work schedules well in advance, provides specific protection to workers on atypical or highly flexible contracts (such on-call work contracts or zero-hour contracts) and allows workers to request changes to work schedules. The requirements of the Directive apply to a broad range of workers across the EU, including those on more flexible work contracts. The Directive does, however, not contain specific provisions regarding the use of AM systems.

Further limits to extended workload are offered by the Work-Life Balance Directive, aiming to facilitate work-life balance for parents and carers and flexible working arrangements. Protective mechanisms for workers include the obligation for the employer to consider and respond to the request of flexible working arrangements, and to justify any refusals or postponements (Article 9), protection from dismissal (Article 12) and from any less favourable treatment resulting from their request (Article 14). These provisions support work-life balance and encourage adaptable work practices and must be respected also in situations where AM systems are used[193].

AM systems at the work floor present opportunities for increased efficiency and enhanced compliance, including with the legal requirements set out in the labour law Directives. For instance, AM systems may be used to monitor and automatically report working time to enforcement authorities, including in sectors where access to the 'work floor' for inspections is more challenging. However, the use of AM systems also creates specific regulatory needs in relation to transparency and wellbeing at work which are not currently addressed in the working time acquis.

Pursuant to Article 6(2) and Point 4(b) of Annex III of the AI Act, AI systems used for the purpose of workers' management leading to decisions affecting the terms of their working relationship or allocating tasks based on workers' behaviour and personal traits are expressly qualified as high-risks AI systems due to their potential impact on the safety, health and fundamental rights of the workers concerned.

The Platform Work Directive sets out specific protection mechanisms for persons working through digital platforms, in particular regarding transparency and fairness of work arrangements. These range from the information and transparency requirements set out above in section 3.2.1 to concrete limitations for algorithmic monitoring and profiling of workers at the work floor. Similar protection mechanisms are considered necessary to enhance the protection of all workers exposed to AM systems in the workplace

192 CJEU, C-518/15, *Ville de Nivelles* v *Rudy Matzak*.

193 European Commission, Study exploring the context, challenges, opportunities and trends in algorithmic management, 2023.

No example or initiative on how automated systems for time management or organisation adhere to working time limits was identified in the selected Member States.

According to the JRC study on the platformisation of work and an OECD artificial intelligence paper on algorithmic management in the workplace, Spanish and German employees' worktime is heavily monitored through digital tools in general (50 % of employees in Germany for 46 % in Spain). A larger difference is noted between the use of AM systems which is broadly used in Spain compared to Germany. According to the JRC study, AM systems used for the automated allocation of work are the most widespread form of AM systems identified in Spain and Germany, where 11 % of German workers and 19 % of Spanish workers are automatically allocated their shifts or working time via digital device.

3.2.4. Data protection and privacy

The use of modern digital technologies has added a new layer of complexity in monitoring and surveillance in the workplace, through many different devices such as smartphones, desktops, tablets, vehicles and wearables[194]. This has been compounded by the COVID-19 pandemic that gave rise to the full automatization of the managerial functions. This section explores to what extent the data protection legislation addresses the use of AM at workplace.

The right to data protection, recognised in Article 8 of the Charter and also enshrined in Article 16 TFEU is seen as an essential component of respect for private and family life and is part of the rights protected by Article 8 of the European Convention on Human Rights (ECHR)[195]. The GDPR provides a general legal framework for the protection of personal data, which applies to private and public actors processing personal data at national level, including in the workplace. Considering the need of important datasets for the improvement, actualisation and well-functioning of AI, both the European Framework Convention on AI and the EU AI Act also lay down standards on personal data protection and data governance. Article 11 of the European Framework Convention on AI particularly insists on the need to uphold the right to privacy and the protection of personal data throughout AI system' lifecycle. It also commands that effective guaranties and safeguards are put in place under national and international law to protect the rights of individuals. In relation to the use of AI for managerial and employment purposes, Recital 57 of the AI Act expressly acknowledges that AI systems used to monitor the performance and behaviour of such persons may undermine their fundamental rights to data protection and privacy. Nevertheless, the Regulation does not insist on personal data protection and rather establishes rules on data governance. Such a lack of special provisions in the AI Act is explained by the use of consistency mechanisms in relation to the GDPR. Indeed, the AI Act heavily relies on the already-existing GDPR, through cross-references and no prejudice clauses to safeguard users' data protection[196]. Conversely, Article 10 of the AI Act rather

194 Article 29 Data Protection Working Party, Opinion 2/2017 on data processing at work, Adopted on 8 June 2017, p. 9.

195 The concept of 'private life' has been broadly interpreted in the case law of the European Court of Human Rights to include respect for one's physical, psychological or moral identity, identity and autonomy, image and reputation. As such, it includes intimate situations, sensitive or confidential information, information that could affect the public's perception of an individual, **and even aspects of one's** family and **professional life** and public behaviour.

196 See for instance Articles 2(7), 10(5) or 26(9) and Recitals 10 and 53 of the AI Act.

focuses on data governance, setting out standards to ensure that high-risk AI systems rely on high-quality datasets to train AI models, hence avoiding errors and biases.

While the GDPR generally ensures that workers receive adequate information on the scope and nature of the monitoring and surveillance[197], and that employers are required to justify the measures[198] and minimise[199] their impact by deploying the least intrusive methods, this omnibus approach has several deficiencies:

Imbalance of power between the parties: Although labour law provides special protection for workers to counterbalance the subordinate nature of employment relationships, the GDPR does not treat workers differently to other data subjects. The EDPB has also affirmed that workers are not in an equal position of power, advising against relying on consent as a lawful legal basis given the dependency resulting from the employment relationship, as it is unlikely that such consent could be freely given[200];

Lack of collective dimension: Although the GDPR permits the representation of data subjects (Article 80), it does not cover important collective aspects of labour law. These include the role of workers' representatives, the consultation of workers, and the role of labour inspectorates in enforcing labour rights[201]. The GDPR safeguards the individual right of workers to have their data protected.

Several attempts to introduce an EU-level data protection framework targeting exclusively workplace relations failed. The lack of political agreement resulted in the 'opening clause' under Article 88(1) of the GDPR, which allows Member States to pass their own legislation on employee data protection[202]. Some scholars argue that, on the one hand, this compromise promoted diverse and innovative regulatory approaches at the level of the Member States, while on the other hand it created further fragmentation, legal uncertainty and inconsistent enforcement[203]. The CJEU recently ruled[204] that three conditions must be met for the use of Article 88: (i) national law must be specific to employment and distinct from general GDPR rules; (ii) the purpose must be to protect the rights and freedoms of workers; and (iii) suitable and specific measures must be in place in accordance with Article 88(2). Although they are not defined, a set of substantive requirements can be derived

197 In line with Articles 12 and 13, employers in their role as controllers need to provide transparency to workers (i.e. data subjects), meaning that they should provide them with the following information: (i) the identity and the contact details of the controller, (ii) contact details of the DPO, (iii) purpose and legal basis, (iv) categories of personal data, (v) recipients, (vi) transfers, (vii) retention periods, (viii) legitimate interests, (ix) exercising rights, (x) lodging complaints with DPA, (xi) source, (xii) automated decisionmaking.

198 Principle of lawfulness (Article 5(1)(a) GDPR) requests that data are processed lawfully, meaning that the controller must be able to demonstrate one of the lawful legal bases for the processing of personal data specified in Article 6 or even in Article 9, in the case of special categories of data.

199 The principle of data minimisation requires that personal data are adequate, relevant and limited to what is necessary in relation to the purpose shall be processed (Article 5(1)(c) GDPR).

200 Article 29 Working Party, 2018, Guidelines on Consent under Regulation 2016/679.

201 Proposal for a Directive on improving working conditions in platform work, COM(2021)762 final.

202 See also Recital 155.

203 Abraha, 2022.

204 CJEU C-34/21, Hauptpersonalrat der Lehrerinnen und Lehrer.

from non-binding instruments[205] regulating data protection in the workplace, including the principles of finality, necessity and proportionality, transparency, and information and consultation[206].

At the EU level, the interplay between data protection and employment legislation has been addressed in the Platform Work Directive. Article 7 of the PWD establishes limitations on the processing of personal data by means of automated monitoring or decisionmaking systems, including a clear prohibition to use such systems for the processing of personal data relating to, for instance, emotional or psychological wellbeing, private conversations, offline data or data relating to specific criteria, e.g. ethnicity, migratory status, political or religious opinions, diseases, etc. The limitations on processing of personal data extend from the start of the recruitment or selection procedure.

In the absence of a specific regulatory framework, national authorities have leveraged the GDPR rules, concepts and prerogatives to protect workers' fundamental rights against intrusive AM systems deployed in the workplace.

In April 2023 in the Netherlands, the Amsterdam Court of Appeal fined *Uber B.V. and Uber Technologies Inc.* to a EUR. 584.000 fine for failure to uphold platform workers' right to personal data protection in a dismissal process. In this case, drivers argued that their platform accounts had been automatically disactivated, being, de facto, dismissed from their possibility to use that intermediary platform to work. On grounds of data subject's right to access information (Article 15(1) GDPR), the Court ruled that the employer must provide information about the functioning of its algorithms. It also found a breach of safeguards against automated individual decisions making and profiling (Article 22 GDPR) and concluded that companies shall ensure meaningful human intervention in decisions based on automated processing.

Similarly in France, by decision of 27 December 2023, the data protection authority fined *Amazon France Logistique* a EUR. 32 million administrative sanction for an overly intrusive AI automated monitoring and evaluating system and the use of video surveillance systems without workers' prior information. Regarding the use of automated tools, the authority sanctioned the deployment of a highly precise tool measuring employees' activities interruption as well as the speed of their product scanning frequency to minimise stock supply errors and supervise employees' work planification and evaluations. The authority found that Amazon had breached the principle of data minimisation for its too precise pause monitoring system (Article 5(1)(c), GDPR) as well as the principles of lawful processing and transparency obligations for not informing employees of the establishment of an intrusive evaluation system.

An example of soft-law tool has been found in France. The national data protection authority (CNIL) has developed a series of practical recommendations on the application of the GDPR to the development and deployment of AI systems. A specific case study illustrates how SMEs can use generative-AI to draft job offers and the key elements to be considered to comply with data protection rules. Although relevant to the employment context, these recommendations do not specifically address risks and challenges arising from the use of AM in the workplace.

No other examples or initiatives were identified in the other selected Member States.

[205] For example, the Council of Europe Recommendation No R (89) on the Protection of Personal Data Used for Employment Purposes 1989 (revised in 2015), the ILO Code of practice on the protection of workers' personal data 1997, and the Article 29 Working Party, Opinion 8/2001 on the processing of personal data in the employment context, 5062/01/EN/Final WP 48.

[206] Abraha, 2022.

3.2.5. Bias and discrimination

Workers are protected against discrimination in a number of ways also through EU primary[207] and secondary law, e.g., the Race Equality Directive[208] prohibits discrimination on the grounds of race or ethnic group, the Employment Equality Directive[209] on the grounds of age, religion or belief, disability, or sexual orientation, and the Gender equality in employment and occupation Directive[210] on the grounds of sex. For example, Article 2 of the Employment Equality Directive forbids both direct and indirect discrimination. Workers are afforded protection through a reversal of burden of proof in legal proceedings (Article 11), while additional safeguards include protection against dismissal or other adverse treatment resulting from the complaint (Article 12). More recently, the Pay Transparency Directive reinforces the principle of equal pay between men and women for work of equal value.

Like humans, algorithms can be vulnerable to biases that can result in unfair and/or discriminatory predictions. Not all biases however result in unlawful discrimination[211]. When this is the case, the EU equal treatment and non-discrimination legislation also applies to the use of AM systems.

The principle of equal treatment, as an overarching principle of EU law and enshrined in Article 21 of the Charter of Fundamental Rights (Charter), has already been recognised as applicable to algorithms in the Deliveroo case[212]. In this case, the Italian Court found that the algorithm used by Deliveroo was discriminatory as it allocated timeslots on the basis of riders' ability to offer and accept work, with no consideration of personal reasons (e.g., family issues or childcare) for late cancellation or non-participation in peak shifts[213]. In addition, the CJEU has previously ruled that the anti-discrimination rules are directly applicable in disputes between private parties, including employment relationships, even though the directives are generally addressed to Member States[214].

However, the current boundaries of EU non-discrimination law are being challenged by algorithmic discrimination for a number of reasons:

Distinction between direct and indirect discrimination[215]: While direct discrimination does not, in principle, require justification, the proportionality test is applied in cases of indirect discrimination. Presenting evidence to support workers' claims may therefore be especially difficult for reasons such as trade secrets and IP protection.

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207 See in particular Articles 19 and 157 TFEU and Articles 21 and 23 of the Charter.

208 Council Directive 2000/43/EC.

209 Council Directive 2000/78/EC.

210 Directive 2006/54/EC.

211 For more insights into addressing bias in AI and algorithms, see ELA, Artificial intelligence and algorithms in risk assessment. A Handbook, July 2024.

212 Ruling of the Court of Bologna of 31 December 2020, http://www.soluzionilavoro.it/2021/01/07/giurisprudenza-tribunale-di-bologna-ordinanza-31-dicembre-2020/.

213 See An Italian lesson for Deliveroo: Computer programmes do not always think of everything!

214 See e.g. CJEU C-414/16, Vera Egenberger v Evangelisches Werk für Diakonie und Entwicklung e.V.

215 For the discussion on whereas discriminatory AI/AM systems should be argued under direct or indirect discrimination see, for example, Adams-Prassl, J., Binns, R. and Kelly-Lyth, A., Directly Discriminatory Algorithms.

Lack of transparency ('black box' problem): AM decisionmaking is often opaque, making it difficult for individuals or courts to understand, trace, or prove discriminatory treatment.

Intersectional discrimination: The Gender Shades study[216] showed that facial recognition software of large commercial platforms was biased against several groups, but especially against dark-skinned women (so called intersectional discrimination to race and gender). However, the CJEU[217] so far does not fully recognise discrimination resulting from the combination of more grounds.

Limited number of protected grounds: The list of protected grounds in EU directives is closed and exhaustive, limiting protection for emerging risks like discrimination based on social origin or socioeconomic status[218].

From the digital acquis perspective, the protection of fundamental rights is the primary objective of the European Framework Convention on AI and the AI Act and the GDPR. Recital 71 of the GDPR AI and data processing used for profiling must not be discriminatory and that potential biases should be anticipated and prevented. Recital 57 of the AI Act acknowledges that AI systems used for recruitment processes, evaluation, promotion, or retention of persons in a working position may perpetuate historical patterns of discrimination against *inter alia* women, certain age groups, persons with disabilities, or persons of certain racial or ethnic origins or sexual orientation. This is the reason why such AI systems are expressly qualified as high-risk AI systems and their technical documentation shall contain detailed information on the potential discriminatory impacts it may have[219].

Article 10 of the European Framework Convention on AI sets out two distinct obligations on equality and non-discrimination. First, the Parties to the Convention shall adopt rules to uphold the right to non-discrimination and equality, including explicitly gender equality. Second, Parties are also required to establish rules aimed at overcoming any inequality issue arising from the use or functioning of AI systems throughout their lifecycle. The AI Act establishes mechanisms to ensure high-risks AI systems' harmful potential are addressed. For instance, Article 15(4) sets out specific obligations in relation to high-risk AI systems' accuracy and resilience against errors, inconsistencies, faults and biases. Operators shall adopt technical and operational measures in that regard such as fail-plans and backups. This provision also requires such AI systems to be developed in a way that eliminates biased outputs, taking into consideration these AI systems' environment and their interactions with natural persons.

The PWD sets out a number of specific safeguards for non-discrimination in relation to AM by digital platforms. For instance, Article 7(1) PWD prohibits platforms from processing data that reveal race or ethnic origin, disability, health, trade union membership, religion, etc. when deploying automated monitoring or decisionmaking systems. Moreover, Article 10, which sets up the requirement to carry out regular risk assessments of AM associated risks contains a specific obligation for the employer

216 Buolamwini and Gebru, 2018.

217 CJEU C-443/15, David L. Parris v Trinity College Dublin and Others.

218 See, for example, CJEU, C-354/13, Fag og Arbejde (FOA) v Kommunernes Landsforening (KL).

219 Article 11(1) and Annex IV of the AI Act.

to modify or switch off any systems that entail a high risk of discrimination. As noted by Eurofound, the PWD thus sets up a 'bias-monitoring' duty set in relation to platform work[220].

In the Netherlands, the Equal Opportunities in Recruitment and Selection Act has been introduced very recently (2025). It aims at combating discrimination in the recruitment and selection process including when algorithms are used. It requires employers with more than 25 employees to develop a publicly accessible procedure to explain how discrimination is prevented.

No other examples or initiatives were identified in the other selected Member States.

3.2.6. Health and safety

Risk assessment

The general rules on the prevention and protection of workers in the workplace are set out in the OSH Framework Directive. A core element of workplace safety is the risk assessment[221]. This assessment involves identifying potential hazards, analysing the risks they create and implementing measures to mitigate or eliminate them. Another key feature of the OSH Framework Directive is the emphasis on a proactive, risk-based approach: employers have the duty to keep themselves informed of the last advanced technologies and scientific findings[222], and to adapt the work to the individuals and to the 'choice of working and production methods', as well as to 'technical progress'[223]. This implies that risk prevention measures need to be modified if circumstances evolve, including technological developments or working conditions. To this end, the EU-OSHA and the EU sectoral social dialogue partners have developed a new Online interactive Risk Assessment (OiRA) tool to help micro and small enterprises (MSEs) assess occupational safety and health risks related to task automation[224].

Without prejudice to general OSH rules, Article 12 of the PWD sets out specific obligations for the health and safety of persons performing platform work. Platforms have to evaluate the risks associated with the use of automated monitoring and decisionmaking systems, focusing for instance on psychosocial issues resulting from the use of such systems. The adequacy of safeguards already in place have to be assessed ensuring that they are still appropriate for the risks identified. Preventive and protective measures have to be implemented to mitigate such risks.

Specific risks linked to AM optimisation

Pursuant to the OSH Framework Directive, employers are obliged to ensure safety and health of workers 'in every aspect related to the work'[225], which encompasses workers' mental health. One of the potential risks associated with the use of AM systems is the increase of psychological stress and

220 Eurofound, 2024.

221 Article 9(1) of the OSH Framework Directive.

222 Preamble of the OSH Framework Directive.

223 Article 6(2), points (d) and (e) of the OSH Framework Directive.

224 See: OSHA, Safe automation of work with new Online interactive Risk Assessment tool, 2025.

225 Article 5 of the OSH Framework Directive.

anxiety[226] due to constant monitoring or the pressure of the need to optimise work processes. The broad formulation of the principles and obligations set out in the Directive may serve as a protective framework for mental health as well. Moreover, the Directive explicitly highlights the importance for employers to alleviate 'monotonous work and work at predetermined work-rate'[227] and to consider their effect on mental health.

Other specific risks relate, for example, to the continuous use of computers or laptops, specific tools and to the workplace physical environment. The Display Screen Directive[228], for example requires employers to assess workstations, evaluating the safety and health conditions with particular regard to risks to eyesight, physical problems and problems of mental health[229] arising from the use of display screen equipment[230]. The Directive also contains requirements for software which shall be easy to use and adaptable to the worker's level of knowledge and experiences. Moreover, there shall be no 'quantitative or qualitative checking facility' without workers' being aware of and the principles of software ergonomics must be applied, in particular to human data processing[231]. While the Directive was originally designed for traditional IT systems, its ergonomic principles provide a critical foundation for ensuring that AM systems remain human-centred, transparent, and supportive of workers' wellbeing.

Additional requirements for the workplace or work equipment are contained in the Workplace Directive[232] and in the Work Equipment Directive[233]. Employers must consider a number of factors with the view to safeguarding health and safety of the workplace, such as light, ventilation, doors, emergency routes, but also technical devices and electrical installations[234]. The latter is broadly defined in the Directive, as the place where workstations is as well as any other place within the area of the undertaking to which the workers have access in the course of their employment[235]. Work equipment, i.e., 'any machine, apparatus, tool or installation used at work'[236] must also be safe, suitable for the work to be carried out and must be used without impairing workers' safety and health[237].

226 OSHA, 2024.

227 European Commission, 2023.

228 Council Directive 90/270/EEC, consolidated text.

229 Article 3(1) of the Display Screen Directive.

230 *Display screen equipment* is defined as: 'an alphanumeric or graphic display screen, regardless of the display process employed' (Article 2).

231 Point 3 of the Annex.

232 Council Directive 89/654/EEC.

233 Directive 2009/104/EC.

234 Article 6 of the Workplace Directive.

235 Article 2 of the Workplace Directive.

236 Article 2(a) of the Work Equipment Directive.

237 Article 3 of the Work Equipment Directive.

More specific rules are in place for persons performing platform work as the PWD contains a precise obligation to avoid deploying automated systems in a way that exerts undue pressure on workers or endangers their physical or mental wellbeing. The scope of this obligation applies not only to fully automated decisionmaking systems but also to any automated systems that support or influence decisions impacting workers in any aspect, including their safety, working conditions, or rights. Finally, Member States are tasked with ensuring that digital labour platforms take preventive measures to protect workers from violence, harassment, and other hazards, including establishing effective reporting channels so workers can report safety concerns or incidents.

EU Member States have general health and safety regulations implementing the EU OSH regulatory framework. The Working Conditions Act in the Netherlands, for example, requires employers to draw up a risk inventory to identify and evaluate all hazards and risks to employees in the workplace. Such risks can cover potential hazards arising from the use of AM systems. Other Member States have similar regulatory frameworks, setting out broad and general obligations which, however, may cover but do not explicitly address AM systems in the workplace.

No other examples or initiatives were identified in the other selected Member States.

3.2.7. Social dialogue (e.g. collective bargaining, social partners agreements)

While AM tools can improve productivity and planning, they also risk undermining traditional mechanisms of workplace democracy and collective representation. Social dialogue is a fundamental component of the European social model[238]. The EU fosters social dialogue through negotiations, consultations or exchange of information in either bipartite (e.g. collective bargaining between social partners) or tripartite relation (e.g. dialogue between public authorities and social partners).

The importance of social dialogue is recognised in EU primary law, especially in Articles 151 – 156 of the TFEU as well as in Article 27 of the Charter that protects workers' right to consultation within the employer and Article 28 that protect workers' rights to collective bargaining and action.

As illustrated above (see section 3.2.1), the importance of consultation in the workplace is recognised also by EU labour and OSH legislation. The Information and Consultation Directive recognises the need to strengthen dialogue and information and consultation on situations which will impact employment situations, or on the measures taken to anticipate potential risks[239]. Consultations are needed for any decisions of the employers' that may lead to a 'threat to employment' or 'to substantial changes in work organisation or in contractual relations'[240]. Recent Eurofound and EU-OSHA reports highlight that such existing legal obligations should be understood as including decisions on the deployment and use of AM systems in the workplace. Nevertheless, legal scholars argue there is a need to make such obligations more explicit.

Procedural rules on when and how consultations shall take place are also set out in EU law. The reorganisation of work or changes in situations resulting from the adoption of AM systems may require employers to consult with their employees and their representatives. However, this

238 Principle 8 of the European Pillar of Social Rights.

239 Preamble of the Information and Consultation Directive.

240 Article 4(2) of the Information and Consultation Directive.

obligation is not evident in the legislation. The European Works Council Directive[241] further enhances consultation obligations in the context of undertakings or groups of undertakings established across different Member States[242]. The question of consultation on the topic of deployment of AM in the workplace is not addressed.

It seems that, at least for the time being, social dialogue regarding AI topics is not particularly well developed[243]. However, in recent years, EU social partners have concluded a series of autonomous agreements concerning, for example, aspects such as telework[244], work-related stress[245] and digitalisation[246]. These framework agreements reflect the social partners' efforts to modernise work organisation, adapt to evolving workplace realities, and promote the integration of new technologies in a way that minimises risks to workers. Measures targeted the use of AM tools in the workplace are contained in the Framework Agreement on Digitalisation. This Framework Agreement has been concluded by the European cross-sectoral social partners and therefore applies to the whole EU territory as well as the territories of the European Economic Area (EEA). It covers all workers and employers of both the public and private sector notwithstanding their form or activities, including economic activities using online platforms. The Framework Agreements applies to all forms of working relationship as defined under national law[247]. According to this agreement, the deployment of AI systems in the world of work should: (i) follow the human-control principle, (ii) undergo risk assessment to prevent any harm (physical and psychological), (iii) be fair and ensure avoidance of bias and discrimination, (iv) transparent and explicable with effective oversight. If AM is employed in HR procedures (e.g., recruitment, performance analysis), its use must be transparent and subject to human intervention if requested by the worker, who is always allowed to contest the decision. Information on the relevant agreements covering AM provisions at Member States level is available in the UNI Europa database[248], which will be further explored with regard to the six selected Member States.

The digital instruments do not really regulate social dialogue. The exception is Article 26(7) of the AI Act, which requires the employers, who are deployers of high-risk AI systems at the workplace, to also inform workers' representatives and the affected workers that they will be subject to the use of the high-risk AI system. This obligation is limited to the provision of information and does not necessitate consultations with workers' representatives. Additionally, the AI Act does not preclude the adoption or preservation of more favourable national legislation and to particularly encourage or allow the adoption of collective agreements[249]. Recital 9 further details that the AI Act should not

241 Directive 2009/38/EC.

242 Member States are to provide for the right to establish European Works Councils in companies or groups of companies with at least 1000 employees in the EU and the other countries of the European Economic Area, when there are at least 150 employees in each of two Member States.

243 industriALL, 2022.

244 Framework agreement on telework, 2002.

245 Framework agreement on work-related stress, 2004.

246 Framework agreement on digitalisation, 2020.

247 European Framework Agreement on Digitalisation, Scope.

248 UNI Europa, Database of AI and AM in collective bargaining agreements.

249 Recital 9 and Article 2(11) of the AI Act.

affect the exercise of workers' fundamental rights recognised at the EU and national levels, including the right to negotiate, to conclude and enforce collective agreements.

On the other hand, PWD ensures that workers' representatives are provided with comprehensive details about AM systems in advance of their deployment and whenever relevant changes occur. Also, authorities can request this information at any time.

At national level, social partners play a more important role in the protection of workers' interests in AI matters. In the Netherlands and Spain collective bargaining agreements and social dialogue are advanced. In the Netherlands, several collective labour agreements now address the use of AI in the workplace. For instance, the provisional Labour agreement for the insurance industry creates an obligation to inform employees on AI impacts on their work. It also includes guidelines for the adequate regulation of AI use between employers and employees. In Spain, alongside several sectoral collective agreements containing protective provisions on AI, the National Collective Agreement of May 2023 (V AENC) establishes similar provisions that apply to the entire territory.

In France, collective bargaining agreements remain limited to company agreements, mostly concluded in the communication, financial, and industrial manufacturing sectors. However, national authorities strongly encourage the use of social dialogue at all stages of AM systems deployment through supporting documents. Recently, the Dial-IA initiative involved 50 representatives of trade union and employers' representative organisations from the public and private sectors, academics and national authorities to reflect on how to strengthen social dialogue relating to AI was launched. This initiative led to the adoption of a manifesto and a comprehensive toolbox to guide collective bargaining and implement the 2020 European Social Partner Framework Agreement. This toolbox includes *inter alia,* a basic knowledge sheet on AI, a stake mapping, a list of arguments in favour of social dialogue and a mapping of leverages available to social partners to effectively engage in social dialogue on AI.

Some Member States also secured workers' rights to information and consultation through their representatives. In Sweden, the Co-determination Act creates a procedural obligation for employers to negotiate before introducing significant technological or structural changes. Similarly, in France, the Labour Code explicitly requires employers to consult work councils before the introduction of new technologies that can affect employees' OSH or working conditions. To issue an informed opinion the work council can request an expert's opinion. In the Netherlands, the Works Councils Act (WOR) requires companies' work councils to be consulted on the introduction of important technological innovations and to be asked for their consent when such instruments may affect employees' evaluation or personal data processing. Pursuant to Article 27(k) of the WOR, work councils have the right to express their consent to introduction of a system that collects, stores and uses personal data (e.g. appointment policy, sick leave, etc.). However, those obligations only apply to medium to larger companies subject to the obligation to have an internal work council.

National case-law however reveals discrepancies and uncertainties regarding the scope of employees' right to information, consultation or participation. In both France and Germany, national courts have been asked to clarify whether work councils and workers' right to co-determination extended to the deployment of AM systems in the workplace. In France, the Judicial Tribunal of Nanterre departed from the Court of Cassation's past case-law and found that work councils had to be consulted on the future deployment of AM systems prior to any deployment or training on such tools. In Germany, the Hamburg Court found that the mere authorisation for employees to use generative AI tools to perform their tasks required workers' consultation but did not justify the application of co-determination procedures.

In Poland, trade unions call for further involvement in discussions relating to AM in the workplace. On 4 December 2024, the National Commission Presidium of NSZZ 'Solidarność' adopted a Position on artificial intelligence in the workplace emphasising the need for a responsible implementation of AI technologies that minimises the potential negative effects. Solidarność further urges regulators to ensure that employees are duly consulted prior to the implementation of AI systems and that their right to privacy is upheld.

No other examples or initiatives were identified in the other selected Member States.

3.2.8. Redress (individual and collective) and enforcement

EU law provides access to justice in relation to infringement of EU primary and secondary legislation, which can be invoked in court, including in the area of labour law. There is not one specific EU legal instrument setting up a mechanism for collective redress, though specific legal instruments provide legal standing to workers representatives, such as trade unions, or NGOs to bring claims on behalf of workers. This is, for instance, the case in equal treatment legislation and more recent labour legislation, such as the Directive on minimum wages.

In addition to the human oversight requirements set up by the PWD in relation to digital platform work (including human review and the right to ask for corrections, see above), Article 18 of the PWD provides persons providing work through digital platforms with a general right to redress. The PWD extends such rights to persons whose employment or contractual relationship has ended and requires dispute resolution to be timely, effective and impartial. Moreover, the PWD requires Member States to guarantee adequate compensation for any damaged sustained resulting from infringements of the PWD. Additional procedural guarantees are included in the PWD, such as the possibility for courts and competent authorities to order platforms to disclose evidence (Article 21 PWD) and protection against adverse treatment and dismissal (Articles 22 and 23 PWD). Legal standing is provided to expressly provided worker representatives and NGOs.

The European Framework Convention on AI sets out obligations for the establishment of effective remedies to challenge AI practices and outputs that breach fundamental rights or the rule of law. Effective and accessible remedies shall be put in place to allow victims of an AI system activity breaching their fundamental rights[250]. In that context, relevant information must additionally be shared with the affected persons and the relevant national competent authorities to enable them to exercise their control and seek redress. The Convention also provides for the establishment of effective procedural guarantees to allow individuals who are victims of a wrongful AI system that have a significant adverse impact on the enjoyment of their right to act against it[251]. Article 26 commands Parties to establish effective oversight bodies to monitor the correct application of the obligations resulting from the Convention. This provision also foresees an obligation of effective administrative cooperation with human rights institutions and other authorities having overlapping competences.

The AI Act contains similar mechanisms, although it organises a more complex administrative oversighting structure focusing on market surveillance. These mechanisms cover all aspects of the economic lifecycle of AI systems and models, from their placement on the market[252] to ordinary market surveillance functions[253]. Similarly to the European Framework Convention on AI, Article 77 of the AI Act requires operators to share appropriate documents with national authorities competent to protect fundamental rights to facilitate their protective mandate. On that ground, fundamental rights bodies are entitled to access to documents and information to investigate on AI systems activities likely to have a damaging effect on fundamental rights, within the remit of their jurisdiction

250 Article 14(1) of the Framework Convention.

251 Article 15 of the Framework Convention.

252 Article 72 of the AI Act.

253 Article 74 to 84 of the AI Act.

and competence. They are also mandated to inform and cooperate with market surveillance authorities where necessary[254]. AI system providers are also mandated to report incidents caused by AI systems to the competent market authority in a timely manner. The AI Act also establishes a set of remedies for users and subject of a wrongful decision grounded on an AI output to exercise their rights. Individuals are indeed allowed to lodge a complaint to market surveillance authorities[255], make use of the protection granted to whistleblowers[256]. The AI Act does not contain any provision foreseeing collective redresses. As a market-oriented legislation it primarily focuses on market surveillance and cooperation between AI system providers and deployers. Nonetheless, the general clause laid down in Article 2(11) of the AI Act leave Member States an open-ended regulatory choice to maintain or introduce more favourable rules to enhance workers' ability to exercise their rights in an employment context, including by allowing the application of more favourable collective agreements[257].

The GDPR specifies remedies for workers with respect to the processing of their personal data. The Regulation sets out the rights of data subjects, with the aim of giving them control over their personal data. In the context of automated processing by AM tools, especially the right to access to the personal data and related information[258], the right to object to[259] or restrict the processing[260], the right to data portability[261] and the rights connected with automated individual decisionmaking[262] are of relevance. In addition, one or more independent data protection authorities (DPOs) ensure the effective application of data protection rules across all sectors[263]. These authorities can handle complaints lodged by data subjects and, where appropriate, investigate the subject matter of the complaint[264]. The DPO can issue warnings to ensure compliance, impose temporary or definitive bans, and issue administrative fines[265]. When it comes to employment matters, however, many national DPAs often lack the legitimacy and interest to do so. Although fines are not often imposed in the employment sector[266], the average amount is higher than in other sectors[267].

The above-listed remedies and enforcement actions are linked to the individual rights of workers. According to Article 80 of the GDPR, trade unions and workers' representatives can assist employees exercise their rights, but the GDPR does not give them any legal standing. Whether such bodies can launch collective actions and enforce data subjects' rights depends on national legal

254 Article 77(1) of the AI Act.

255 Article 85 of the AI Act.

256 Article 87 of the AI Act.

257 See Article 2(11) and Recital 9 of the AI Act.

258 Article 15(1) of the GDPR.

259 Article 21 of the GDPR.

260 Article 18 of the GDPR.

261 Article 20 of the GDPR.

262 Article 22 of the GDPR.

263 Article 51(1) of the GDPR.

264 Article 57 of the GDPR.

265 Article 58 of the GDPR.

266 Employment is eighth in the list of the 11 sectors, ranked by the number of fines. See: GDPR Enforcement Tracker.

267 Employment is the third sector based on the sum of fines. See: GDPR Enforcement Tracker.

systems. The main drawback of the current system is thus the lack of collective rights relating to transparency, information, human oversight, DPIA and the right to an explanation, as workers are very unlikely to take individual action due to a lack of knowledge, motivation and fear of retaliation by the employer. Additionally, AM tools also use data that is outside the scope of the GDPR, such as statistics and anonymised data, or data related to other individuals, for which there are limited possibilities for individual action.[268]

The distribution of powers relating to the use of AM systems at work is heterogenous. In all Member States, the use of AM systems in the workplace falls within the ordinary competence of labour inspectorates. There is no example of specific units, methods or tools available to labour inspectors to monitor the effects of AM systems on workers. Representatives of the French labour inspectorates suggested that further training would be necessary to adequately understand and address such new matters.

At the same time, in most Member States, data protection authorities acted through their GDPR prerogatives to oversight the use and challenges of AM systems, including in employment matters. As illustrated in Section 3.2.4, the French and Dutch data protection authorities used their administrative punitive powers to fine companies for their use of intrusive AM system and automated decisionmaking processes at work.

In the Netherlands, since 2023, the data protection authority has been appointed as the coordinating supervisory authority for algorithms and AI that threaten fundamental rights. For the implementation of the AI Act, it specifically created the Coordination of Algorithmic Oversight Department (DCA), a separate organisational unit which supervises the use of algorithms and AI. This unit provides overarching risk analysis, strengthens cooperation between supervisory authorities and contributes to the development of new legal frameworks. Similarly, the national AI authorities have responsibilities to enforce AI safety rules. For instance, Spain established a new AI Supervisory Agency (AESIA) competent to implement the AI Act and exercise technical and legal oversight to ensure the safe and ethical use of AI at the national level.

Beyond ordinary judicial actions and remedies to the data protection authorities, national laws do not have specific collective redress mechanisms addressing breaches of workers' rights by AM systems. No other examples or initiatives were identified in the other selected Member States.

3.3. Conclusion

This study carried out a mapping of key provisions and mechanisms relevant to the protection of workers during the deployment of AI and AM in the workplace. This exercise reveals that, while the EU digital acquis establishes a comprehensive regulatory framework for the use of AM across all sectors, and certain provisions within EU labour and OSH legislation could be construed as addressing issues related to AM systems in the workplace, the unique characteristics of workplace organisation give rise to new challenges.

The regulatory mapping shows that the existing EU legal framework already provides several **important safeguards** for workers in relation to AM, even though it was not designed primarily with this purpose in mind. Instruments such as the **GDPR** guarantee strong individual rights over personal

[268] See presentation of the Tobias Müllensiefen, European Commission / EUI, Worker Protection Between the GDPR the AI Act, at the EUI seminar AI and algorithms at the workplace: Socio economic implications and regulatory challenges on 5 May 2025.

data and establish some limitations to automated decisionmaking. The **AI Act** explicitly designates AM tools used in employment as *high-risk AI systems*, triggering obligations on transparency, human oversight and conformity assessments. The **OSH framework** imposes binding duties on employers to ensure safe and healthy working environments, which can extend to psychosocial risks linked to monitoring and algorithmic scheduling. Together, these measures provide certain general safeguards. To address the specific challenges of platform work, the **PWD** introduces targeted rules on transparency, fairness, human oversight, safety and accountability in one of the sectors most affected by AM. At the same time, the current framework continues to display **gaps and limitations**.

The regulatory analysis above is structured around the main protection mechanisms, set out in EU legislation, and features needed for the sound deployment of AM in the workplace, taking into consideration the Guidelines from the High-Level Expert Group. It also considered the use cases of AM in the workplace highlighted in the previous sections of this report. Based on this analysis, the main regulatory gaps at EU level have been identified as follows.

The EU legislation on working conditions typically applies to 'workers', the definition of which is largely left to Member States. As a result, certain individuals, such as persons performing platform work, workers in non-standard forms of employment (e.g. seasonal workers, on-call workers) or the (solo) self-employed[269], may not be covered by the full set of labour law guarantees. The PWD extends the specific protection mechanisms for the use of AM systems to persons performing platform work, including those in non-traditional employment relationships and (solo) self-employed. However, its protection mechanisms specifically designed for the deployment of AM apply only to the limited category of persons performing platform work, and not to other sectors of the economy. By contrast, digital acquis instruments such as the AI Act and the GDPR have a broader scope of application and do not offer specific protection mechanisms just for workers. As a result, workplace AM is only regulated indirectly through the obligations imposed on employers as business operators or as data controllers or processors, unless national rules specifically fill this gap. This leads to fragmentation and uneven coverage across employment statuses and between Member States.

In relation to **information and transparency obligations**, existing labour and OSH rules contain general duties to inform and consult workers, but they do not explicitly require disclosure about the use of AM systems. Moreover, the Information and Consultation Directive does not apply to smaller undertakings or establishments with less than 50 or 20 workers, respectfully. The AI Act introduces transparency duties, such as notifying workers when they are subject to a high-risk AI system and requires 'transparency by design' for AI developers. Such information requirements specifically cover information provision to workers, though they are less specific than those set out in the PWD for persons performing platform work.

Some of the legal instruments analysed require **specific safeguards** relevant for the deployment of AM systems, such as human oversight, the right to explanation, and impact assessments. However, the analysis has shown some limitations to some of these safeguards when it comes to the protection of workers' rights. For instance, the AI Act requires AI system providers to share

[269] To be considered a worker under EU labour law, a self-employed person must meet three distinct criteria. See Section 3.1.2 for more information.

information that allows human oversight to be carried out by deployers and establishes an information obligation on the use of AI. The GDPR contains an obligation to provide 'meaningful information' about automated decisions and restricts the use of fully automated decisionmaking. The PWD contains more specific requirements in relation to human oversight (e.g. right to override AM systems' decisions) as well as obligations for employers to appoint trained humans with authority and resources, as well as a right to human review and a detailed right to explanation. The PWD applies such obligations not only to fully automated monitoring systems and automated decisionmaking systems (which are subject to more stringent limitations), but also to partially automated AM systems. Such specific safeguards are limited to persons performing platform work and do not extend to other workers. Ex-ante assessments are also subject to limitations in scope: the AI Act foresees Fundamental Rights Impact Assessments (FRIAs), which do not apply to private employers unless they are providing public services. The GDPR requires Data Protection Impact Assessments (DPIAs), but only when specific risk thresholds are met, which may leave out several deployments of AM[270].

Working-time rules, such as maximum weekly hours, daily and weekly rest periods, and predictability of schedules, apply across the board. However, the acquis lacks specific safeguards to deal with algorithmic scheduling, algorithm-driven pace setting, or the intensification of work through automated monitoring. Targeted protections appear in the PWD but apply only to persons performing platform work.

The GDPR provides strong safeguards for individuals in relation to **personal data processing**. However, it does not take into account the structural power imbalance between employers and workers. This makes reliance on consent problematic, as it cannot be considered 'freely given' in most employment situations. Moreover, the GDPR provides limited collective enforcement mechanisms, focusing instead on individual rights. Article 88 of the GDPR allows Member States to introduce more specific rules for employee data processing, but this has resulted in divergent regimes across the EU. The AI Act complements the GDPR by imposing governance and transparency duties on high-risk AI systems, but it does not create workplace-specific privacy rights for workers, unlike those that have been developed for persons performing platform work in the PWD.

EU **equality legislation** applies to AM insofar as it affects protected grounds such as sex, age or ethnicity. However, in practice, proving **discrimination** is difficult because of the lack of transparency and complexity of algorithmic systems. Furthermore, EU equality law is based on a closed list of protected grounds, which does not cover other risks associated with AM such as bias linked to employment type, socioeconomic status, or personality traits. The AI Act recognises the risk of discriminatory outcomes and classifies many AM tools as high-risk AI systems, but it does not impose robust, ongoing bias detection or mitigation obligations on employers who deploy them. The PWD requires algorithmic bias monitoring and even the obligation to modify the automated decisionmaking system or the discontinuation of its use, in order to avoid such decisions in the future. However, this obligation is limited to platform work.

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[270] EDPB, Guidelines on Data Protection Impact Assessment (DPIA) and determining whether processing is 'likely to result in a high risk' for the purposes of Regulation 2016/679, wp248rev.01.

The EU **OSH framework** is technology-neutral, which means it can apply to psychosocial risks created by AM, such as stress, pressure from constant monitoring, or unpredictable schedules. However, the directives do not contain any algorithmic management-specific duties, such as obligations to address AI-driven pace-setting, performance surveillance, or ergonomic risks linked to digital interfaces. The only EU instrument to impose targeted requirements on employers to address such risks is the PWD. Furthermore, EU OSH legislation generally requires employers to involve workers in risk assessment, but there is no explicit EU-wide requirement to cover AM-related risk assessment and monitoring.

EU law requires information and **consultation** in cases of major organisational changes. The deployment of AM systems is not explicitly included as such as trigger, leaving uncertainty as to the application of the consultation obligations. The AI Act contains a duty to inform workers when high-risk AI systems are used but does not regulate the involvement of the social partners. Finally, small undertakings are excluded from the scope of participation rights under EU law. The PWD contains specific consultation obligations relating to the deployment of AM systems for persons performing platform work.

Finally, **remedies** for workers affected by AM are fragmented across different legal frameworks. Under the GDPR, workers can file complaints with data protection authorities, though these procedures are focused on the use and processing of personal data. Despite the limitation in scope, it is important to note that the enforcement mechanisms under the GDPR have been used by workers in several Member States in relation to the deployment of AM systems. The AI Act relies on market surveillance authorities to monitor compliance rather than authorities focused on the protection of working conditions and fundamental rights. Finally, labour and OSH legislation enforcement varies significantly between Member States. Collective redress mechanisms are scarce outside the platform economy, which means workers often lack effective collective standing to challenge the use of AM. Finally, it is important to note that the mandates of different supervisory authorities are not aligned, leaving no single authority with responsibility for overseeing the full impact of AM in the workplace.

The table below provides an overview of the main mechanisms for each type of legal instrument, as well as highlighting gaps in legal protection.

Table 7 – Overview of the legal assessment

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
Scope (material and personal)	Existing labour and OSH directives are technologically neutral but can be interpreted so that their general duties (information and consultation, risk management) also apply when AI/AM tools are introduced. Nevertheless, none of them explicitly address the risks associated with the deployment/use of AM systems. EU labour and OSH rules apply to 'workers', a term defined by the case law of the CJEU. While Member States can implement more favourable definitions, genuinely self-employed individuals are in principle not covered.	The AI Act and the Framework Convention broadly apply to all forms of AI systems, including AI systems used in workplaces. Most AM systems deployed in workplaces are expressly qualified as high-risk AI systems, subject to the more stringent provisions of the AI Act. On the other hand, the GDPR is technologically neutral. It applies safeguards to all processing operations, including AM systems, and distinguishes between personal and non-personal data. The latter is regulated to ensure free circulation and innovation, rather than rights protection.	The PWD applies to automated monitoring and automated decisionmaking systems. However, its scope is limited to the platform economy, and relevant provisions only apply to persons performing platform work (this includes solo self-employed).	Although the PWD is the most comprehensive piece of legislation on the use of AM tools in the workplace, its material and personal scope is limited. As overarching legislation, the scope of the EU digital acquis is broad enough to cover most AM tools as well as all types of workers (this includes solo self-employed). However, none of these instruments are specifically designed to address challenges at the workplace. The existing labour law and OSH acquis applies, but is limited to workers in an employment relationship, excluding workers in non-traditional forms of work (e.g. (solo) self-employed workers, casual workers) and sometimes excludes small companies (e.g. consultation).

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
				Moreover, while several legal instruments can be interpreted to provide a minimum level of protection to workers' rights (e.g. requirement to do a risk assessment, information requirement), there are important limitations as the protection mechanisms are not specifically tailored to the risks resulting from AM systems in the workplace.
Information, consultation and transparency	Workers have a general right to be informed and consulted before 'substantial changes in work organisation', a notion that can encompass the deployment of AM. However, there is no explicit requirement to disclose information about the use of AM systems, or specific features thereof. Moreover, the Information and Consultation Directive applies only for undertakings with more than 50 employees and for establishments with more than 20 employees.	The principle of transparency is emphasised in the AI Act and the GDPR. The AI Act specifically sets out workers' and workers' representatives' right to information prior to high-risk AI system deployment in the workplace.	Article 9 of the PWD requires platforms to provide persons performing platform work, and authorities with detailed written explanations of any automated monitoring or decisionmaking systems, and to update these explanations whenever the systems change.	No EU instrument guarantees uniform AI and AM-specific information and consultation rights for persons not performing platform work or for workers in undertakings with fewer than 50 employees on in establishments with fewer than 20 employees. Existing obligations are not specific about the use of AI or AM systems, specific features thereof, or updates in case of system changes.

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
Human oversight and the right to explanation	Neither EU labour nor OSH law contains an explicit duty to keep humans 'in the loop', ensure human oversight or explain algorithmic decisions.	The AI Act sets out provisions on human oversight. The AI Act mainly relies on AI system providers to share sufficient information allowing the performance of human oversight by deployers. At deployers' level, trained personnel shall be appointed and supported to effectively exercise human oversight responsibilities. GDPR adds an obligation to provide 'meaningful human information' about automated decisions and restricts the use of fully automated decisionmaking.	The PWD provides specific human oversight obligations for fully and partially automated decisions in the context of platform work (e.g. training ability to override, designated human contact, etc.), prohibits fully automated adverse decisions and establishes a right to human review and the right to a detailed explanation. The PWD is tailored to workers, specifically aiming to safeguard working conditions.	While information and human oversight obligations are set out in the EU digital acquis, these are more limited and less tailored to the protection of workers' rights than those set out in the PWD. The AI Act permits fully automated or AI-assisted adverse decisions, but ensures that such persons have the right to human oversight and the right to explanation. Additional, more specific, obligations and rights foreseen by the PWD are limited to persons performing platform work.
Ex-ante assessment and continuous monitoring	Although employers must carry out general OSH risk assessments before introducing new technology, these are not tailored to potential risks associated with AM.	Risk assessments rules are set out in different instruments of the EU digital acquis. Continuous monitoring of AM systems meeting specific thresholds is envisaged by the GDPR	The PWD lays down rules for regular impact assessments, including of specific OSH and potential discriminatory impacts stemming from the deployment of automated decisionmaking and monitoring systems.	Except for OSH risk assessments and DPIA, which would most probably apply in an AM setting, the broader impacts of AM tools on fundamental rights will be assessed in a more limited

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
		(DPIA). The AI Act envisages a fundamental rights assessment (FRIA) before AI systems deployment, but only for public services. Ex-post monitoring is also subject to discrepancies. The AI Act is the only regulation requiring a constant iterative risk assessments of AI systems impacts on users.	The PWD includes oversight obligations for national authorities and labour inspectorates, as well as obligations for platforms to keep records and documentation on AM systems available.	way in terms of both frequency and scope. Under the PWD, these impacts will only be assessed within the limited scope of platform work, albeit on a regular basis (both ex-ante and ex-post). By contrast, under the broader scope of the AI Act, impacts will only be assessed if they are deployed by public employers, and only prior to deployment. Private-sector employers outside the platform economy are not required to conduct AI-specific impact assessments or continuously monitor effects.
Organisation of working time	The EU acquis and CJEU case law ensure that maximum working hours, rest periods and time recording are safeguarded, regardless of the technology used.	Although there is no provision directly protecting workers in that regard, AM systems used to allocate tasks based on personal aspects or make decisions affecting terms of work-related relationships, such as working time are	The specific protection mechanisms set up by the PWD extent to automated monitoring and decisionmaking systems that affect working time, access to assignments, etc.	The current rules do not require employers to demonstrate that AI-generated schedules adhere to working time limits or to consult with workers or social partners in that regard.

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
		expressly qualified as high-risk AI systems subject to more stringent rules.		
Data protection and privacy in the workplace	Specific provisions regarding data protection are integrated in some labour law instruments (e.g. obligations relating to working time records under Working Time Directive). No specific obligations relating to AM systems in labour acquis, with exception of PWD.	GDPR provides a strong legal framework for the protection of personal data, used in relation to the use of AM systems in national case-law. However, it does not contain specific protective rules for workers' nor considers the specificities of the worker-employer relationship. . The AI Act primarily focuses on data governance rules to cover both personal and non-personal data for AI systems placement on the market.	Article 8 of the PWD treats all automated monitoring and decisionmaking of persons performing platform work as 'high-risk' processing, triggering a mandatory DPIA and stricter safeguards. For instance, the PWD contains a prohibition on the processing of specific personal data, such as data on workers' private conversations, off-duty time, etc.	The EU digital acquis provides rules and guarantees for data governance and the protection of personal data. Specific protective mechanisms and risks identified in employment contexts are in place for platform work (PWD) or have been set out in national legislation. However, such protective mechanisms do not extend to other work environments, where specific issues may arise (e.g. issue of free consent). .
Bias and discrimination	The Employment Equality Directive contains protective rules against workers' discrimination. However, those rules do not address the specific risks stemming from the use of AM tools such as the need for nuanced assessment to distinguish	The digital acquis acknowledges bias and discrimination risks stemming from AI systems. Moreover, Article of the 9 GDPR establishes a principle prohibition	The PWD contains specific provisions to prevent bias, including a strict prohibition on processing sensitive data, and risk assessment duties requiring employers to modify or switch off any	The PWD is the only piece of legislation that contains ex-ante and continuous bias mitigation duties and even the obligation to modify the automated decisionmaking system or the discontinuation

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
	direct and indirect discrimination; the lack of transparency coming from 'black box' effects, the risks resulting from software limitations or the limited number of protected grounds.	(subject to exhaustively listed exceptions) for the processing of personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation.	systems that pose a high risk of discrimination.	of its use, in order to avoid such decisions in the future. Outside of the PWD, there is a lack of horizontal requirements for actively switching off biased AM systems, carrying out continuous bias audits, and ensuring transparency regarding training data in employment. Moreover, specific risks associated to AM, such as bias linked to employment type or personality traits, is not covered by the exiting legal framework.
Health and safety	The OSH acquis encompasses a comprehensive set of general rules commanding employers to ensure workers' safety and health 'in every aspect related to the work'. These requirements often indirectly cover the deployment of AM systems at work as the instruments have been developed to evolve to consider emerging risks (e.g. risk assessment obligation under the OSH Framework Directive). However, the	Health and safety are protected interests under the European digital acquis. The AI Act includes OSH risks in the risk management system that is part of the development of the AI lifecycle, as well as in the built-in safeguards that are part of the product development. The AI Act follows a product-based	The PWD explicitly regulates AM with a strong emphasis on OSH. For instance, it introduces a general principle that AM systems used in platform work shall not adversely affect workers' health and safety. It also sets out specific requirements for OSH, such as the requirement to regulatory evaluate the impact of AM systems on	Although identified as an area of vulnerability for AI systems, the AI Act does not set out any rules to address OSH risks specifically. The EU OSH acquis does, however, set out general rules that protect different aspects of workers' health and safety which could be impacted by the use of AM systems in the

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
	legal framework does not contain AM-specific duties.	approach for regulating OSH risks.	health and safety, to put in place preventive and protective measures (e.g. for psychosocial stress, fatigue), a right to human contact in the company, etc.	workplace. However, these mechanisms do not contain AM-specific obligations for employers and rights for workers, tailored to the specific OSH risk related to the deployment of AM systems. The PWD has established more specific protection measures, but is limited in its personal scope.
Social dialogue and collective bargaining	The Information and Consultation Directive and the European Works Council Directive create consultation rights, but only in certain undertakings or establishment (e.g. with more than 50 or 20 employees) and without AM-specific triggers.	The EU digital acquis does not contain key obligations regarding social dialogue and workers' participation. The AI Act and the GDPR do not specify requirements for the involvement of the social partners (with exception of Article 88 GDPR where it allows for the adoption of more stringent national protection measures in consultation with the social partners).	The PWD contains specific information and consultation obligations towards workers' representatives on the introduction or substantial changes to AM systems in a specific workplace. Further information obligations apply regarding data collected and impacts on working conditions. Detailed requirements apply, for example, regarding timeliness of information provision and meaningful engagement in social dialogue on AM systems used.	There is no EU requirement securing consultation (beyond information) on the rollout of AM systems in SMEs or outside of platform work. Collective bargaining on AI depends on voluntary initiatives, mostly at Member State level. The EU digital acquis allows for more favourable measures to be determined at the national level, including through collective bargaining. Specific information, consultation and cooperation obligations related to the

PROTECTION MECHANISMS	LABOUR AND OSH ACQUIS	DIGITAL ACQUIS (GDPR, AI ACT)	PWD	KEY GAPS / NEED FOR FURTHER EU ACTION
			Finally, the PWD creates a shared monitoring and cooperation obligation between social partners and national authorities for effective enforcement of the Directive.	introduction and use of AM systems in specific workplaces are currently limited to platform work.
Redress and enforcement	Workers may take legal action under general EU and national rules. Some sectoral directives grant trade unions standing, but there is no EU-wide collective redress mechanism. The EU Representative Actions Directive, (2020/1828) is limited to consumer protection matters and does not cover labour rights or working conditions.	The EU digital acquis focuses on market surveillance and administrative oversight, as well as safeguarding individual rights. Besides the possibility given to Member States to establish more favourable rules for workers in this context, there are no particular provisions supporting the right to seek collective redress.	Article 18 of the PWD grants the right to timely and impartial redress and empowers the courts to order the disclosure of evidence. Workers are protected against retaliation, and both worker representatives and NGOs also have legal standing. Authorities are required to cooperate with trade unions for the effective enforcement of the Directive.	Remedies for workers affected by AM systems are fragmented across different legal frameworks, with different legal bases/aims. Legal redress is organised around individual cases, while collective redress are currently unavailable for potential damages resulting from AM systems. Finally, there is no coherent enforcement architecture that combines labour, OSH and digital regulators as the mandates of the different competent authorities are not aligned.

Source: Authors' elaboration.

4. Task 4 – Policy options and impact assessment

4.1. Policy options

The increasing use of algorithmic management (AM) tools across sectors raises regulatory challenges that are only partially addressed under current EU legislation. Table 7 in the legal analysis in Section 3 identifies significant gaps in the protection of workers' rights, including transparency, human oversight, occupational health and safety, and effective (collective) redress. Addressing these gaps requires targeted policy responses. This section outlines three distinct policy options to regulate the use of algorithmic management that vary in legal ambition and binding effect. Together, they represent a spectrum from soft-law instruments to new legislative action.

Option 1: Recommendation. A non-binding Council of the European Union (Council) Recommendation addressing the risks and governance needs related to algorithmic management by providing guidance to Members States.

Option 2: Amending existing legislation to address – partially or wholly – risks and gaps in legislation related to algorithmic management.

Option 3: New directive. Introduction of a horizontal directive specifically targeting the governance of algorithmic management across sectors.

Below is a more detailed description of each option.

4.1.1. Option 1 – Recommendation and guidance to Member States

A Recommendation accompanied by guidance to Member States could be issued by the Council, providing non-binding guidance to Member States and social partners on managing the risks and impacts of algorithmic management. A Joint Recommendation by the Council and the Commission, which is not specifically provided for in the TEU, would also demonstrate inter-institutional alignment. However, adopting it would be more complex, which is probably why this type of document is mostly used for external relations rather than matters of the internal market and social policy. The Recommendation would promote a common EU understanding of good practice, encourage early policy coordination, and set expectations for future legislative or institutional reforms.

The content of the Council Recommendation could include sound principles for addressing issues related to transparency, human oversight and the right to explanation, monitoring of AM, data protection, bias and discrimination, health and safety, social dialogue and collective redress related to AM. It may also encourage Member States to update their national occupational health and safety frameworks and integrate AM risks into labour inspectorate guidance, as well as provide relevant training.

The legal basis for such a Recommendation would be Article 292 TFEU, which allows the EU institutions, in particular the Council, to adopt Recommendations without binding force, combined with Article 153(1) TFEU on the competence of the EU to support and complement Member State activities in relation to the improvement of the working environment to protect workers' health and safety and working conditions, among others.

4.1.2. Option 2 – Amending existing directives to address legislative gaps

Section 3 identified the existing legislation directly or indirectly related to the use of AM and highlighted the gaps in the protective mechanisms for workers in relation to AM usage. This option looks at the possibility of closing legal gaps by amending existing legislation. It entails a partial or full amendment of existing legislation to ensure that the risks arising from AM usage are explicitly regulated. It is a **package of targeted amendments** to existing EU labour, OSH and digital-rights instruments to close the specific gaps identified in **Table 7.** It is described as a package in the sense that each piece of legislation can be amended without amending other legal instruments. Some of these instruments are older parts of the acquis and require targeted modernisation. These are described first. Given its recent adoption and explicit reference to AM, the Platform Work Directive (PWD) is treated separately in the subsequent sub-section. Adapting older legislation would entail amendments to a significant number of directives, which are listed below in clusters:

- Update of the labour/OSH acquis to reflect safeguards for workers in relation to AM risks:
    - **The OSH Framework Directive 89/391/EEC (and relevant daughter directives)**: The updated directives would specify or make clear that risk assessments must cover AM-related psychosocial hazards (e.g. work intensity and surveillance-induced stress) and require preventive measures when AM is introduced or changed, and worker participation in design and monitoring of AM systems (see also below).
    - **The Information and Consultation Directive 2002/14/EC** would clarify that the deployment or substantial change of AM systems is a trigger for information and consultation duties of the employers. To ensure that all workplaces are covered, an AM-specific threshold would have to be introduced and deviated from the current 'above 20 or 50 employees' threshold for AM-specific changes.
    - **The Working Time Directive 2003/88/EC** would be updated to add explicit safeguards for **algorithmic hour rostering** (e.g. reasonable advance notice, compatibility with daily/weekly rest), linking digital scheduling to existing time-recording duties.
    - **The Directive on Transparent and Predictable Working Conditions 2019/1152** would require, in its Article 4, layman-language written notices to be provided to the workers where automated systems are used.
- **Clarify the connections and ensure cross-referencing with the digital acquis (GDPR and AI Act):** To refer to the definitions of AI/AM tools; to specify which AM systems should be deemed high-risk AI under Annex III of the AI Act and to cross-refer to the obligations of the employer in such cases; and to clarify that processing of personal data by means of AM systems requires a data protection impact assessment under the GDPR.

The **PWD is the only piece of EU legislation explicitly addressing AM**. The PWD includes articles (Chapter III, Articles 7-15) that, among others, cover provisions for transparency, human monitoring, human review, and information and consultation for persons doing platform work in connection with work under algorithmic management. This directive would need to be amended/recast to expand the PWD's advanced safeguards, currently limited to workers performing platform work, into a set of general rights for all employees and possibly also solo self-employed individuals under AM. However, such an amendment/recast would be complicated by the fact that the PWD is not

intended as a horizontal directive. For example, Chapters I and II are focused on a particular business model, platform work, that the directive is designed to regulate and do not readily lend themselves to a horizontal approach to regulating AM. Hence, while some articles could be rephrased to include all workers and self-employed individuals[271], others, such as the entirety of Chapter II would apply specifically to platform work.

Adopting an amendment/recast of the PWD, as well as amending the older labour acquis, would mean that Member States would need to adopt a wide range of implementing measures.

The legal basis for the amendments suggested under this option would follow the legal basis of the individual directives.

4.1.3. Option 3 – New legislative directive

This option creates a horizontal 'Algorithmic Management Directive' (AMD) covering all workplaces. It differs from option 2 by leaving the 'older' labour/OSH acquis unchanged, and in structure, it is not constrained by the approach of the business model-specific PWD. This implies that scope, obligations, and governance choices can be derived from first principles. The directive would codify a comprehensive approach to AM systems, fully integrating labour, OSH, equality, and data governance dimensions, taking into account existing legislation in the labour/OSH acquis and the PWD.

The AMD could contain all or a subset of the following elements:

1. **Scope and definitions:** Applies to all employers, as well as workers and solo self-employed. 'Algorithmic management' is defined to include any automated system that allocates tasks, monitors, evaluates or makes decisions affecting working conditions, referencing AI Act definitions for 'AI system'.
2. **Information, consultation and transparency register:** The right to be informed and consulted extended to all workers when it relates to AM (including companies with less than 50 employees or establishment with less than 20 employees, not yet covered outside the PWD, cf. Table 7). Employers maintain a local register of AM systems with purpose, (learning) datasets, metrics, accuracy and limitations. Workers and representatives can access the register.
3. **Human oversight and right to explanation:** Mandatory human review before 'significant' decision. Rights equal to those established in the PWD article 11.
4. **Algorithmic impact assessment (AIA):** Prior to deployment and at defined intervals, employers must perform an integrated assessment (fundamental rights, OSH—including psychosocial factors—working time, discrimination). Rights equal to those established under PWD Article 8 for all individuals within the scope.
5. **Data protection and privacy:** Similar to the PWD Articles 7 and 8, AM can be designated high-risk, implying mandatory DPIAs. Assessments are made available to workers' or solo self-employed representatives.

[271] E.g. Article 1 could be amended to cover 'improving working conditions in platform work *and regulating algorithmic management in general*'. Core definitions (Article 2) could be amended such that 'digital labour platform' would become 'algorithmic management deployer' or another neutral term (while necessarily retaining a sub-definition for platforms to which other chapters of the directive refer).

6 **Bias and discrimination mitigation:** Provisions similar to PWD Article 10, including periodic evaluation of AM tools; obligation to retrain, calibrate or suspend systems exhibiting disparate impact.

7 **Health and safety:** Without prejudice to the obligations in the OSH Framework Directive 89/391/EEC (and relevant daughter directives), explicit integration of AM risks into OSH management systems by a requirement to include psychosocial risk indicators (stress, work intensity) particularly related to AM and to co-design preventive measures with worker representatives.

8 **Social dialogue and participation:** Right to be informed and consulted for workers and their representatives (see point 2). Promotion of collective bargaining clauses on algorithmic use (similar to PWD, Article 25).

9 **Redress and collective enforcement:** Expansion of the rights established in Articles 18–23 of the PWD within the existing national enforcement structures.

A new specific Directive would find its legal basis in Article 153(1)(a) TFEU with respect to OSH topics and in Article 153(1)(b) TFEU with respect to labour topics in conjunction with Article 153(2)(b) TFEU, which allows for the adoption of Directives for the minimum harmonisation of working conditions and measures for the protection of workers' health and safety, and Article 16(2) TFEU on the right to privacy, similar to the legal basis used for the PWD.

4.1.4. Pros and cons of the different policy options

The three options present different levels of key characteristics related to the coverage of identified legal gaps, speed of implementation and implementation costs (e.g., in the European legislative process and implementation in Member States), the creation of a level playing field, third-party uncertainty from new legislation (e.g. businesses not directly meant to be affected by the regulation)[272], the risk of overlap with existing labour acquis and legal clarity. Table 8 provides a comparison of these characteristics. Option 1 relies on soft coordination, option 2 relies on an amendment of the existing legal framework, while option 3 creates a new binding horizontal framework. Table 8 below summarises the main ex ante advantages and drawbacks.

Regarding **the coverage of identified legal gaps,** a Recommendation (option 1) can signal good practice across all domains in Table 7, but it is not legally binding for Member States. The impact, therefore, depends on voluntary uptake and will likely be uneven. Amending the existing legislation (option 2), either by amending the labour acquis and/or by an amendment of the PWD can address all legal gaps identified in Table 7. A new horizontal directive (option 3) offers the most coherent way to cover legal gaps because it can be designed from first principles to address every gap, taking account of the existing labour acquis.

Speed of implementation and implementation costs also diverge. Option 1 can be agreed and disseminated relatively fast, with minimal administrative effort. Option 2 requires legislative processes/es with several actors involved, and implementation of such changes in Member States. The legal drafting work (in the case of amending several directives) is significant, with potentially

[272] Third-party uncertainty in this context refers to a situation where legislation (new or amended) drawn up to address a particular issue (in this case, AM risks) potentially affects the legal environment for businesses, not concerned with the issue.

several open files to coordinate. As such, it could be that at the national level, transposition would take place through several legal acts.

For option 3, a legislative process and implementation would be required, as described for option 2, but as a single proposal, it would be more clearly framed and better targeted to bridge gaps and avoid overlaps with existing legislation.

On the **level playing field** and **third-party uncertainty**, option 1 leaves greater scope for national divergence and therefore weaker protection of the level playing field and increases uncertainty for companies with cross-border operations. At the same time, it poses no uncertainty for parties not directly involved in AM. Option 2 would ensure a level playing field by basing AM regulation in existing EU-wide legal instruments. It would reduce fragmentation but increase uncertainty for third parties if existing labour legislation is amended to account for AM. In the case where the PWD is amended/recast, further legislative uncertainty is generated for platform companies because of the risks of PWD amendments affecting their business model. Option 3 provides the strongest option in terms of a level playing field and third-party certainty, because a single framework for AM regulation applies across sectors. A new directive focused on AM usage should bring little uncertainty to businesses not involved in AM practices.

There is a distinct **risk of overlap with the existing labour acquis** and a question of **legal clarity**. Option 1 avoids overlap by design but offers limited certainty. Option 2 must carefully handle several older directives that were not initially designed to address AM risks. In the case of amending the PWD, the complexity of transforming a directive drawn up to regulate a business model into a horizontal directive is large, with some articles only applying to the business model (platform work) and others applying horizontally to all workers. Option 3 maximises legal clarity but will require careful drafting to avoid overlap with existing labour legislation, in particular PWD, and to align it with the GDPR and the AI Act.

The three options also differ in the ability to achieve **proportionality**. Option 1 is proportional to its impact, whereas options 2 and 3 differ in the sense that proportional legislation is more complicated to accomplish in option 2 compared to option 3, due to option 2's reliance on existing legislation, which may not be amendable to ensure optimal proportionality.

Table 8 – Pros and cons of different policy options (summary table)

	PROS	CONS
Option 1 Recommendation	Simple and quickest adoption procedure Low implementation costs[273] Flexibility in national implementation Can encourage voluntary action across identified gaps. No (less) uncertainty for third parties (not involved in AM).	Non-binding Risk of uneven uptake No direct enforcement, hence, may not change practices in high-impact sectors. Risk of legal fragmentation across countries.
Option 2 Amend existing legislation	Builds on existing definitions (in the case of the PWD). Can cover all legal gaps identified in Table 7 (transparency, over-sight, OSH, bias, monitoring, privacy). Level playing field (no legal fragmentation across EU countries).	Complex legal procedure and implementation (several directives would need to be amended). High implementation costs (Member States may have to re-transpose several directives) Longer adoption timeline than option 1. Risk of overlap with existing employment acquis (in case of relying on PWD). Increasing uncertainty for third parties. Requires additional enforcement capacity (relative to option 1).
Option 3 New algorithmic management Directive	Legal clarity – single horizontal framework (can use relevant definitions from PWD) (though see cons below). Lower implementation costs than option 2 (but higher than option 1). Can cover all gaps identified in Table 7 (transparency, oversight, OSH, bias, monitoring, privacy). Level playing field (no legal fragmentation) No (less) uncertainty for third parties (not involved in AM).	More demanding legislative procedure than option 1, but less than option 2. Higher implementation costs than option 1 (but lower than option 2). Risk of overlap with the PWD Requires additional enforcement capacity (relative to option 1).

Source: Authors' elaboration.

[273] Implementation costs under option 1 depend on the number of countries that take legislative action and *would not have done so* under the baseline assumption of no EU policy intervention. This number is uncertain but likely to be low, given that AM regulation is discussed in several countries or is/will be regulated through collective bargaining. Another consideration is that option 1 will likely lower implementation costs for countries that would have legislated under the baseline but have not yet done so, since they can rely on guidance without including costly elements. An overall assessment is that implementation costs are low compared to Policy options 2 and 3.

4.2. Impact assessment

4.2.1. Defining the baseline – no additional EU legislation

Based on OECD-AI report and differences among EU countries (see Section 2), the use of AM is likely to increase in the coming years. Hence, under the baseline scenario, the use of AM in workplaces is expected to expand rapidly with no additional EU legislative action, while recognising that some Member States may introduce national measures that slow down both the speed of adoption and the intensity of use. Although some firms hesitate to adopt AM due to concerns about costs or workforce resistance, for instance, 79 % of non-adopting firms (in DE, FR, IT, and ES) cite high costs, and 56–67 % cite staff resistance as barriers (OECD-AI study). Nonetheless, as AI tools become cheaper and more normalised, even these barriers are likely to diminish, leading to pervasive AM across all sectors and firm sizes over time. Moreover, competitive forces, within countries and across the EU, will push in this direction, though national legislation may partly offset this development. For the same reasons, we expect that country-specific legal initiatives will emerge, limiting AM usage to some degree.

Impacts on workers under the baseline are a concern. Current research and survey evidence link algorithmic management to a range of psychosocial and health risks (cf. section 2). Where AM tools are present, workers report increased stress levels and worse work-life balance. Other risks include inadequate breaks or rest, which can exacerbate fatigue and increase the risk of burnout. As a result, chronic stress, exhaustion, and mental health issues such as burnout are rising in algorithmically managed workplaces. Finally, physical health and safety risks may also grow under unmanaged AM. In Member States that adopt national safeguards, adverse effects are expected to materialise more slowly, though the direction of impact remains the same.

Under the baseline, we quantify the increase in worker exposure to AM over the short term by applying a simple within-industry catch-up rule to each country-by-industry cell in the EWCS. For every industry, we first compute a frontier benchmark as the unweighted mean of the top-three country exposures. Each country-by-industry pair is then assumed to close half the gap to the frontier country-by-industry benchmark. This is a normative convergence exercise to illustrate the potential spread of AM across the economy. The approach accounts for current country-by-industry differences in initial uptake. National initiatives can slow convergence relative to the absence of national initiatives.

Under the baseline, the EU-wide prevalence of AM exposure would increase from 42.3 % to 55.5 %. The timeframe for achieving this catch-up is highly uncertain in the absence of substantial national restrictions. Again, with more Member-State legislation, the realised increase would be smaller and more gradual. Given the growth in AM uptake and the fact that we rely on the baseline on only half the distance to the frontier being closed, it is expected that AM exposure would increase within a 5-year window. Given that no account is taken for overall catch-up with the US, this estimate is judged to be conservative and a lower bound on the potential increase in AM usage, though subject to substantial uncertainty with respect to Member States' legal action. Based on the results in Section 2, the impact on workers implies an increase in stress prevalence of 0.8 pct. point (Table 9). The prevalence of autonomy at work, good work-life balance, and sufficient rest between work shifts all decrease by 0.3 per cent. point. These effects roughly double if convergence between country-by-

industry pairs is assumed to be full rather than half. Member States' legislation may also affect the estimated impact on workers under the baseline.

Table 1 – Baseline development in impact on workers

			BASELINE, CLOSING HALF THE GAP		BASELINE, CLOSING THE FULL THE GAP	
MEASURE	INDICATION	PREVALENCE (%)	PREVALENCE (%)	DIFFERENCE (%-POINTS)	PREVALENCE (%)	DIFFERENCE (%-POINTS)
Stress	Negative	23.9	24.7	0.8	25.5	1.6
Autonomy at work	Positive	49.6	49.3	-0.3	49.1	-0.5
Good work-life balance	Positive	84.1	83.8	-0.3	83.5	-0.6
Able to get hour off	Positive	67.7	66.9	-0.8	66.0	-1.7
Sufficient rest between workdays	Positive	82.6	82.3	-0.3	82.0	-0.6
Work bad for health	Negative	26.9	27.5	0.6	28.2	1.3

Source: Authors' calculation based on EWCS.

In summary, the baseline scenario anticipates an increase in the number of workers subjected to algorithmic oversight and decisionmaking, accompanied by heightened risks to their stress levels, and work-life balance. Existing EU laws only partially mitigate these issues. Traditional labour and occupational safety directives do apply (e.g., general duties to protect worker health and limits on working hours), but they were not designed with digital management in mind and leave important gaps. The only dedicated instrument so far is the Platform Work Directive (PWD), which introduces advanced AM safeguards (transparency, human review, bias prevention, etc.) but applies only to workers performing platform work and only to the platform work business model. Some Member States will likely (partly) address these issues in national legislation. The extent to which this will occur is uncertain, but it is judged unlikely that all Member States will have legislation in place in the medium term. Thus, under the baseline, the legal gaps identified in the analysis (Table 7), such as the lack of transparency rights for non-platform workers, the absence of an explicit 'human-in-the-loop' requirement, the lack of systematic algorithmic risk assessments in regular firms, and weak avenues for redress, will for many workers, in whole or part, remain largely unaddressed.

Because some Member States are likely to adopt legislation related to AM, and Member States' legislation will not be subject to common principles and guidelines, under the baseline, legal fragmentation will increase. This will weaken the single market by increasing the costs of doing business across multiple member states due to varying regulations on the use of AM. Since 42.3%

of workers (as measured by the EWCS) are subject to some form of AM, increased fragmentation is likely to affect a large share of companies with operations in several Member States. This burden will fall harder on SMEs doing business across borders due to their smaller capacity to adopt to different regulatory regimes.

The impact of the policy options will be assessed, *relative to the baseline*, along five dimensions: impact on workers' AM exposure, effects of AM usage on outcome measures (e.g. stress), cost for companies in general, costs for SMEs, and impact on administrative costs (member states and EU level combined).

There is evidence that managerial practices are important for firm-level productivity.[274] The effect on productivity is not directly assessed but is assumed to be proportional to the change in the company's AM use (worker exposure to AM). While a good measure of the productivity effects of introducing AM does not exist and is likely to differ across sectors and contexts, productivity effects are a key motivation for adopting AM systems, and the promise of productivity increases is stressed across the literature.[275] It is not expected that there would be significant productivity differences across the policy options, but there is considerable uncertainty in this domain. One plausible downside mechanism is if regulatory design unintentionally discourages experimentation and slows organisational learning about how to calibrate AM and build the necessary complements in workflow, data quality and skills to reap the full productivity benefits.

It is not feasible to assess these effects quantitatively; instead, we apply a semi-quantitative scale per dimension: None, Small / Medium / Large. A '+' and '-' sign are used to indicate the sign of the expected effect. E.g. 'Small-' captures minor deterioration; 'Medium' denotes a material effect, and 'Large' indicates a substantial impact. Signs '++' / '-' are used to indicate between-categories effects ('Medium++' denotes a larger impact than 'Medium+', but a smaller impact than 'Large+').

4.2.2. Impact of policy option 1

Option 1 involves a non-binding Council Recommendation that would provide guidance to Member States and employers on managing the risks associated with algorithmic management. The instrument would promote a common European approach and encourage proactive measures without creating new legal obligations. It could affect legislation by countries that would have adopted legislation under the baseline and may also spur some countries to pursue legislative action. The content of the Recommendation would likely cover key principles and best practices identified in the legal analysis, such as transparency of AI systems, human oversight of automated decisions, assessment of psychosocial risks, and inclusion of social partners in dialogue on AM (cf. Section 3). For example, it might urge Member States to update their national occupational safety and health (OSH) regulations to explicitly address algorithmic risks, or recommend that employers conduct impact assessments of their AM tools and consult with workers when introducing AM tools. The

[274] Bloom, N., & Van Reenen, J. (2007). Measuring and explaining management practices across firms and countries. *The quarterly journal of Economics*, *122*(4), 1351-1408.

[275] Milanez et al., 2025.

Recommendation could also endorse initiatives such as integrating 'right to disconnect' policies or AM-specific guidelines into labour inspectorates' practices to address work-life balance issues.

Addressing legal gaps

Due to the soft-law nature of option 1, it can only partially address the legal gaps identified in Section 3, Table 7. In effect, it encourages Member States and companies to address the identified gaps through their own laws or practices, rather than mandating direct action. For instance, it could call for extending information and consultation rights about AM systems to all workplaces (addressing the current absence of AM-specific transparency rights for non-platform workers), but it would be up to each Member State to implement such advice. Similarly, the Recommendation may promote human-in-the-loop oversight (echoing PWD provisions that ban fully automated decisions) and emphasise the importance of human review before major decisions, such as dismissals.

Overall, option 1 would highlight all the key issues: urging employers to conduct algorithmic risk assessments (to anticipate and monitor risks that current OSH rules only generically cover), to ensure AM tools do not violate working time norms (for example, by recommending advance notice of algorithmic schedule changes or adherence to rest requirements), to prevent invasive data practices (aligning with GDPR principles), and to establish consultation mechanisms for algorithmic decisions. By mirroring the known gaps, the Recommendation serves as an EU-level push tool. It can also spur additional social partner interaction related to the use of AM at the EU level.

The extent to which legal gaps will be closed relies on the extent to which option 1 will influence emerging legislation under the baseline, and the amount of additional legislation and guidance it will spur among Member States.[276] On both points, the assessment is that the impact will be relatively small.[277] However, there is considerable uncertainty in assessing this point.

This means that critical gaps could remain under a purely voluntary regime. Small and medium-sized enterprises (SMEs), for example, may be less likely to implement non-binding recommendations due to their limited resources and lower awareness. Yet, these smaller workplaces currently fall outside requirements such as the Information and Consultation Directive (less than 20 or 50 employees), a gap that the Recommendation alone cannot effectively address across the EU. Thus, while option 1 can raise awareness about extending algorithmic transparency and participation rights to all workers, it cannot guarantee coverage. Similarly related to issues of bias or redress, the Recommendation can encourage measures (e.g., suggesting employers voluntarily audit their algorithms for bias or establish internal appeal processes for AI-driven decisions), but it offers no new enforceable right for workers to demand these measures.

[276] 'Additional legislation' refers to legislation that would emerge under the baseline in the absence of EU policy action.

[277] This is in line with the assessment of guidance on AM in the impact assessment of the PWD. PPMI (2021). Study to support the impact assessment of an EU initiative to improve the working conditions in platform work.

Expected effect on AM usage

Because this option is non-binding, it is not expected to alter the overall use of algorithmic management in the short term. However, a Recommendation could have a direct influence on the legislation that Member States will enact under the baseline, and some indirect influence on practices across sectors. By setting out a clear EU-endorsed standard of 'good AM governance', it might spur proactive changes, especially among larger companies and in sectors already under public scrutiny (e.g. in platform economy, finance, logistics). For example, multinational firms or those with strong corporate social responsibility commitments might voluntarily follow the guidance to publish information about their workplace AI systems or to introduce human oversight committees, in order to demonstrate compliance with emerging EU norms.

Across different sectors no subject to Member States' regulation, uptake may vary. Highly digitalised sectors (IT, finance) or those already familiar with EU soft law might be early adopters of Recommendation principles, integrating them into existing risk management. Smaller domestic firms may not significantly change behaviour unless prompted by national authorities. The Recommendation could encourage Member States to issue sector-specific guidelines. In terms of firm size, option 1 is likely to lead to a divergence, as larger firms are more likely to be aware of and follow an EU Recommendation. They also have the capacity to implement measures such as algorithm audits or worker consultations. SMEs, on the other hand, may have low awareness or feel less pressure to act. The use of AM in smaller companies could remain largely unchanged, potentially even increasing (as cheap algorithmic tools proliferate) without the compensating safeguards that larger firms voluntarily adopt. The overall trend of AM growth would continue under this option (labelling the impact 'Small-'), albeit with some voluntary constraints and legislation emerging in certain leading companies or Member States. The impact will increase with the number of additional countries (relative to the baseline) taking legislative action following the Recommendation.

Impacts on workers compared to baseline

For workers, an EU Recommendation would offer some improvements over the baseline scenario, but likely only modestly and unevenly. In workplaces where the guidance is heeded, employees could experience better protection and transparency. For example, if an employer voluntarily implements the recommended principles, workers might be informed about algorithmic decisions affecting them (e.g., how a scheduling app decides shifts) that they were previously not informed about. This could slightly reduce stress, improve other measures considered (Table 9), and improve perceived fairness, knowing that algorithms are not working unchecked. Moreover, if the Recommendation spurs the integration of psychosocial risk checks into OSH practices, workers in those firms might see steps taken to limit work intensification (for instance, voluntary caps on algorithmically driven performance targets or ensuring minimum rest breaks). That would help mitigate some of the stress and burnout issues noted under baseline. However, given its non-binding nature, option 1's overall impact on workers EU-wide would likely be low. The benefits would be very patchy. Some gains might occur via social dialogue, e.g. unions using the EU text to negotiate better terms, which could benefit workers in unionised settings, but those in non-union or precarious jobs might see no relief.

As Table 8 highlights, effective redress and enforcement are major gaps. A Recommendation can encourage Member States to strengthen enforcement (e.g. labour inspectorates focusing on AM

issues), but it cannot grant workers new rights to challenge decisions made by algorithmic management systems or seek collective redress. Thus, compared to baseline, some workers might experience a slight improvement in their situation, but many would likely see no tangible difference. Overall, stress levels and mental health outcomes for workers might improve marginally (if a subset of employers reduces work pressure or surveillance intensity), but not uniformly. Option 1's impact on worker autonomy and rest will similarly be limited.

Also here, the impact will depend on Member States' actions relative to the baseline. This includes how the Recommendation influences legislative approaches emerging under the baseline and how it affects countries where no legislative action would have emerged under the baseline.

In quantitative terms, worker risk reduction under option 1 might be rated 'Small+' relative to the baseline. It is essentially a mild deviation from the baseline trend – helpful in specific contexts, but not enough to significantly alter aggregate outcomes, such as the overall incidence of algorithmic stress or work-life balance conflict across Europe.

Implementation and compliance costs

At the EU level, a Recommendation is quick and inexpensive. There is no co-decision, limited drafting and consultation costs, and light follow-up (awareness, guidance, occasional monitoring). There is no need for new regulators or inspection regimes, so the administrative burden for EU and national authorities remains minimal compared with a binding directive. Hence, administrative costs are labelled 'small--'.

For firms, compliance is voluntary and therefore carries no mandatory cost if Member States do not enact additional legislation following the recommendation. Large employers may choose to implement elements (e.g. clearer worker information, basic human-oversight procedures, voluntary audits), while many SMEs will likely continue business-as-usual. Any indirect costs would stem from national follow-up where Member States convert guidance into rules (e.g. psychosocial risk checks), which would then vary by country. Costs for companies are assessed at 'Small-' and for SMEs, specifically 'Small-'. Costs are to a small extent offset by improved harmonisation, though this impact is limited.

Overall, option 1 is the least demanding and scalable to firm capacity, although uneven uptake can create light fragmentation and leave proactive firms bearing small voluntary costs while laggards face none.

4.2.3. Impact of policy option 2

Option 2 proposes an amendment of existing legislation, either by amending several older directives in the labour acquis and/or by amending the PWD, such that the algorithmic management provisions apply to the broader workforce. This could extend the advanced protections on AM currently reserved for workers performing platform work to all workers subject to AM, regardless of sector or employment status (including solo self-employed). The main idea is that any employer using algorithmic management systems for monitoring, supervision, or decisionmaking regarding workers would be bound by the requirements similar to those that platforms must follow.

Addressing legal gaps

In principle, amending existing legislation could close the legal gaps identified in Section 3. The policy outcome would be equivalent to that of option 3 and amendments (e.g. by amending a combination of the PWD and the older labour acquis) would include the elements listed under '4.1.3 Option 3 – New directive'. Because outcomes related to workers are equivalent to those under option 3, we only describe them briefly here and refer to the more substantive assessment under policy option 3. The main difference with respect to option 3 is under the heading 'Productivity, implementation and compliance costs'.

Expected effects on AM usage and impacts on workers compared to baseline

The overall impact on workers is similar to option 3. While everyday work pressure does not disappear, the overall effect is a 'medium++' improvement in job quality, with fewer unfair outcomes and better guardrails in place for monitoring and evaluation. This is in line with the impact assessment of the PWD.[278] It is expected that option 2 will have a small negative impact on AM usage relative to the baseline. However, due to the increased legal complexity of option 2, resulting from the amendment of several directives, it is expected to be less proportional in terms of outcomes than option 3, which can be better targeted. It is therefore expected that slower or non-uptake is likely among resource-constrained, low-margin employers, particularly SMEs. For AM prevalence, option 2 is labelled 'Small--'.

Implementation and compliance costs

As is the case for option 3, compliance for firms is non-trivial. Option 2 will have higher compliance costs for three reasons. First, directly for AM using companies, because several legislative changes are likely to occur in Member States following the reimplementation of the amendments to the relevant directives.[279] Second, for platform companies operating under the assumption of transposition of the PWD as it is now legislated. Amendments to the PWD will increase uncertainty among platform companies, at least in the period before the amendments are decided. Third, indirectly for companies not involved with AM or platform work, as such companies will need to keep track of potential amendments to the labour acquis where necessary. As such, option 2 will indirectly affect all companies, including those not subject to AM regulation. For companies in general, the cost impact is labelled 'medium++' (higher than under option 3). Costs are relatively higher for SMEs and are labelled 'medium++/large+' (also higher than under option 3). Costs could be partly offset by higher legal certainty and lower costs for companies doing business in several Member States.

The one-off legislative process also adds public costs. In total, administrative costs are labelled 'Medium++/Large+', higher than option 3 ('Medium+'). While it is difficult to assess the legal complexity in detail without examining each individual directive to be amended, it is clear that amending the PWD in particular is complex. The PWD is designed to regulate a business model with highly automated AM as a core element. It is not a priori clear how well uses and definitions of AM in the PWD will carry over to other businesses that have much less intense or lighter use of AM procedures (often assisted by a human manager). Additionally, as detailed above, only some articles

[278] PPMI (2021). Study to support the impact assessment of an EU initiative to improve the working conditions in platform work.

[279] The PWD only needs to be transposed by 2 December 2026.

are relevant to amend. Relying on the old labour acquis (i.e., without the PWD) would require equally significant rewriting of existing legislation to cover all legal gaps.

4.2.4. Impact of policy option 3

Option 3 establishes a dedicated, horizontal Algorithmic Management Directive (AMD) that governs algorithmic management across all sectors and employment relationships, including those of solo self-employed individuals. Unlike the case of Option 2, a new directive would not be constrained by the structure and content of existing legislation, some of which apply more broadly across the labour market. It can define 'algorithmic management' more precisely in a non-platform work context (which is potentially different from a platform work context, where the AM is integral to the business model), to cover automated system that allocates tasks, monitors and evaluates performance, or makes or materially shapes decisions affecting working conditions; and rule out simpler, less intrusive tools. The directive can set its own personal scope, applying by default to all workers in an employment relationship (and seeking employment, in case of HR related cases) and solo self-employed. It can calibrate obligations by risk and firm size, independent of the existing labour acquis. so that high-impact deployments face stricter duties, while genuinely low-risk, low-scale uses comply in simpler ways.

Addressing legal gaps

A purpose-built directive has the advantage of being able to close all gaps identified in the legal analysis. Scope ceases to be a limiting factor as the instrument can apply horizontally across employers and sectors, while clarifying coverage for non-standard arrangements. It can, where justified, extend a protective subset to dependent self-employed, addressing situations where AM significantly constrains autonomy despite formal self-employment.

Transparency shifts from case-by-case notices to system-level visibility. Workers and their representatives would not only be informed when a particular decision affects them; they would also understand the systems in place in their workplace, their purposes, and their key limitations. This makes hidden algorithms less likely, reduces the information asymmetry that can fuel mistrust, and gives social partners a concrete basis for dialogue and oversight.

Accountability and human oversight contain an explicit prohibition on fully automated adverse decisions. Where algorithms materially shape outcomes, the human reviewer must be trained, independent enough to exercise judgement, and capable of correcting errors. A clear right to (human) explanation makes decisions intelligible and contestable.

Risk assessment and monitoring become continuous practices rather than one-off checklists. By integrating OSH, equality and data concerns in a single algorithmic impact assessment, employers assess not just technical compliance but the experienced effects of AM on workload, autonomy, fairness and safety. High-risk deployments can be subject to stricter internal governance, notification to authorities, or prior consultation duties.

The AMD can also tie algorithmic management to working-time protections. Requiring advance notice for AM-generated rosters, setting conditions for short-notice changes, and clarifying that out-of-hours prompts should be disabled or ignored by default which all help prevent technology from eroding existing rest and maximum-hours standards. This is a missing link in the current acquis.

On data protection and privacy, the directive can clarify what is proportionate in employment. It can prohibit categories of invasive processing, refine legitimate-interest tests in AM contexts, and require that data protection and algorithm impact assessments be performed together, reducing duplication while raising the bar for risky tools.

Bias and discrimination can be addressed by requiring routine fairness testing appropriate to the use case, corrective retraining or retirement of biased systems, and cooperation with equality bodies for systemic risks. That shifts enforcement from ex-post litigation towards ex-ante prevention.

Social dialogue and participation are made concrete by information and consultation duties before significant deployments. For very high-risk tools, Member States may allow co-decision rights through works councils or sectoral agreements. This ensures AM is treated as an organisational change rather than a purely technical procurement.

Finally, redress and enforcement become more coherent. Workers gain clear complaint routes, protection from retaliation, and access to representative support. At system level, coordination between labour inspectorates, data-protection and equality authorities is encouraged or mandated, reducing the current fragmentation.

Expected effect on AM usage

A horizontal directive would change how firms evaluate and deploy AM. The immediate effect is greater selectivity. Employers will weigh efficiency gains against governance duties, legal risk and reputational costs. High-risk or weakly justified tools are likely to be abandoned or redesigned. This should filter out the most problematic uses, such as emotion recognition for attentiveness, and always-on surveillance, without curbing helpful applications that genuinely improve productivity, coordination or safety.

Sectors already reliant on AM, such as large logistics and e-commerce, as well as parts of retail and warehousing, would continue to use these systems, but with more rigorous processes including formal algorithmic impact assessments, human-in-the-loop checkpoints, calibrated monitoring, and clearer worker information. Many large employers that already run GDPR and OSH compliance system would integrate processes established under the AMD into their systems and integrate algorithmic governance. In finance and manufacturing, where performance analytics and dynamic tasking have grown, firms would moderate pacing systems that generate excessive intensity or disparate impact and invest in explainability features, override controls and audit trails.

In SMEs and low-margin settings, the regime is likely to slow the adoption of complex or high-impact tools. Some small employers may defer experimental deployments, particularly where off-the-shelf systems cannot meet explanation or bias-testing needs. Proportionality would be important here. Simplified algorithmic impact assessment for low-risk uses, templates and guidance, and phased timelines can keep routine digital tools, basic time-recording, and simple rostering within reach of SMEs at no or little extra costs. The market response should also help. Producers of AM software will compete on 'compliance-ready' features, such as built-in transparency dashboards, fairness checks, and administrator controls that make it easier for their customers (i.e. AM using companies) to meet obligations. Over time, this should raise the quality of AM in the market, even if it slows down, at an early stage, the rate of adoption. Overall, a small negative effect on AM usage, 'small-', is expected.

Impacts on workers compared to baseline

For workers, Option 3 offers the most substantial improvement over the baseline. System-level transparency, coupled with case-by-case specific explanations, helps workers understand what tools exist, what they do, and how to contest mistakes. Anxiety associated with 'unknown' algorithms would decline when significant decisions cannot be taken by software alone and when outcomes must be explained.

Procedural fairness should improve. A trained human manager provides a buffer against data errors, and out-of-context metrics. The simple knowledge that adverse actions will be reviewed by a human and can be appealed helps alleviate the sense of being at the mercy of a machine.

Psychosocial risks are better managed. By incorporating stress, fatigue, and work intensity into the algorithmic impact assessment and OSH regimes, employers would need to ensure that AM-driven pacing and monitoring are compatible with safe work practices. Where negative effects emerge, mitigation is mandatory. Over time, this should reduce instances of unrealistic targets, constant nudging, and surveillance practices that undermine wellbeing.

Work-life balance should improve. Guardrails around the misuse of algorithmic scheduling, such as providing advance notice, ensuring the reasonableness of changes, and disabling out-of-hours prompts, make it harder for technology to erode rest time by stealth. While not eliminating all pressures of modern work, this creates clearer expectations and fewer intrusions into personal time.

Dignity and privacy gain firmer protection. The directive can draw lines against particularly intrusive techniques in employment and require proportionality for any monitoring. Workers are less likely to face practices that feel demeaning or invasive, which in turn supports trust in legitimate, safety-oriented monitoring.

Workers' voice and access to remedies are strengthened. Information and consultation requirements turn AM deployment into a topic for social dialogue in line with other organisational changes. Individual rights are protected by accessible procedures and representative support, with safeguards against retaliation. The expected overall effect would be a measurable improvement in job quality, characterised by lower stress, a better work-life balance, and a less adverse impact on health. For policy option 3, the impact is labelled 'medium++'.

Implementation and compliance costs

At EU level, drafting and adopting a horizontal directive that intersects labour law, data protection, equality and OSH will take time. Once adopted, Member States face a substantial but one-off transposition effort, as well as the need to align enforcement across labour inspectorates, data protection authorities, and equality bodies. Some Member States may designate a coordination unit or build a structured cooperation mechanism. Member states can be supported from the EU level through guidance and training to enhance cross-border consistency in transposition and implementation.

Authorities will need additional capacity. Inspectors and case-handlers require training in algorithmic issues. Cooperation between labour, data and equality regulators can minimise duplication and ensure coherent outcomes. Over time, periodic inspections would be enhanced to include AM checks. The directive should align with the AI Act and data-protection law (GDPR) to avoid double burdens, allowing combined assessments and shared documentation where

appropriate. Admin costs are labelled 'medium+' compared to 'medium++' in option 2 due to the more complex amendments of existing legislation in option 2.

For companies, compliance costs are non-trivial but deemed manageable. They will need to inventory AM systems, perform and periodically update algorithmic impact assessments (often combined with Data protection IAs), appoint or train managers as reviewers for significant decisions, configure systems to generate explainable outputs and audit logs, and set up information and consultation routines before significant deployments. Larger firms will absorb these duties by extending existing governance for data protection, safety and internal audit. They may invest in additional compliance staff and in tools that automate parts of the algorithmic IA process, including bias testing and explanation generation. The short-run costs are real, but they scale with organisational complexity and are potentially offset by reduced legal risk and reduce costs for companies involved in several Member States. Costs for companies using AM are labelled 'medium+'.

For SMEs, the relative burden is higher. Proportionality is therefore important, and option 3 offers improved ability for proportionality than option 2 (as discussed above). Simplified algorithmic IAs for low-risk uses, standard templates and guidance, and phased application of the most demanding provisions. Public support, model documents, helplines, and sectoral guidance can lower fixed costs. Routinely used digital tools should remain feasible under a light-touch track. Costs for SMEs are labelled 'medium+'. Relative to option 2, this reflects the ability to have a better-targeted directive towards SMEs and low-scale non-risk usage. Under option 2, all SMEs have to keep attention to the amendment of existing legislation, whether they use AM or not. For non-AM using companies, 'compliance' will not require changes, but they will still incur legal costs to understand changes in national law and ensure that they remain compliant after the changes.

4.2.5. Summary of impacts

The three options thus illustrate different pathways for addressing (part of) the challenges of algorithmic management, ranging from guidance to amendments of existing law and the creation of a dedicated directive. Each approach carries implications for coverage, enforcement, costs and administrative demands, and their eventual effects would depend not only on the chosen legal instrument but also on how Member States transpose and implement it, how firms adapt their practices, and how workers and social partners make use of the rights provided.

Table 10 below summarises the key comparisons of the impact assessment.

Table 20 – Comparative assessment of policy options for addressing AM in the workplace[280]

CRITERIA	BASELINE (0) – NO ACTION	OPTION 1 – RECOMMENDATION	OPTION 2 – AMEND EXISTING LEGISLATION	OPTION 3- NEW DIRECTIVE 'AMD'
Coverage of legal gaps (cf. Table 7)	Gaps remain, partly or wholly, unaddressed in many MS. No specific AM rights beyond the platform sector in many MS.	Low. Partial uptake may improve transparency, oversight, etc., but no uniform guarantee. Many gaps likely persist in practice. Depends on additional measures[281] adopted by MS.	High. Can cover all gaps identified through amendments of relevant directives.	High. Can cover all gaps identified
Impact on algorithmic management use	Continued growth of AM across sectors (with uncertainty). Some changes in practices in MS where legislative action is taken. SMEs and large firms adopt AM without new constraints in MS without legislative action.	Small-: Growth of AM usage is mildly slowed relative to the baseline Some MS will adopt guidance (partly) in planned legislation Few MS will initiate new legislation Voluntary adoption of best practices by some firms. Depends on additional measures adopted by MS.	Small--: Growth in AM usage is expected to slow down mildly. SMEs may be more cautious about adopting AM due to compliance duties (which are expected to be more complex than option 3).	Small-: Growth in AM usage is expected to slow down (but less than for option 2, due to less complexity). SMEs may be more cautious about adopting AM due to compliance duties.

280 The assessment of policy options is relative to the baseline and impacts range from 'Small--' to 'Large+'.

281 'Additional measures' in the table refers to measures not envisaged under the baseline. It includes two components: 1) National legislation that takes place under the baseline but is influenced by the Recommendation, and 2) Member States taking legal action – which would not have been taken under the baseline – as a result of the recommendation. See main text for a discussion of these points.

CRITERIA	BASELINE (0) – NO ACTION	OPTION 1 – RECOMMENDATION	OPTION 2 – AMEND EXISTING LEGISLATION	OPTION 3- NEW DIRECTIVE 'AMD'
Effects on workers (vs. baseline)	Negative trend – Rising stress, intensification, loss of autonomy, poorer work-life balance. Scale of the negative trend depends on the number of MS with legislative action	Small+: Mild positive impact on workers. Some MS will adopt guidance (partly) in planned legislation Few MS will initiate new legislation Some workers see benefits if employers follow guidance (e.g. better transparency, some oversight). Overall risk reduction is low – uneven and dependent on voluntary compliance. Many workers see little change relative to baseline Depends on additional measures adopted by MS.	Medium++: Workers (including solo self-employed) under AM should see improvements as legal gaps are addressed. Less stress and work-life balance is improved indirectly.	Medium++: Workers (including solo self-employed) under AM should see improvements as legal gaps are addressed. Less stress and work-life balance is improved indirectly.
Public implementation costs	Baseline costs only for MS with legislative action. Depends on the number of MS with new legislative initiatives	Small--: Few MS will initiate new legislation. Depends on additional measures adopted by MS.	Medium++/Large+: amending and re-implementing several directives will incur significant (one-time) costs for public bodies (EU and national). Enforcement bodies need extra capacity.	Medium+: Drafting and adopting a new directive carries significant costs for public bodies. These costs are likely to be smaller than under option 2 due to less complexity. Enforcement bodies need extra capacity.

CRITERIA	BASELINE (0) – NO ACTION	OPTION 1 – RECOMMENDATION	OPTION 2 – AMEND EXISTING LEGISLATION	OPTION 3- NEW DIRECTIVE 'AMD'
Cost for companies	Costs will increase in MS that take legislative action. Costs will increase for companies doing business in several MS SMEs are harder hit due to their lower capacity of assessing regulations in several countries.	Small-: Small increase for companies (including SMEs) due to minor additional legislation. Costs are partly offset (though limited) by improved harmonisation (following guidelines). Depends on additional measures adopted by MS.	Medium++. Costs for companies are likely to be substantial. The opening of several directives affects not only companies applying AM, but also other firms that need to pay attention to potential changes. SMEs face even higher costs (medium++/large+). Costs could be partly offset by higher legal certainty and lower costs for companies doing business in several Member States	Medium+. Costs for companies (including SMEs) are substantial, but lower than under option 2, as fewer companies are affected and due to the potential for better targeting/proportionality. Costs could be partly offset by higher legal certainty and lower costs for companies doing business in several Member States
Feasibility & timeline	Not assessed in baseline	Quick to adopt at the EU level; relies on the political will of Member States to implement advice	Longer legislative process. A package of existing legislation needs to be amended.	Longer legislative process compared to option 1, but likely shorter compared to option 2.
Legal clarity	Increase in legal fragmentation across the EU. Weakening of the single market	Only marginally improves legal clarity and the single market Depends on additional measures adopted by MS.	Legally most complex, as amendments are difficult to tailor perfectly to AM. While some relevant definitions are available in the PWD, turning a directive regulating a business model into a partly horizontal directive is likely to be complex.	Legally clearer than option 2. Likely the most proportional instrument. Complexity in taking care to align with existing labour acquis and the PWD. Improves single market by creating a level playing field

CRITERIA	BASELINE (0) – NO ACTION	OPTION 1 – RECOMMENDATION	OPTION 2 – AMEND EXISTING LEGISLATION	OPTION 3- NEW DIRECTIVE 'AMD'
			Improves single market by creating a level playing field	

Source: Authors' elaboration.

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ANNEX A – ALGORITHMIC MANAGEMENT DEFINITIONS

AUTHOR/INSTITUTION & YEAR	DEFINITION
Lee et al. (2015)	Algorithms and their supporting systems that take on manager roles.
Möhlmann & Zalmanson (2017)	Software algorithms that oversee and control many remote workers by tracking and automating decisions.
Leicht-Deobald et al. (2019)	Algorithms designed to assist and govern HR decisions.
Wood et al. (2019)	An extension of how companies manage customers, but applied to workers.
Duggan et al. (2020)	A control system where self-learning algorithms make and act on decisions about labour, reducing human involvement, often using worker data.
Gal et al. (2020)	Computer methods that use digital data from different parts of an organisation to understand worker behaviour.
Cheng & Hackett (2021)	Computer programs that efficiently process information to recommend HR actions like hiring or training.
Jarrahi et al. (2021)	An ongoing process where people in an organisation interact with algorithms that guide their work.
Möhlmann et al. (2021)	Collecting and using large amounts of data on a platform to create and improve algorithms that handle traditional management tasks.
Newlands (2021)	A collection of computer processes that automatically generate data, evaluate worker behaviour, and assign tasks.
Meijerink & Bondarouk (2023)	A control system based on data that computers can read and software algorithms.
Piasna (2024)	AM as 'the use of a diverse set of technological tools and techniques to automate managerial roles in companies, including task allocation, monitoring, evaluation and the disciplining of workers'. She further states that its reliance on AI allows for the automated or semi-automated implementation of decisions, thereby eliminating the need for human intervention.
Rani, Pesole, and Gonzalez Vazquez (ILO 2024)	The ILO (2024) report then revises and expands upon this definition to capture a broader scope of digital technologies' effects on work organisation and monitoring. This broader approach includes: (i) Specific-purpose digital technologies, those designed for a particular function or application. (ii) General-purpose digital technologies, those with wider applications that can be adapted to different situations, even if not explicitly designed for work coordination. The ILO report notes that technologies not explicitly intended for work coordination can still have significant direct effects on work organisation, task allocation, job quality, and industrial relations. For example, the report highlights how instant messaging apps like WhatsApp can exert strong control and pressure over workers, and algorithms designed to manage patient flows in healthcare can also affect work organisation and potentially be used for worker monitoring.
Eurofound (2024)	It adopts a broader conceptual approach. It considers the impact of 'specific-purpose' and 'general-purpose' digital technologies, including

AUTHOR/INSTITUTION & YEAR	DEFINITION
	those not explicitly designed for work coordination but which nonetheless exert a significant influence on work organisation, task allocation, job quality, and industrial relations. This includes tools like instant messaging apps that can exert control or pressure over worker.
Dupuis (2025)	AM as 'a system of control where self-learning algorithms are given the responsibility for making and executing decisions affecting labour, thereby limiting human involvement and oversight of the labour process'. Dupuis notes that these definitions highlight the automation of management functions and their potential impact on labour effort, but may not fully capture the complexity and variety of tasks algorithms can perform, or who controls their implementation
Faioli (2025)	AI/AM as a 'Third Element'. The presence of AI, particularly advanced forms like Frontier AI or General-Purpose AI (GPAI), introduces a 'third element' into the traditional worker-employer relationship. This intelligent machine or robot actively interacts with workers and employers, challenging established legal, HR management and organisational frameworks.
OECD (2025)	AM as 'the use of technological tools which may include artificial intelligence (AI), to fully or partially automate tasks traditionally carried out by human managers'. This broad definition encompasses the use of software for functions such as giving instructions to workers, monitoring them, or evaluating them. This aligns with similar broad understandings of algorithmic management used in their survey
OSHA (2025)	AI and algorithm-based worker management (AIWM) refers to digital systems that gather work-related data, including data on workers and tasks. This data is then fed into algorithmic or AI systems. The purpose of these systems is to make automated or semi-automated decisions or provide information to employers, managers, human resource services, and sometimes workers. These decisions and information are used for various managerial functions, including allocating work shifts, allocating work tasks, supervising/monitoring workers' performance or behaviour, evaluating workers' performance. OSHA emphasizes that AIWM can lead to optimised work organisation, potentially benefiting both employers and workers if occupational safety and health (OSH) fundamentals are properly addressed. It also notes that these systems redefine task execution, coordination, and worker supervision. While automated decisionmaking involves AI systems making decisions independently, semi-automated systems offer insights and support for informed decisionmaking by humans.

ANNEX B – DESCRIPTION OF SURVEY DATA SOURCES

This Annex gives a brief description of each of the four surveys.

OECD (OECD2024)

The OECD employer survey[282] is conducted by the OECD under its AI-WIPS programme (with fieldwork by Ipsos). The survey targets mid-level managers/supervisors in firms so they can report directly on the tools their workplace uses and how those tools affect management and workers. It covers 6,047 firms with 20+ employees across six countries, France, Germany, Italy, Japan, Spain and the United States, with data collected from June to August 2024. The questionnaire measures the prevalence and intensity of algorithmic management (AM) via 15 concrete use cases grouped into three categories: instruction (e.g., allocating work schedules/activities, providing task instructions), monitoring (e.g., tracking working time, completion and speed of work, content/tone of communications, worker location, health & safety, fatigue/alertness), and evaluation (e.g., setting targets, rewarding or sanctioning performance, leaderboards). Beyond adoption, it asks managers why firms do not adopt (e.g., costs, staff resistance, concern for workers), and gathers perceptions of the impacts on managerial decision quality, speed, and autonomy, as well as job satisfaction and skill needs (managerial, analytical, and social). It also probes trustworthiness concerns (accountability for wrong decisions, explainability, protection of workers' physical/mental health) and inventories governance measures in place (guidelines, worker consultation, audits, options to opt-out/access/request correction of data), enabling cross-country comparisons of both practices and safeguards.

ESENER (ESENER2024)

ESENER 2024 (European Survey of Enterprises on New and Emerging Risks). Run by the European Agency for Safety and Health at Work (EU-OSHA), the 2024 wave targets establishments with five or more employees, interviewing the person most knowledgeable about OSH risk management (typically the senior manager responsible for OSH/HR) and, where applicable, worker representatives. The sample comprises 41,458 establishments across the EU-27, plus Iceland, Norway, and Switzerland, with fieldwork conducted from May to October 2024. For measuring algorithmic management (AM), the master questionnaire includes a digitalisation module that asks whether the establishment uses machines/systems/computers that automatically allocate tasks/working time/shifts, systems that monitor workers' performance or behaviour, AI systems to perform work tasks, as well as robots interacting with workers and wearables, allowing proxies of AM exposure at the establishment level. It also inquires whether routine risk assessments cover the use of digital technologies (including automatic allocation/monitoring) and whether employees were consulted about the health and safety implications of such technologies (e.g., Q314). Beyond AM-relevant items, ESENER 2024 covers core OSH management practices (regular risk assessments, internal/external expertise), psychosocial risk management (stress, harassment/violence procedures), training, remote/hybrid work, drivers and barriers to addressing risks, and inspectorate interactions.

[282] Algorithmic management in the workplace, OECD, 2025

Eurobarometer

Eurobarometer 554[283] is an EU-wide public-opinion survey fielded in April–May 2024 that includes a dedicated workplace module. The sample size is 26,000 respondents distributed on 27 EU countries. It asks employed respondents about their awareness of their employer's use of digital technologies/AI to manage work; whether such tools have been used in their current/most recent workplace for six core management functions: hiring, task allocation, scheduling, monitoring, performance assessment (rewards/sanctions), and safety; what information/explanations and data access they received; and their attitudes to robots/AI and to potential rules (privacy protection, limits on automated monitoring/decisions, transparency, and worker involvement). The instrument thus captures worker-level exposure and perceptions rather than establishment-level adoption.

EWCS2024

EWCS 2024 (European Working Conditions Survey). Run by Eurofound, the 2024 wave targets workers (employees and the self-employed) across 35 European countries (EU-27 plus eight neighbours); fieldwork ended in November 2024, with a target of around 50,000 interviews. For measuring algorithmic management (AM), the questionnaire includes worker-level items on whether a computer/system monitors work performance, allocates tasks, or determines when to work (used in our analysis as Q56A–C), enabling a binary exposure indicator and breakdowns by worker and job characteristics. Beyond AM, EWCS 2024 covers core job-quality domains (earnings, prospects, skills & discretion, working time, work intensity, social and physical environment), plus modules on digitalisation/AI at work, remote work, OSH/psychosocial risks, work–life balance, training, autonomy, and social relations.

[283] Artificial Intelligence and the future of work.

ANNEX C – AM PREVALENCE BY WORKER AND WORKPLACE CHARACTERISTICS

Table C1 – AM prevalence among employees by company size (EWCS2024)

COUNTRY	TOTAL	COMPANY SIZE			
		Micro (<10 employees)	Small (<50 employees)	Medium (<250 employees)	Large (>250 employees)
EU	42	31	41	47	53
AT	50	38	51	55	57
BE	59	51	54	63	66
BG	36	31	39	39	32
CY	35	31	35	43	46
CZ	43	41	41	46	49
DE	38	23	35	40	46
DK	70	53	74	73	79
EE	43	40	40	50	53
EL	27	19	35	38	26
ES	42	32	43	53	52
FI	41	30	45	43	47
FR	37	21	33	42	55
HR	49	40	54	51	67
HU	33	24	35	39	35
IE	53	40	46	60	62
IT	46	39	50	51	59
LT	31	29	29	35	40
LU	60	45	54	59	75
LV	41	25	41	50	54
MT	40	32	35	45	44
NL	66	69	67	64	63
PL	40	18	37	45	59
PT	27	27	17	35	60
RO	40	35	43	42	52
SE	51	43	52	51	57
SI	40	27	37	46	60
SK	40	30	42	53	40

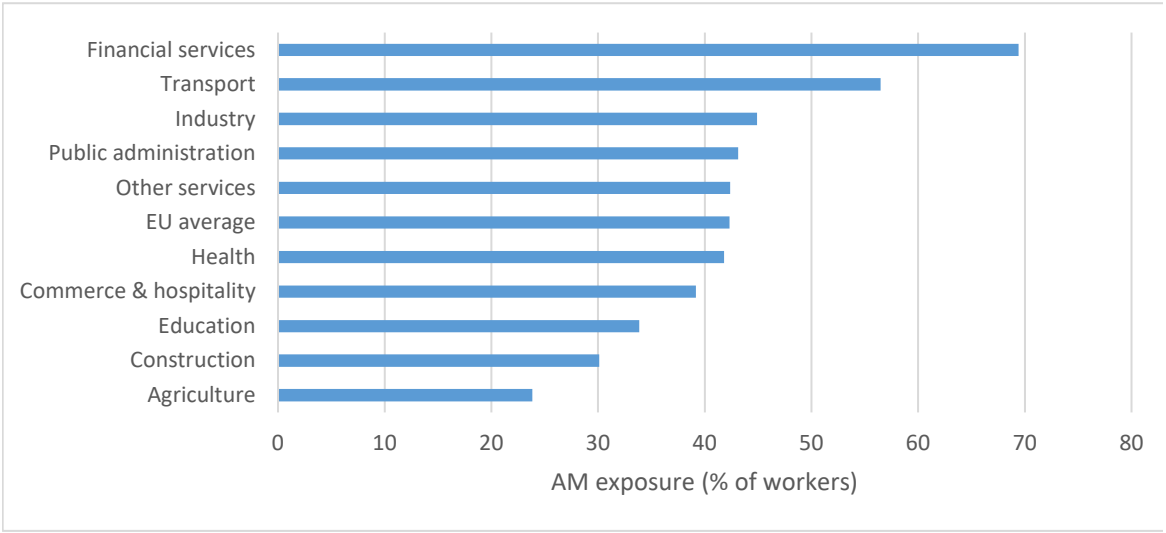
Source: Authors' calculations based on EWCS2024

Table C2 – AM prevalence of employees by sex, education and age (EWCS2024)

COUNTRY	TOTAL	SEX		EDUCATIONAL ATTAINMENT			AGE GROUP		
		Women	Men	Low	Medium	High	20-34	35-49	60-64
EU	42	41	44	28	43	46	45	42	40
AT	50	49	53	37	51	55	57	49	44
BE	59	57	60	40	57	64	58	59	58
BG	36	35	35	9	28	48	40	37	28
CY	35	39	31	9	23	45	41	33	31
CZ	43	35	51	22	45	44	54	43	35
DE	38	36	40	34	49	33	45	37	32
DK	70	71	69	57	72	71	69	70	71
EE	43	40	46	44	44	42	44	45	37
EL	27	24	30	5	14	36	23	30	25
ES	42	38	46	16	42	52	43	43	35
FI	41	42	41	43	44	40	40	41	46
FR	37	33	41	10	32	45	32	39	41
HR	49	52	46	5	49	49	53	47	47
HU	33	32	35	9	34	41	38	34	23
IE	53	52	52	37	47	57	58	53	39
IT	46	50	45	30	53	51	39	48	55
LT	31	30	32	4	26	37	37	32	21
LU	60	53	63	32	63	64	66	54	51
LV	41	40	42	29	31	53	51	38	33
MT	40	37	41	18	36	50	36	46	21
NL	66	68	64	53	69	65	75	61	62
PL	40	40	39	2	37	45	43	39	35
PT	27	25	29	13	29	36	27	28	22
RO	40	41	42	35	37	57	50	43	26
SE	51	47	55	62	55	48	56	48	50
SI	40	40	40	30	38	44	35	43	37
SK	40	40	40	32	35	48	47	39	33

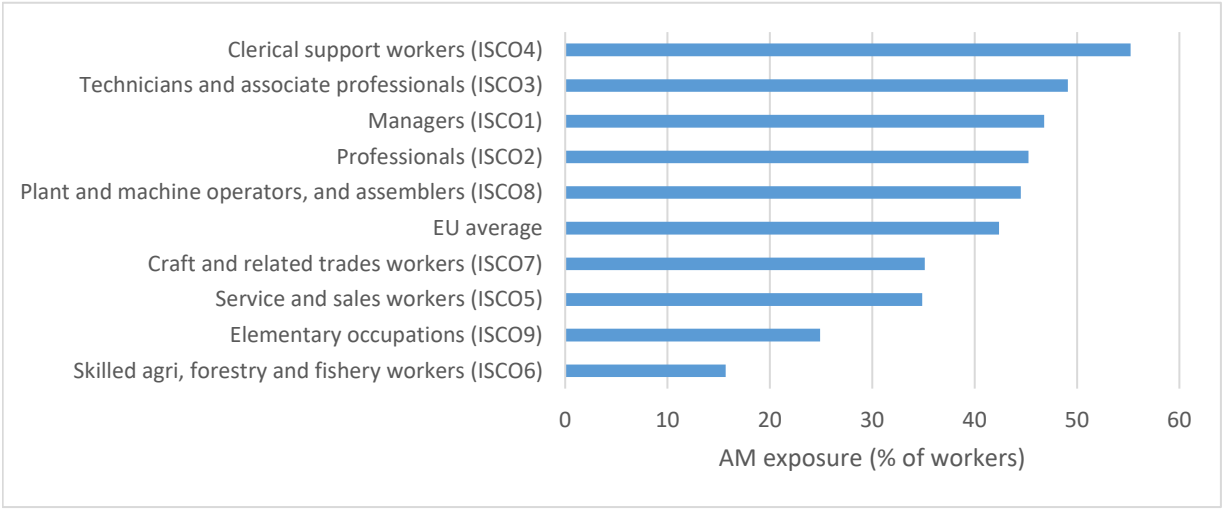
Source: Authors' calculations based on EWCS2024

Figure C1 – AM exposure by economic activity (EU27, %)



Source: Authors' calculations based on EWCS2024.

Figure C2 – AM exposure by occupational groups (EU27, %)



Source: Authors' calculations based on EWCS2024.

Table C3 – AM prevalence of employees' additional characteristics (EWCS2024)

COUNTRY	TOTAL	UNION OR OSH REPRESENTATIVE		PERMANENT CONTRACT		FULLTIME		MIGRANT BACKGROUND	
		No	Yes	Yes	No	Yes	No	Migrant	Native
EU	42	32	47	44	35	44	34	41	43
AT	50	31	57	53	25	54	31	47	52
BE	59	48	62	61	47	61	50	51	62
BG	36	29	42	37	22	36	9	64	35
CY	35	28	41	36	33	34	44	32	36
CZ	43	38	48	43	50	43	50	41	44
DE	38	31	40	38	39	41	31	41	37
DK	70	60	72	71	63	72	59	77	68
EE	43	35	47	45	23	45	22	46	43
EL	27	22	32	29	24	29	9	12	28
ES	42	30	49	44	31	43	31	32	45
FI	41	23	45	42	42	43	30	46	41
FR	37	23	43	40	24	39	22	29	39
HR	49	41	56	48	53	50	27	45	49
HU	33	29	38	34	29	33	25	71	33
IE	53	37	57	55	42	57	35	57	49
IT	46	34	53	50	39	51	34	45	48
LT	31	23	38	33	15	32	8	24	31
LU	60	53	61	61	36	61	51	61	50
LV	41	33	44	42	30	42	33	35	42
MT	40	26	44	45	14	41	23	27	44
NL	66	67	66	68	56	66	65	58	68
PL	40	29	44	42	28	41	22	43	39
PT	27	20	37	27	25	27	30	28	27
RO	40	36	46	42	50	41	49	n.a.	42
SE	51	38	52	52	42	52	35	55	50
SI	40	30	47	43	25	42	23	32	42
SK	40	25	46	40	43	41	34	38	40

Source: Authors' calculations based on EWCS2024.

ANNEX D – CONTACTS INTERVIEWED AND INTERVIEWS' STRUCTURE

We contacted and interviewed:

- President of CEC (Confédération Européenne des Cadres)
- Vice President, Global Chief AI Governance Officer at Wipro and AI ethics expert
- Responsible for AI, industriAll Europe
- Vice-President of EESC's Section on Employment, Social Affairs and

Citizenship (SOC) and Rapporteur of SOC/803 opinion on 'Pro-worker AI'

- NYU School of Professional Studies, teaching Digital Workplace Design and Design thinking for HR

The interview structure is informed by the desk analysis, focusing on recently proposed or implemented AI/AM tools, emerging impacts of AI/AM on employment relationships, employment structure, changing demands, labour shortages, economic performance, working conditions, health and safety, and fundamental rights, insights into social inclusion implications of AI/AM technologies in workplaces. The scheme we used for the interviews is based on these queries:

I. Validation of desk review and general perceptions

1. Based on your understanding, do our initial findings on the broad impacts of AI/AM (e.g., on productivity, working hours, health, safety, and fundamental rights) align with your observations from your sector/area of expertise? Could you elaborate on any points of agreement or divergence?

2. From your perspective, what are the most significant positive developments or opportunities arising from the introduction of AI/AM in workplaces today?

3. Conversely, what are the most pressing concerns or challenges you are currently observing related to AI/AM adoption?

II. Emerging AI/AM tools and their real-world application

4. Are there any recently proposed, piloted, or implemented AI/AM tools or systems that you believe are particularly impactful, either positively or negatively, that our desk review might not have fully captured? Can you describe them and their intended/actual effects?

5. How do these newer tools differ from earlier generations of automation in terms of their implications for workers and management?

III. Specific impact areas

A. Employment relationships & structure

6. How is AI/AM altering the nature of the employment contract or common work arrangements (e.g., remote work, platform work, hybrid models)? Are you seeing shifts in legal or contractual terms?

7. What impact is AI/AM having on collective bargaining processes or the role of social dialogue? Are new areas for negotiation emerging?

8. How is AI/AM influencing the required workforce skillset? Are you observing new skill shortages or a change in demand for certain roles?

9. Are there specific job roles or sectors where AI/AM is leading to significant labour shortages or, conversely, to a reduction in demand for human labour?

B. Working conditions and health and safety

10. In what ways is AI/AM affecting the organisation of work within companies (e.g., decisionmaking processes, team structures, supervision)?

11. How is AI/AM influencing working time (e.g., scheduling, flexibility, monitoring)? Are you seeing changes in work-life balance as a result?

12. What are the key implications of AI/AM for training and skill development needs for both managers and employees?

13. Regarding health and safety, what concerns do you have about the potential for AI/AM to increase work intensity or contribute to mental health problems (e.g., stress, burnout, surveillance anxiety)?

C. Economic performance and fundamental rights

14. From an economic perspective, how is AI/AM impacting productivity and overall economic performance in organisations you observe? Are the benefits widely distributed?

15. How are fundamental rights (e.g., privacy, non-discrimination, human dignity, freedom of association) being protected or challenged in workplaces using AI/AM? Can you provide examples?

16. In what ways can AI/AM technologies lead to or exacerbate bias and discrimination in hiring, performance management, or other workplace decisions? How are these issues being addressed?

IV. Social inclusion and unforeseen implications

17. What are the key social inclusion implications of AI/AM introduction in workplaces? Are certain demographic groups or types of workers disproportionately affected (positively or negatively)?

18. Are there any unforeseen challenges or opportunities related to AI/AM that our desk review or these questions haven't addressed, which you believe are critical for policymakers to consider?

V. Future outlook and policy implications

19. Looking ahead, what do you see as the most critical areas for policy intervention or regulatory oversight regarding AI/AM in the workplace?

20. What role do you believe your organisation/sector should play in shaping the future of AI/AM to ensure a fair and beneficial transition for all?

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This study investigates the integration and effects of artificial intelligence and algorithmic management (AM) technologies within European workplaces, extending beyond the realm of platform work. It thoroughly examines the European regulatory framework for the use of AM technologies, engages in stakeholder interviews, and analyses case studies within the logistics, healthcare, telecoms, automotive and manufacturing sectors, revealing notable gaps in worker protection and regulatory oversight.

The study estimates that exposure to AM could rise from 42.3 % to 55.5 % in the medium term, generating productivity opportunities but also challenges in employment relations, working conditions and workers' wellbeing. It identifies key regulatory gaps in AM use at work, and explores the role EU legislation could play both in addressing the gaps and in guaranteeing responsible use of AM in the workplace. It develops three policy options: adopting a recommendation; amending a package of existing legislation; and adopting a new legislative instrument to regulate the use of AM.

The added value of acting at EU level has been identified in ensuring the same level of protection for all workers, improving working conditions and safeguarding fundamental rights. For companies, having a common set of rules would enhance the level playing field and increase legal certainty.

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