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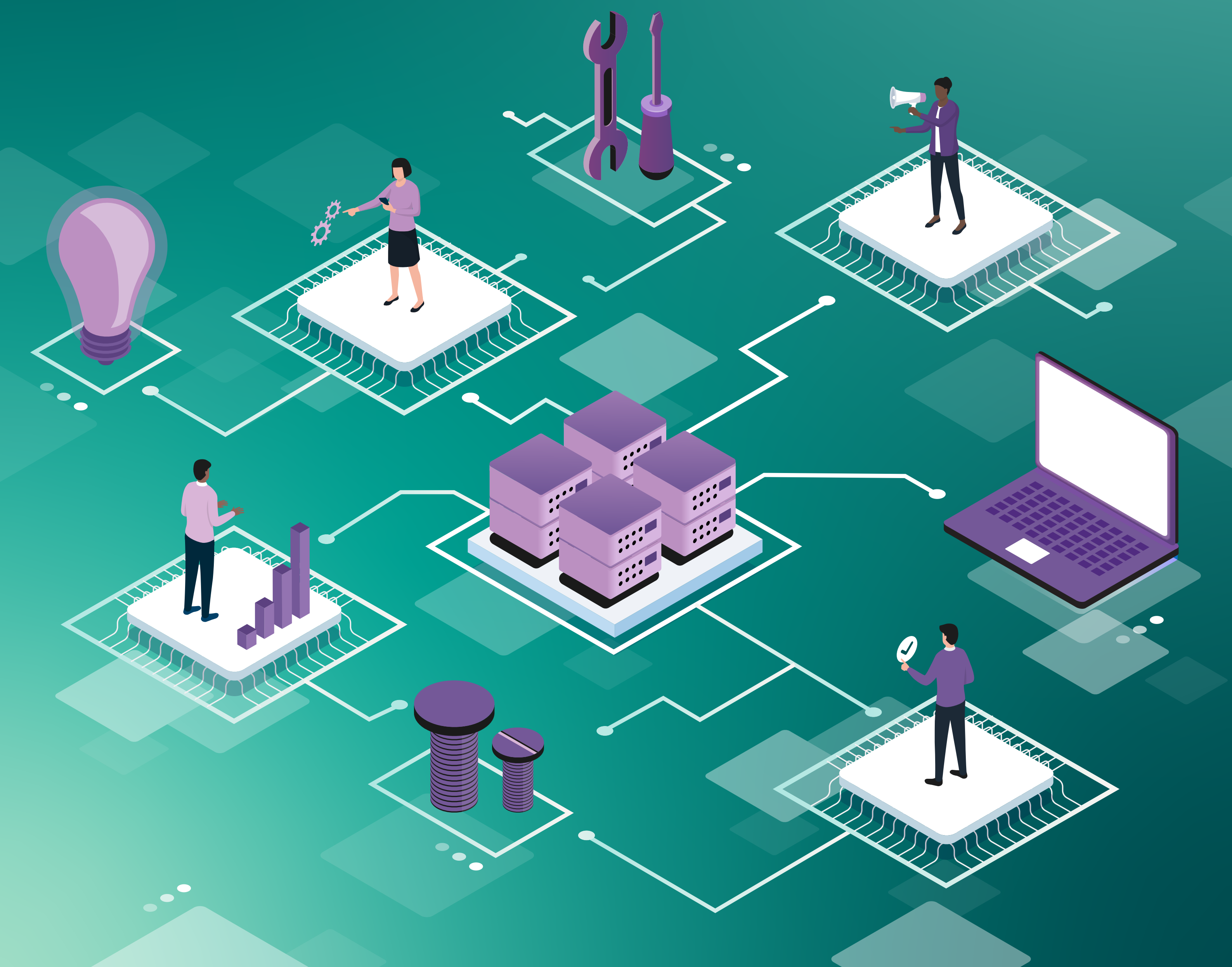
# Digital Monitoring, Algorithmic Management and the Platformisation of Work in Europe

Gonzalez Vazquez, I., Fernandez Macias, E., Wright, S., Villani, D.

2025



## Contact information

Name: Ignacio Gonzalez Vazquez
Address: C/ Inca Garcilaso 3, Edificio Expo,
1st floor, 41092 Seville, Spain
Email: Ignacio.GONZALEZ-VAZQUEZ@ec.europa.eu

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# Contents

# Abstract

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# Abstract

This report presents new evidence on the platformisation of work in the European Union, examining the prevalence and potential impacts of digital tools, digital monitoring and algorithmic management. The report is based on data from the new AIM-WORK survey, conducted in 2024-2025 and representative of the working age population in all 27 EU Member States. The data reveals that over 90% of EU workers use digital devices, with the use of AI tools at work, particularly AI chatbots powered by Large Language Models, rising rapidly: on average, a third of EU workers report using AI for work-related purposes. Digital monitoring is common, particularly for working hours and entry or exit. Algorithmic management is less prevalent but also quite significant, taking diverse forms, including automated task allocation and performance evaluation. We identify two distinct types of platformisation, typical respectively of industrial and office workplaces. Our evidence indicates that some types of platformisation have no significant implications for working conditions. However, the full platformisation of work, which includes simultaneously all the forms of digital monitoring and algorithmic management that we identify on the basis of the data, is associated with generally worse working conditions. This applies also to the forms of platformisation more prevalent in manual work settings.

# Acknowledgements

# Acknowledgements

The AIM-WORK survey would have not been possible without the excellent work of Ipsos European Public Affairs, who conducted the fieldwork that allowed the collection of the rich data that underpins this report. In particular we would like to thank Sara Gysen and Chiara Vinciguerra for their dedication and commitment. The report has benefitted greatly from the work of our colleagues in the Directorate-General for Employment, Social Affairs and Inclusion, in particular Guillaume Hemmert and Andrea Glorioso. The authors would also like to thank Uma Rani, Antonio Aloisi, Rafael Munoz de Bustillo Llorente, Anna Milanez, Cesira Urzi-Brancati, Maurizio Curtarelli, Sara Riso, Dragos Adascalitei, Wouter Zwysen, Carin Hakansta, Alicia de Quinto Notario, Alina Sorgner and Annarosa Pesole for their valuable comments in the preparation of the AIM-WORK questionnaire and this report.

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## Authors

- Ignacio Gonzalez-Vazquez
- Enrique Fernandez-Macias
- Sally Wright
- Davide Villani

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# Executive summary

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# Executive summary

The increasing use of digital devices and networks has led to an expanding "platformisation" of work based on data-driven practices of work organisation, control, coordination and management. The platformisation of work is the increasing use of digital platforms for coordinating work processes in an algorithmic way. It can be linked to three interconnected and growing phenomena: the pervasive use of digital tools at work, the digital monitoring of work activity, and the algorithmic management of work. While offering potential for productivity gains and streamlining of work processes, this platformisation also raises concerns about privacy, worker autonomy and work intensification. This report presents a first overview of the new AIM-WORK worker survey for the EU and all its Member States, focusing primarily on the use of digital tools in the workplace, the prevalence and characteristics of digital monitoring and algorithmic management practices across the EU, analysing the positive and negative impacts of the increasing implementation of these technologies.

The AIM-WORK survey, which includes responses from 70,316 individuals across all 27 EU Member States, collected in late 2024 and early 2025 statistically representative evidence on the use of digital tools (including tools powered by Artificial Intelligence - AI), digital monitoring and algorithmic management in European workplaces (i.e. the use of software to control, coordinate or manage work beyond mere monitoring). The survey was implemented through computer-assisted telephone interviewing (CATI) on a random sample of mobile phones to facilitate broad coverage, building upon a previous exploratory survey that provided initial insights in Germany and Spain. The AIM-WORK survey has generated comprehensive representative information on this highly consequential and rapidly evolving phenomenon within the European Union.

The AIM-WORK survey shows that over 90% of EU workers use digital devices at work, with computers, mobile devices, office software, and communication platforms being the most common, indicating a high level of digitalisation of work across Europe. However, significant variations exist across countries and occupations, with Northern and Central European countries showing higher adoption rates. There is also a strong gradient by education and occupation, with higher adoption rates by white collar jobs and the highly educated, providing evidence of a digital divide in the workplace. 50% of low-educated workers do not use digital tools at work or use mobile devices only, compared to less than 10% of high-educated workers.

Concerning AI in the workplace, a high proportion of EU workers (30%) have used AI-powered tools for work at least once in the last 12 months. This concerns particularly the use by workers of AI chatbots powered by Large Language Models (LLMs). This type of AI usage is particularly high in Denmark, Belgium, the Netherlands, Finland and Austria, indicating differential rates of AI diffusion across the EU. The AIM-WORK data reveals a rapid deployment of AI technologies, most frequently used for text-related tasks such as writing and translation. Workers show a generally positive attitude towards the benefits of using AI at work (most of them say that the use of AI has made their work easier). However, there are significant differences by occupation: more than one-third of white-collar occupations use AI tools at work, compared to less than 20% for the rest of occupations and only 6% for elementary occupations.

Digital monitoring is quite prevalent, particularly the monitoring of working time (37% of EU workers are digitally monitored for working hours and 36% for entry/exit of work). ‘Physical monitoring’, or the monitoring of the physical location of workers, and ‘activity monitoring’, or the monitoring through digital tools of worker activities, are generally less frequent but they affect a significant proportion of workers in some countries. Some of these forms of digital monitoring, such as the monitoring of office work or social media, can be quite intrusive. This highlights the increasing ability of employers to collect data about workers. Prevalence varies

> Platformisation is reshaping European workplaces

significantly across Member States, being particularly high in some Member States in Central and Eastern Europe.

Algorithmic management, less prevalent than digital monitoring, is also significant, presenting a quite diverse pattern across European countries and workplaces. Our survey results indicate that 24% of EU workers have their working time allocated automatically, with Spain, Poland, Ireland, and Romania exhibiting the highest rates of algorithmic management. This form of automated working time allocation is part of what we refer to as 'algorithmic direction' often paired with algorithms that determine workflow or task prioritisation. Moreover, 'algorithmic evaluation', where performance is assessed and rewarded or penalised automatically, is also present in European workplaces albeit to a lesser extent.

In the final section of the report, we analyse how the use of digital tools, the digital monitoring of work and the algorithmic management of workers are combined in specific work contexts. This allows us to propose a new classification of workers according to the degree of 'platformisation' of their work, ranging from "full platformisation" (workers subject simultaneously to all forms of digital monitoring and algorithmic management, around 2% of the total) to "no platformisation" (workers who use no digital tools at all or are not subject to digital monitoring or algorithmic management, encompassing 6 and 33% of workers, respectively).

In between those extremes there are partial forms of platformisation: of particular interest are the categories of "physical" and "informational" platformisation. Physical platformisation entails (digital) physical monitoring and algorithmic direction of work, and it affects around 7% of EU workers, mostly in sectors such as mining, transportation and logistics. Informational platformisation is defined by activity monitoring and algorithmic evaluation, affects around 9% of EU workers and is most frequent in the financial and insurance sectors. Full platformisation and physical platformisation are clearly associated with negative working conditions, particularly increased stress and diminished autonomy and flexibility, whereas other forms of partial platformisation (including the informational variety) do not seem to have significant negative implications. Finally, the prevalence of platformisation varies widely across European countries, with higher values in Eastern and Southern Europe.

Ultimately, the AIM-WORK survey provides a thorough and updated snapshot of how the digital revolution continues to reshape the European world of work in profound and uneven ways. Some combined forms of digital monitoring and algorithmic management should be carefully considered in terms of their potentially negative implications for working conditions. The diverse experiences highlighted in this report call for targeted measures and a concerted effort among social partners and policymakers to ensure that the ongoing digitalisation of work unfolds in a manner that is both economically beneficial and socially responsible.

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# 1

# Introduction

# 1 Introduction

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The pervasive use of digital devices and networks for all kinds of different purposes is a defining feature of society in the 21st century. In the last 30 years, the digital revolution has generalised the use of interconnected, data-driven digital tools, both hardware and software, reshaping our lives and jobs. Machines powered by AI increasingly mediate our social, cultural, economic and political interactions. For example, they are increasingly integrated into socio-economic activities such as credit scoring, policing, driving, online dating, and drone warfare (Rahwan, et al., 2019). Digital platforms, which can be understood as digital infrastructures that coordinate all kinds of transactions in digital networks, are the most efficient way to share information and interact in digital environments (Fernández-Macias et al., 2025). Because of this, the use of digital platforms has spread very quickly for so many different purposes that it has led to a 'platformisation' of society: digital platforms are present everywhere and, for many of us, have become the most natural way to look for housing, temporary accommodation or leisure activities, to purchase or exchange all kinds of goods and services, to find romantic partnerships, to access media, news content, audio-visual material, and so on. This way, the use of digital social media platforms to interact and share content with other people is fundamentally reshaping social interactions, with many benefits but also worryingly harmful effects notably on inclusivity or mental health (see, for example, O'Neill 2016; Popovac et al., 2023) as well as on the foundations of public debate and democratic institutions throughout the world (see, for example, Bucher 2018; Fornasier and Borges 2022; Wells et al., 2021).

Digitalisation, and the increasing platformisation of all aspects of life and society, were often initially seen in a very positive light, underscoring the potential of the digital revolution to better connect people and facilitate access to data and all kinds of transactions. Digital platforms enable human interactions and the exchange of information at a scale never seen before in human history, and its collaborative features undoubtedly have positive implications. However, digitalisation and the platformisation of society have gone hand-in-hand with the emergence of large technological corporations that extract value from this data and accumulate increasing amounts of power and influence (Gandini 2019; Srnicek 2017; Zuboff, 2015, 2019; Zysman and Newman 2006; Vallas 2019). The massive data-driven surveillance of our lives that underpins this new form of capitalist accumulation has negative implications in terms of privacy, human agency and autonomy.

Employment and the world of work have also been affected by these changes. In recent years the Joint Research Centre's research programme on the Changing Nature of Work [1] has investigated the many ways through which the nature of work has been altered by the digital revolution. Like in previous historical periods of fast technological change, concerns have mounted in recent decades about possible job losses resulting from automation technologies and the generalised digitisation of work processes that has taken place since the 1980s. In reality, no major impacts on net employment levels have been observed so far as a result of the digital revolution, but so much attention has been paid to this that another, much more consequential impact may not have received the attention it deserves: the profound changes in the way work is organised, planned, monitored and managed in the digital age (Fernández-Macías et al. 2025).

Like in other aspects of our societies and economies, the use of digital platforms has also spread quickly to the coordination and management of work-related transactions. The digitisation of work processes, enabled by the widespread use of digital technologies in the workplace starting from the 1980s with the advent of personal computers, has led to what Adler-Bell and Miller (2018) have called 'the datafication of labour'. This means that employers now have available to them a range of digital tools to capture and analyse worker data, electronically monitor their workers, and manage them using algorithms (Adler-Bell and Miller 2018; Franke and Pulignano, 2021 & 2022; Kellogg et al., 2020). Data-driven management techniques are implemented in workplaces across all sectors and areas of economic activity and all kinds of organisations, which has resulted in an increasing standardisation and bureaucratisation of work (Fernández-Macías et al. 2022; Baiocco et al. 2022). Integral elements in these new managerial and control structures are digital monitoring and algorithmic management of work. These features are increasingly common and have been shown to possibly lead to productivity and efficiency gains through a streamlining and simplification of work processes. As employers develop new business models, the platformisation of work affords them new methods of worker control and productivity management that have the potential to substantially affect working conditions and worker outcomes (Bernhardt, Kresge and Suleiman 2023; Parent-Rocheleau and Parker 2021; Bailey 2022; Wood et al., 2019, Fernández-Macías 2018; Baiocco et al. 2022; Rani et al. 2024).

This three-pronged reality of: (i) pervasive use of digital tools in the workplace, including AI tools, (ii) digital monitoring of work and (iii) algorithmic management, is what previous JRC research has conceptualised as the platformisation of work (Fernández-Macías et al. 2023; 2025), as a manifestation in the world of work and employment of the broader platformisation trends described above.

> The digital revolution reshapes the world of work by changing how work is organised, monitored and coordinated

The impact of digital technologies in the world of work, including the platformisation of work, has been receiving increasing attention from researchers, policy makers and the general public in recent years. A recent Eurobarometer on AI and the Future of Work revealed that large majorities of Europeans think that rules addressing risks and maximising the benefits of digital technologies in the workplace would be important. Most Europeans have a positive opinion of robots and Artificial Intelligence in the workplace, but concerns about their negative impact on employment are still present (European Union, 2025).

Interest in this phenomenon surged with the proliferation of digital labour platforms that coordinate and mediate on-location or online work transactions. These digital labour platforms led to the emergence of the highly debated - and now more and more regulated - 'riders' and platform work phenomena. Although still limited in scope, these experiences have drawn significant attention due to their distinctly novel character within the world of work. It is important

[1] joint-research-centre.ec.europa.eu/projects-and-activities/employment_en. For an overview of the main findings of this research programme, see Fernández-Macías et al. 2025.

to note that the concept of the platformisation of work which we discuss in this report is much broader in scope and refers to the increasing use of digital platforms for the coordination of work in more traditional forms of employment. This contrasts with previous JRC research on platform work, which in particular identified important challenges in relation to the employment status of persons performing platform work and their working conditions (Pesole et al. 2018; Urzí-Brancati et al. 2020). The new European Directive on improving working conditions in platform work [2] represents major progress in adapting labour market institutions and legislation to this new phenomenon. The chapter on algorithmic management in the Directive, which includes a series of provisions of enhanced transparency, information to workers, human-in-command requirements and other safeguards for workers, is a major stepping stone in mitigating the potentially negative implications of these technologies, while reaping their benefits in the specific context of work mediated through digital labour platforms.

But again, the focus of this report is on the related but much broader phenomenon of the platformisation of regular work. The increasing use of digital platforms to coordinate work outside digital labour platforms, in all kinds of economic activities and organisations, is receiving increasing attention. While the origins of many contemporary forms of digital monitoring and algorithmic management can be traced back to the advent of the platform economy (Adams-Prassl et al., 2023), they now play a role in activities such as the allocation of tasks, schedules, performance ratings in a growing number of workplaces in the regular economy (Milanez et al., 2025). Against this backdrop, and following up on a previous exploratory survey conducted in two countries in 2022-2023 (Fernández Macias et al. 2023), the European Commission's Joint Research Centre in partnership with the Directorate-General for Employment, Social Affairs and Inclusion conducted in 2024-2025 the AIM-WORK (Analysis on Impacts of Artificial Intelligence and Algorithmic Management in the Workplace) survey. The AIM-WORK survey's main objective is to collect representative data from the working-age population across all 27 EU Member States on their use of digital tools – including tools powered by Artificial Intelligence (AI) – in the work context, as well as the extent to which digital monitoring and algorithmic management are present in European workplaces. The new AIM-WORK data allows us to undertake a robust assessment of the prevalence and implications of digital tools usage, digital monitoring and algorithmic management at work, providing an updated, comprehensive cross-country and cross-sectoral picture across the EU. To the best of our knowledge, this is the first time that this type of information is gathered by a representative survey at the European level.

This report presents a first descriptive overview of the new AIM-WORK data for the EU and all its Member States, focusing primarily on the use of digital tools in the workplace, the prevalence and characteristics of digital monitoring and algorithmic management and the platformisation of work across the EU [3]. This initial overview of the main findings will be complemented with a series of analytical papers further exploring, in detail, the most relevant insights. The original contribution of this study is threefold:

- Firstly, the study updates and clarifies the concepts of digital monitoring, algorithmic management and platformisation of work, based not only on our previous work (Fernandez-Macias et al. 2023) but also on existing and emerging literature.
- Secondly, the study proposes an approach to operationalise these concepts for measurement purposes, developing a set of indicators on digital tools usage, digital monitoring, algorithmic management and the platformisation of work in the EU.
- Thirdly, on this basis the report provides for the first time quantitative evidence on these topics for all Member States of the EU, based on high quality and statistically representative data.

[2] Directive 2024/2831 of the European Parliament and of the Council of 23 October 2024 on improving working conditions in platform work. eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202402831

[3] This report focuses exclusively on the platformisation of work, but the AIM-WORK survey also collected information on work mediated through digital labour platforms and on the provision of unpaid digital content by users of content-sharing platforms. Such data will be presented and analysed separately.

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The report is structured as follows. Section 2 clarifies key concepts underpinning the AIM-WORK survey, revising and updating the main definitions of digitisation of work, digital monitoring, algorithmic management and platformisation of work in the light of recent evidence and the JRC Automation-Digitisation-Platformisation (ADP) framework (Fernández-Macías et al, 2025). Section 3 discusses the technical characteristics of the new AIM-WORK survey, explaining how it has been conceived and designed and its key methodological features. Section 4 dissects the use of digital tools at work in the EU. Section 5 complements this analysis with a specific focus on the use of AI tools at work. On this basis, section 6 discusses digital monitoring and section 7 delves into algorithmic management of work. For each dimension, the report presents the key evidence stemming from the new AIM-WORK data for the EU and all its Member States. Section 8 brings together all the previous elements and synthesises the state of play of the platformisation of work in Europe today and some of its potential consequences. Section 9 discusses the results and concludes.

# 2

# Key concepts and existing evidence

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# 2 Key concepts and existing evidence

The digital revolution started decades ago, and it is already quite mature: this cycle of innovation, growth and socio-economic transformation, which was kickstarted by microprocessors in the late 70s, would be already approaching its end according to the framework of Freeman and Louca (2001) and Pérez (2003). Technological revolutions end in periods of relative stagnation until some key innovation sparks a new cycle: some argue that the new cycle will be driven by AI, others by green technologies, or perhaps even something else (Fernandez-Macias et al. 2025). What seems clear is that after decades of diffusion, digital technologies have already transformed the world of work in significant ways and will continue to do so. In our own research, we argue that the most consequential impact of the digital revolution on work is in terms of work organisation and employment relations, rather than employment numbers or occupational change (Fernández-Macías et al. 2025).

Contributing to this line of research, this report presents new comparative evidence of how digital technologies are transforming the organisation and management of work and impacting working conditions in EU countries. We start in this section by defining clearly the key concepts we have used for collecting this evidence, anchoring it in scientific and policy debates on the impact of the digital revolution on the world of work. This section will discuss one by one the main topics covered in later pages: the diffusion of digital technologies in work (with a focus on AI), digital monitoring, algorithmic management, and the platformisation of work.

## 2.1 The digital revolution and the world of work: the ADP framework

We start by briefly explaining the conceptual and analytical pillars of our research on these topics, as they are set out in the Automation-Digitisation-Platformisation (ADP) framework (Fernández-Macías 2018; Fernández-Macías et al. 2025). This framework provides the key ideas that underpin our research on the impact of the digital revolution on the world of work, including in the context of the AIM-WORK survey.

The starting point of the Automation-Digitisation-Platformisation (ADP) conceptual framework is the distinction of two domains in economic processes: the technical and the social (Fernández-Macías 2018: 5-7). On the one hand, we can see the economy as a technical process of transforming inputs into outputs. From this perspective, technology can be defined as the tools and methods used in this process. On the other hand, we can see the economy as the social process of collaboration between different people to produce the goods and services necessary to sustain themselves.

Both domains (the technical and the social) are analytically distinct but practically intertwined and deeply integrated into each other. People are obviously an integral part of any technical production process, providing energy, skill, ingenuity and agency. Social coordination mechanisms such as the division of labour or institutions can, in fact, be considered as 'social technologies'. At the same time, technologies are created and used by people, and therefore they will be shaped by people's interests, values and norms. And simultaneously, these technologies will also alter and reshape social relations and social coordination mechanisms. In short, the two domains are inextricably integrated and continuously influence and reshape each other—not only through technical feedback loops, but also through contestation, negotiation and control. The introduction and use of technologies, therefore, both reflects and reinforces existing power asymmetries—affecting who decides, who benefits, and who bears the costs.

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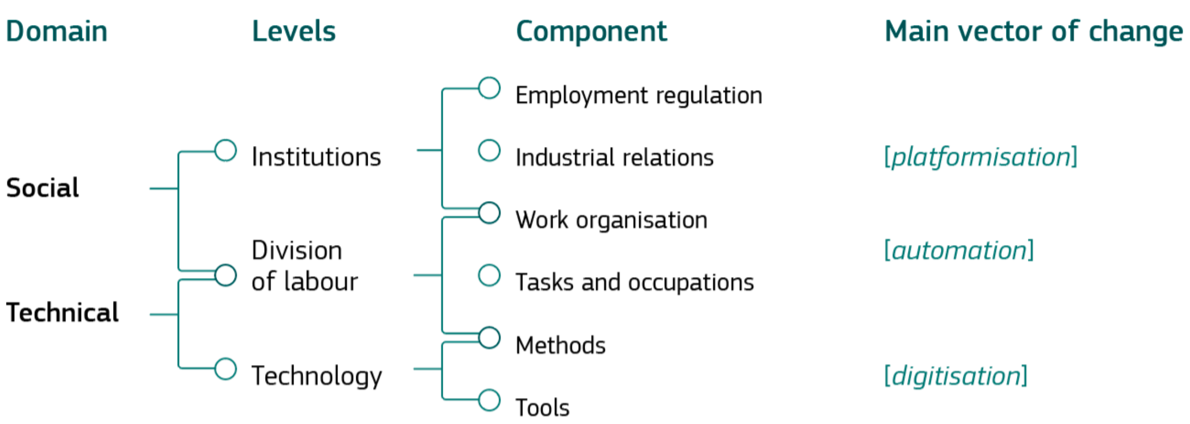
As can be seen in Figure 1, this dual distinction – of technical versus social domains of the economy – can be further decomposed in three levels:

- *Technology* refers to the tools and methods used in production and corresponds unambiguously with the technical domain.
- *Institutions* refer to the enduring and socially constructed mechanisms that coordinate economic interactions, corresponding directly with the social domain.
- The *division of labour* has a very peculiar position in this framework because it pertains both to the technical domain (as it reflects the technical specialisation of labour input into the economic process) and to the social domain (as it is a key mechanism for the social coordination of collaborative economic activity). In other words, the division of labour (and its subcomponents: tasks and occupations, and work organisation) plays a pivotal role between the technical and the social domains in this framework, and as such it plays a central position in the analysis of the changing nature of work in the digital age.

These three levels can be further disaggregated into a series of components, which roughly correspond with research topics that we have covered in our research over the years (see also Figure 1; for a summary, see Fernández-Macías et al. 2025). From bottom to top in Figure 1, at the lowest level of the technical-social continuum (at the most 'technical' extreme), we have included the tools and methods of production. Above, we differentiate three components of the division of labour (from more technical to more social), namely: methods, tasks and occupations, and work organisation. Finally, the institutional level (the most 'social' extreme) is differentiated in three components, again from more technical to more social: work organisation, industrial relations and employment regulation. Two of the components are hybrid, corresponding to two levels simultaneously: methods are both a component of technology and of the division of labour, while work organisation is part of the division of labour but it can also be considered an institutional feature. Of course, sometimes the demarcation between these elements is not so neat as depicted: these demarcations are mostly intended for analytical purposes, to help locate and contextualise the different elements of our framework.

> The introduction and use of technologies both reflects and reinforces existing power asymmetries

Figure 1
Domains, levels and components of the ADP conceptual framework




Source: Fernandez-Macias et al. 2025.

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Figure 1 also shows the link between the domains, levels and components of our framework and the three vectors of change of the digital revolution with respect to the world of work. Here the demarcations are less precise, because each of the vectors (automation, digitisation and platformisation) can affect all domains, levels and components simultaneously (again, all elements are interconnected, and any differentiation is more analytical than practical). However, it is useful to briefly mention where they would be broadly located in the overall framework. From bottom to top:

- *Digitisation* (the increasing use of digital tools in work contexts) is most directly linked to the technical domain, corresponding with the technology level and with the methods and tools components.
- *Automation* (the replacement of labour by machines) is mostly related with the division of labour, directly affecting both work organisation and the distribution of labour input by tasks and occupations.
- Finally, *platformisation* (the use of digital platforms to coordinate work) is mostly a phenomenon of the social domain, directly affecting the institutional framework of labour (outside and within productive organisations).

It is important to emphasize that the ways in which these vectors of change manifest in the world of work are not neutral or strictly technical. We should rather consider the forms of production as embedded in historically and institutionally defined systems of control and authority. Power relations—shaped by hierarchical structures and the capacity of some actors to direct the actions of others—play a central role in determining how tasks are allocated, how work is organised, and how new technologies are implemented. This perspective highlights that the social domain of our framework, particularly as affected by platformisation, is crucial for understanding how technological change intersects with the dynamics of control and inequality in the labour process. Indeed, these practices interact with pre-existing institutional frameworks, leading to divergent outcomes (Baiocco et al. 2022). For example, the use of monitoring software may be constrained by strong co-determination rights and data protections in one national context, while being implemented with few restrictions in another. Therefore, the high autonomy and high worker participation culture of Nordic workplaces will filter the effects of platformisation in a way that the low-trust, highly supervised environment of other industrial relations models simply will not, highlighting the primacy of the social and institutional domain over purely technical features.

The AIMWORK survey collects information about all components in this framework, from tools to industrial relations and employment regulation from the perspective of the worker. However, the survey focuses on two of the vectors of change: digitisation (with detailed information on the digital tools and systems used by workers) and platformisation (with detailed information on how those tools and systems are used to coordinate work organisation and employment relations).

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## 2.2 The diffusion of digital tools at work, with a focus on Artificial Intelligence

Data analytics applied to work processes is not new. Taylorism and scientific management, which were central to mass industrialisation in the early 20th century, already used rudimentary forms of data analysis (Cappelli, 2020). Data-driven systems were used in the automotive manufacturing sector in the mid-1980s with computer-integrated manufacturing imposing normative control over workers and employee performance monitoring tools were also used in call centres in the 1990s (Rani et al. 2024). Early forms of AI – known as expert systems – have been used in manufacturing for more than four decades (OECD/BCG/INSEAD, 2025). Newer types of AI, which learn and make predictions from data, now have a role in many business processes. For example, in the manufacturing sector, AI is used in industrial research, product design, fabrication and assembly, process control (including digital twins [4]), supply chain management, training and cognitive support, digital security, marketing and pricing. Sectors such as insurance and finance have been using big data for many years, and enterprises in ICT are major users and developers of AI. Overall, there is evidence that AI-driven methods of worker control and productivity management using more powerful digital systems are increasingly being used by employers (Cappelli, 2020; Zuboff 2019; Bernhardt, et al., 2021; OECD/BCG/INSEAD, 2025).

A synthesis of efforts to investigate the extent of AI uptake and some of its key characteristics reveal several consistent aspects, including that the extent of diffusion of AI in the business sector is still generally low but varies considerably across countries and certain sectors (ICT, finance and insurance services, legal and other professional and technical services, such as engineering, advertising, design and consulting) consistently register the highest shares of AI use in firms (OECD/BCG/INSEAD, 2025). The study also found AI use rates were very low in core business processes in small enterprises (with fewer than 50 employees). This can be partly explained by a scarcity of skills – particularly specialised talent – hindering AI uptake, even in many large firms (OECD/BCG/INSEAD, 2025). Other factors such as cost considerations and the more limited potential benefits of sophisticated management technologies in small firms may explain this lower prevalence in smaller firms.

> Generative AI can raise labour productivity while fundamentally altering work processes

In the last couple of years the advent of generative AI and the increasingly widespread use of Large Language Models (LLMs) across different domains of society and the economy has raised new and pressing questions for researchers and policy makers about the impact of these technologies in the world of work and their future development. According to a recent JRC report, generative AI can impact economic structures by driving industry transformation and the emergence of new business models. It could deliver substantial productivity gains and foster job creation across various sectors (Abendroth Dias et al. 2025), even though there are concerns about potential job displacements and there is relevant evidence casting doubt on the productivity enhancing potential of genAI (Becker et al. 2025), which in any case is difficult to measure (Perry et al. 2025). Achieving higher rates of AI adoption could also lower defect rates in production, thus reducing the need for material inputs (OECD/BCG/INSEAD, 2025). A survey of US businesses reveals that firms using AI exhibit better overall performance and higher incidence of employment expansion compared to other businesses. These firms often undergo organisational changes to accommodate AI, particularly by training staff, developing new workflows, and purchasing cloud services/storage (Bonney et al. 2024). Brynjolfsson, Li and Raymond (2025) find a productivity-enhancing effect in the use of a generative AI-based conversational assistant among customer support agents. Other studies document productivity enhancements with

[4] A digital twin is a virtual representation that serves as the real-time digital counterpart of a physical object or process.

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potential implications in broader labour market contexts (Wiles and Horton 2024, Spatharioti et al. 2023), while Hartley et al. (2025) use a worker survey to identify a significant time-saving effect of the use of generative AI to complete tasks. Bick et al. (2024) estimated that generative AI could plausibly grow labour productivity by between 0.1% and 0.9% at current levels of usage.

In the employment domain, there is increasing debate about the potential for AI to automate cognitive processes previously considered non-automatable (such as creativity) but also to augment human capabilities (Brynjolfsson & McAfee, 2014 & 2017, Felten, et al., 2021 and 2023; Tolan, et al, 2021). With potentially large-scale implications for the structure and composition of the workforce and the nature of work (Adams-Prassl, et al., 2023), recent advances lead some scholars to believe that AI could be an era-defining technology (Brynjolfsson & McAfee, 2017). In a recent study Handa et al. (2025) show that AI usage peaks in software development and technical writing, but it extends more broadly as around 36% of occupations use AI for at least a quarter of associated tasks. Usage splits nearly evenly between automation (43%) and augmentation (57%) of human capabilities. Other recent studies find muted effects of AI on employment due to offsetting effects: highly-exposed occupations experience relatively lower demand compared to less exposed occupations, but the resulting increase in firm productivity increases overall employment across all occupations (Hampole et al. 2025). Humlum and Vestergaard (2025) also show small labour market effects of AI chatbots in the case of Denmark, with some but modest productivity gains.

While AI has the potential to deliver productivity and efficiency gains, challenges include job displacement and reconfiguration of social and economic structures, including altering industry structures and reshaping organisations (Felten, et al., 2021; Milanez et al., 2025). In a recent study conducted in the US, Daepp and Counts (2025) find that, in the absence of intervention, early differences in generative AI uptake across US territories show a potential to reinforce existing spatial and socioeconomic divides. In the EU, AI patents data reflects that the AI superstar regions also tend to be those for which AI is most central in its knowledge space, and a large part of AI-development capabilities build from the historic strengths of a region (Buarque et al. 2020), which also suggests a potential impact on territorial disparities.

It has also been argued that AI can fundamentally affect work processes, reinforcing a tendency towards the platformisation of work that is already underway by powering more sophisticated digital monitoring and algorithmic management systems (Fernández-Macías et al. 2025). Jarrahi et al. (2021) highlights how the rapid development of machine-learning algorithms, which underpin contemporary AI systems, has created opportunities for the automation of work processes and management functions. While advanced production technologies may offer safer conditions for workers by taking over more dangerous tasks and reducing exposure to hazardous environments, the introduction of these technologies can present some physical, organisational and psychosocial risks such as time pressure, fear of job loss, etc (EU-OSHA

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2024, Gonzalez-Vazquez et al. 2024). From the studies published to date, multiple occupational risk factors resulting from algorithms and AI have been identified (Todoli-Signes, 2019; Urzi Brancati, et al., 2022; EU-OSHA 2024). Todoli-Signes (2019) observes that it is unlikely that managers will be able to process the sheer amount of information accumulated by new devices and sensors. This being so, companies delegate the processing and use of information to algorithms or AI, where algorithms can perform some of the functions of HR managers, middle managers, and supervisors, which can cause specific psychosocial risks for workers. Findings from a report co-authored by EU-OSHA, the JRC and Eurofound highlighted the relationship between advanced digital technologies and the presence of psychosocial risks in the workplace (Urzi Brancati, et al., 2022). Analysis suggests that workers who use digital technologies (basic and advanced) are more likely to report poor mental health at work than those who do not use any digital devices (EU-OSHA, 2024).

These implications may well require changes in the current labour market institutions and regulations to grasp opportunities while addressing any possible emerging risks, but there is a lack of robust scientific evidence to underpin future policies to accompany or address these changes. Moving beyond narrow concerns focussed on privacy, Bernhardt et al. (2021) argue that researchers are only beginning to identify the full range of actual and possible negative impacts on workers from the diverse set of data-driven technologies being introduced by employers. Crucially, it is employers who decide when and why to use electronic monitoring, which decisions to automate, or which productivity benchmarks to rate workers against (Cappelli, 2020; Bernhardt, et al., 2021).

Finally, while there is a growing body of research on the likely impact of AI on employment, Lane et al. (2023) identifies a lack of data examining what actually happens in organisations and to workers when AI is introduced. As will be discussed later, the AIM-WORK survey provides new data on AI usage in the workplace, shedding light about its initial phase of deployment in the EU and the implications this may have for work organisation.

## 2.3 The rise of digital monitoring of work

Digital monitoring is a common reality in European workplaces in the 21st century. Following Lyon (2001), digital monitoring of work can be conceptualised as any systematic collection and processing of data facilitated by digital technologies, whether personally identifiable or anonymised, with the explicit or implicit intent of influencing, managing, or evaluating individuals within a work context (Lyon, 2001; Ball, 2021). On this basis and for the purpose of our analysis, digital monitoring (for readability, "of work" will be implied) *refers to the use of digital tools to systematically collect data about work and workers.*

Critically, from this perspective this process entails an inherent power dynamic (Ball, 2021:10), implying a relationship of subordination of the worker vis-a-vis the employer, the latter of whom conducts the monitoring activities. For an activity to qualify as monitoring, two elements need to be present: data must be gathered and analysed; and then applied in a process of influence over the original data target. As such, monitoring always involves an exercise of power (Fernández-Macias et al., 2023).

While Lyon (2001) emphasizes the information gathering aspect, a more comprehensive understanding must recognise the expanding scale, scope, and depth of data collection due to advancements in digital technologies in recent years. This expanded scope includes not only traditional performance metrics, but also new data in relation to behaviours, location, physiology, and even professional reputation and social connections (Ball, 2021:22). These can be considered as intrusive forms of monitoring that can have negative implications for workers and raise concerns in terms of data ownership and privacy.

While some forms of worker data collection fall within the prerogative of the employer and do not require prior notice , debates about these forms of digital monitoring are becoming increasingly central because they go beyond traditional methods of monitoring in the workplace, as they can be ubiquitous and much more powerful (De Stefano and Taes, 2023). This, in turn, can have new consequences for workers, including the intrusion of workers' private lives, a decrease in justice perceptions and worker satisfaction, and an increase in worker resistance (Ball, 2021:24). Furthermore, as we will explain next, the increasing use of algorithmic management systems can also amplify the consequences of digital monitoring in the workplace.

## 2.4 The use of algorithms for the management of work

Algorithmic management usually refers to the use of algorithms, i.e. finite sequences of codified instructions, usually executed via computer programs, to manage – direct, evaluate and discipline - and coordinate the workforce, going hand in hand with data collection and worker monitoring (Lee, 2015; Mateescu and Nguyen, 2019; Kellogg et. al., 2020; Jarrahi, et al., 2021; Wood, 2021; Parent-Rocheleau and Parker, 2021; Baiocco et al. 2022, Cox and Oosterwijk, 2024; Rani et al. 2024, Milanez, et al., 2025, European Commission 2025). Building on previous JRC work, for the purpose of this analysis we define algorithmic management as the use of digital technologies, which may be powered by artificial intelligence (AI) or not, to automate workforce management and coordination functions.

Recent JRC-ILO work shows that a vast array of digital systems, including general-purpose ones, can be used to manage and coordinate work and collect worker data, whether intentionally or not (Rani, et al., 2024, Fernández-Macías et al., 2025). As explained in Fernández-Macías et al. (2023), algorithmic management and digital monitoring tend to go together. This is because algorithms need data to operate and because digital information is most efficiently processed by algorithms. Therefore, algorithmic management of work generally presupposes some degree of digital monitoring, and conversely, digital monitoring tends to foster the use of algorithms for managerial purposes.

These management practices can improve business models and streamline work processes in a more efficient way. Case studies show that data-driven coordination and management practices can increase productivity and enhance work organisation by improving information flows and coordination efficiency, fostering communication and simplifying the coordination of work, but they can also facilitate a standardisation of work processes and the breaking down of jobs in smaller tasks that can lead to an increasing fragmentation and commodification of labour (Franke and Pulignano, 2021 & 2022; Rani et al. 2024, Milanez, et al., 2025). Algorithmic management can also exacerbate information asymmetries, increase managerial control, and facilitate labour externalisation, transforming employment relationships (Rani et al., 2024; Adams-Prassl, et al., 2023). This can also lead to skill underutilisation, heightened work intensity, reduced autonomy, anxiety and stress (Wood, 2021; Bailey, 2022; Bernhardt, Kresge, and Suleiman, 2023; Milanez et al., 2025). Concerns have also been raised about the quality of decisions resulting from automated processes (Milanez, et al., 2025).

Until recently, algorithmic management had been discussed primarily in the context of the platform-mediated economy, where a particular focus has been on how algorithmic management both substitutes and complements traditional management oversight (Jarrahi, et al., 2021;

> Algorithmic management can streamline work processes and drive efficiency gains, but it can also deteriorate job quality

Newlands, 2020). Newlands (2020) suggests that in digital labour platforms, rather than complementing human-to-human monitoring, algorithmic monitoring is used as the primary method. Moreover, she suggests that when monitoring and management tasks are relegated to algorithms, organisations become heavily reliant on the reliability of the algorithms, reducing the capacity of organisations to make fair and accurate decisions. While initial arguments in favour of using algorithms for managerial decisions often rested on the idea that algorithms could be more objective or neutral in their decisions than humans, this argument is increasingly challenged because algorithms can be equally biased and opaque, with calls for greater human oversight (Adams-Prassl et al. 2023). Additionally, a system can only track data that can be codified, so workers' activity is rendered into code, leading to oversimplification where 'invisible' activity might go unpresented (Newlands, 2020).

Jarrahi et al. (2021) points out how the transformative reach and consequences of algorithmic management are also spreading to more standard work settings. Relevantly, an emerging body of qualitative studies is shedding light on the reality of algorithmic management in traditional workplaces (Cirillo et al. 2022, Rani et al., 2024; Cox and Oosterwijk, 2024, Nilsson et al. 2025). The qualitative studies conducted so far reveal a complex reality, with sector and country-specific impacts that are mediated by the institutional framework in place. In some cases, significant negative impacts are observed on worker rights and wellbeing, as well as shifts in the balance of power between labour and capital (particularly in the Global South as reported by Rani et al. 2024, but also in Europe as per Cox and Oosterwijk 2024). However other cases show that improved working conditions can also go hand-in-hand with improvement of work organisation, for example by reducing physical risks or limiting the burden of routine, administrative tasks to workers. Qualitative evidence suggests that the detrimental impacts of these technologies are not inevitable.

## 2.5 Previous evidence of platformisation of work

Building on previous work (Fernández-Macías, 2018; Fernández-Macías et al. 2023 & 2025), we propose to conceptualise the platformisation of work as the increasing use of digital platforms for coordinating work processes in an algorithmic way. This definition brings together the use of digital monitoring (section 2.3) and algorithmic management practices (section 2.4). Bernhardt et al. (2021) focus on three major applications of digital technologies in the workplace: worker data collection, electronic monitoring, and algorithmic management. While they discuss each in turn, these authors acknowledge that, in practice, multiple applications are often integrated into a single technological system. Hence, the approach taken in the AIM-WORK survey to conceptualise platformisation as a combination of practices represents progress in terms of studying how technologies, practices and applications interact with one another in the workplace.

Referring to the ADP framework, platformisation operates mostly in the social domain, directly affecting the institutional framework of labour (internal and external to productive organisations), but also work organisation and tasks. Digital platforms are technological infrastructures that allow multiple parties to interact with one another. They are the most common form of coordinating transactions in digital networks. In general, digital platforms used for coordinating work processes tend to incorporate functions of digital monitoring and algorithmic management. The platformisation of work therefore refers to the simultaneous occurrence of three related but distinct phenomena:

- the use of digital devices at work, which represents the material base for the development of these practices,
- the digital monitoring of work, and
- the use of algorithms for the management of work.

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The increasing reliance on digital platforms within work processes tends to produce a greater degree of digitised standardisation and bureaucratisation. As digital tools become ubiquitous, and as algorithmic systems used for direction, evaluation, and monitoring become more common, sophisticated digital bureaucracies are taking shape across diverse organisational settings. Some argue that this implies a shift towards neo-Taylorist, data-driven control structures (Rani et al., 2024 Bernhardt et al., 2021). Also, this platform-driven organisation of work can be understood as a contemporary continuation of historical waves of bureaucratisation, echoing Weber's classic analysis (Weber 2015, originally 1922; see also Baiocco et al. 2022). The enhanced formalisation of work procedures, the routinisation of decision-making through automated systems, the centralisation of control, and the prevalence of impersonal, algorithmically-mediated management all point towards a heightened form of bureaucratic rationalisation which, as mentioned in the previous subsections, can be detrimental to working conditions mostly via a decrease in autonomy, as well as an increase in routinisation and intensity at work (Fernández-Macías et al. 2023).

"As digital tools become ubiquitous, and as algorithmic systems used for direction, evaluation, and monitoring become more common, sophisticated digital bureaucracies are taking shape across diverse organisational settings"

How much is known about the prevalence of the platformisation of work in the European Union and the consequences of platformised regular work environments? Until recently, these emerging realities were not well understood and there is very limited evidence about this complex emerging phenomenon. In 2023, a pilot JRC survey conducted in Germany and Spain was one of the first studies that shed light on the phenomenon of platformisation of work (Fernández-Macías, et al., 2023). The JRC Algorithmic Management and Platform Work survey (AMPWork), representative of the working age population in those two countries, revealed a significant prevalence of digital monitoring, the most common form being the tracking of working times, followed by the use of swipe cards for tracking entry/exit/movements in the workplace and the use of devices to monitor vehicle locations and CCTVs or webcams. According to AMPWork, algorithmic management appeared to be much less common than digital monitoring, although not marginal. Around one in five workers in Germany, and one in three in Spain, were found to be subject to one or more automated systems of management.

AMPWork represented a first step towards a better understanding of the platformisation of work and its impacts, however its limited geographical scope and exploratory nature limited the practicality of using this data to assess policy implications. In the EU, there are other reference surveys that investigate the impact of the digital transition in the workplace, such as Eurofound's European Working Conditions Survey (Eurofound, 2015 and previous waves) and EU-OSHA's ESENER survey (EU-OSHA, 2025), but neither of these surveys have so far looked in detail at digital monitoring, algorithmic management or the platformisation of work.

An important recent contribution to quantitative evidence in this area is the OECD algorithmic management survey published in early 2025 (Milanez, et al., 2025). Data from the survey, which covered over 6000 mid-level managers across six countries (France, Germany, Italy, Japan, Spain, and the United States), showed that algorithmic management tools are widespread in the European context [6] According to this OECD survey, the tools most widely used by European firms are basic monitoring tools (e.g. the monitoring of working time or completion of tasks) or tools that automate

[6] The data also reveals extremely high prevalence in the US and significantly lower in Japan. They key concepts and variables in the OECD survey are largely comparable with AIM-WORK although prevalence metrics are calculated differently. www.oecd.org/en/publications/algorithmic-management-in-the-workplace_287c13c4-en.html

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to some extent the assignment of tasks, shifts or instructions to workers. Managers tend to be positive about the impact of algorithmic management in their own decision-making and their job quality, although they are more nuanced in terms of the risk of biases (with managers in European countries more likely to believe that on balance these tools could increase bias in decision-making). Importantly, the OECD data shows a significant degree of mistrust on the side of managers themselves towards these tools, where nearly two-thirds reported at least one concern regarding the trustworthiness of the algorithmic management tools they use[7] Another relevant finding concerns the increasing use of firm-level governance measures to address the implications of the use of these tools.

A key finding in previous JRC research is that the impacts of the digital revolution on work and employment are strongly mediated by labour market institutions (Bailey, 2022; Fernández-Macías, et al., 2025; Rani, et al., 2024). Labour standards, employment and labour regulations and industrial relations play a crucial role in shaping the outcomes of digitalisation, and digitally-enabled managerial practices interact with pre-existing forms of work organisation and control. For instance, recent evidence shows that similar types of digital technologies such as handheld scanning devices used in logistics can lead to very different outcomes across different sectors and countries (Rani, et al., 2024).

To conclude, we can say that there is a need for more and better evidence to inform policy discussions and initiatives on these fields, particularly in light of the continued focus on the impact of digitalisation in the world of work. Building and complementing previous evidence, we hope the findings presented in this report can make an important contribution towards filling the evidence gap.

[7] Managers most often flag problems with accountability, explainability and physical and mental health.

# 3

# The AIM-WORK survey: design and methodology

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# 3 The AIM-WORK survey: design and methodology

The survey on the Impact of Algorithmic Management and Artificial Intelligence in the Workplace (AIM-WORK) has been the result of a joint effort led by the Employment research team of the European Commission's Joint Research Centre, in close collaboration with the Directorate-General for Employment, Social Affairs and Inclusion. The development and revision of the questionnaire was validated though technical consultations with a group of experts from leading research institutions and other international organisations. Ipsos European Public Affairs conducted the fieldwork in late 2024 and early 2025.

The AIM-WORK survey focuses on the third vector of change identified in the ADP framework (see section 2), namely the platformisation of work, and secondarily also on the vector of digitisation. The survey does so by collecting new data on the use of digital devices at work, digital monitoring and algorithmic management practices, as well as the use of AI-driven tools in the workplace. Additionally, the survey gathers basic information on the prevalence of work via digital labour platforms and on the extent and motives for sharing content on online platforms with non-family members and close friends, although these data are analysed separately and are not covered in this report.

The AIM-WORK survey is representative of the working age population (16-64) living in private households in all 27 Member States of the EU, whose usual place of residence is the territory of the country, and who can speak the national language (or one of the national languages, where more than one official language exists). This large pan-European survey includes responses from 70,316 individuals across all the 27 EU Member States. A random sample of between 1,253 and 3,781 respondents between 16 and 65 years old was obtained in each country. Target sample sizes ranged between 3,750 interviews (for Italy, France, Germany, Spain and Poland) and 1,250 (for Cyprus, Malta and Luxembourg). For the rest of Member States the target sample size was 2,500.

The master questionnaire for the AIM-WORK survey was based on the questionnaire of the JRC Algorithmic Management and Platform Work survey (AMPWork, Fernández-Macias, et al., 2023) which had been developed earlier by the JRC team in collaboration with the Directorate-General for Employment, Social Affairs and Inclusion [8]. The AIM-WORK master questionnaire

> The AIM-WORK survey investigates how algorithmic management, artificial intelligence, and digital platforms transform European workplaces and labour practices.

[8] Compared with the AMPWork questionnaire, the AIM-WORK questionnaire was considerably streamlined, adapting it from face-to-face interviewing to the computer-assisted telephone interviewing (CATI) format. The original block of socio-demographic questions was split into two sections, with the main socio-demographic questions located at the beginning, and the remainder of socio-demographic questions located towards the end. The decision to split the block of socio-demographic questions was based on the rationale of prioritising the quality of responses for the core block of questions about conditions of work. To increase the sample size for the work-related questions, a question was added to identify those people not currently in employment but who had been in paid work at any point during the previous 12 months. The working conditions questions were also streamlined and simplified in comparison to the questions in AMPWork. As a result of the streamlining process, the core section of the AIM-WORK questionnaire is the one covering conditions of work. Within this section, the questions on digital device usage and software tools were, in most part, preserved from the AMPWork questionnaire. The same applies to the section on digital monitoring, although with some minor redrafting and streamlining, with the addition of some questions to capture additional possible types of digital monitoring. The core set of questions on algorithmic management was also preserved from the AMPWork questionnaire.

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is available in Annex I. It consists of the following main sections:

- Survey introduction
- Socio-demographics I
- Conditions of work
    - Digital device usage
    - Use of AI at work
    - Digital monitoring at work
    - Algorithmic management
- Platform-mediated work
- Sharing of content in digital platforms outside family and close friends
- Socio-demographics II

These core set of questions in the survey is the 'conditions of work' block. In particular, the questions on digital device usage, digital monitoring at work and algorithmic management are the ones allowing the construction of the key indicators on digital monitoring and algorithmic management that are presented in the report, as well as the platformisation of work metrics that are proposed in section 8. More details on the questions on digital tools, digital monitoring and algorithmic management are available in sections 4, 6 and 7 respectively, as well as in the Annex.

In terms of content, the main novelty in the AIM-WORK questionnaire relative to AMPWork was the inclusion of a new block of questions on the use of AI at work, focusing on the use of AI assistants or chatbots such as ChatGPT or similar, as well as other AI-powered tools. The approach that was used included an initial simple filter for AI usage, then the respondents who said that they used AI at work were asked questions about the types, frequency and purpose of AI usage at work. The questionnaire also included a question to identify the main AI tool(s) used, as well as a question on the impact of AI tools on work. In this section, additional questions were also included about other advanced technologies used at work (robots, autonomous vehicles, and technology for predictive purposes). A new set of questions on unions and worker representation was also added.

The block on working conditions is followed by a short block of questions on platform-mediated work, where these questions were only asked to platform workers. Similarly, the section on unpaid digital labour was only administered to respondents who said that in the last 12 months they shared content on online platforms with people outside their immediate social circle (around a third of respondents). As these two blocks of the questionnaire were not capturing data on the primary objective of the survey (i.e. platformisation of work), these findings will be reported separately.

CATI surveys provide high population coverage in the EU Member States due to the high prevalence of mobile phones. After careful consideration of the proportion of mobile and landline phones to be used in the sample, a single-frame mobile phone design for all countries was used. In the absence of suitable population registers for sampling, Random Digit Dialling (RDD), using mobile phone samples, was adopted as the sampling procedure. The procedure that was used for generating the RDD mobile samples follows the standard approach used on all high-quality random probability CATI surveys, involving the following steps:

- Identification of all eligible prefixes;
- Drawing of a sample of numbers with equal probability from all possible numbers attached to these eligible prefixes (such that all numbers per eligible prefix would have a chance of being included in the sample);
- Screening the selected sample using a provider lookup query to identify active numbers;
- Checking the sample on mobile providers.

An initial draft of the questionnaire was subject to cognitive testing by Ipsos in June 2024. This involved a total of 30 cognitive testing interviews with a diverse sample (according to age, gender, education, income level, and urbanity/rurality) of participants in Spain, Ireland, and Poland in their native language. The cognitive testing was aimed at understanding how respondents interpreted and responded to the questionnaire, revealing potential difficulties and areas for improvement (see methodology report for details). The cognitive testing led to several modifications. In particular, some questions were tailored so that they were suitable for different worker types, some questions were re-worded and/or examples were

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added to improve clarity, and some response options were refined. Prompts were also added for the interviewers to ensure active probing to obtain detailed responses for the open-ended questions on occupation and company sector.

Subsequently, a full pilot survey was conducted in September 2024, with a total of 166 pilot interviews with respondents from Ireland, Poland and Spain. The pilot led to further small adjustments to the master questionnaire, as well as some re-ordering in the flow of questions (particularly to move the second block of socio-demographic questions to the end of the survey).

The AIM-WORK main fieldwork was initiated across all countries on 23 October 2024. The fieldwork period took approximately 13 weeks and proceeded smoothly under the coordination of the Ipsos European Public Affairs team, who followed rigorous quality control procedures, including close monitoring of interviews (see methodology report for more details). The fieldwork concluded in January 2025, as planned. The approach to weighting the AIM-WORK data is explained in Box 1.

A detailed account of the methodology used for the AIM-WORK survey is available in a dedicated methodology report, published separately (De Cuyper et al. 2025)

### Box 1
### Weights in AIM-WORK

The weighting approach followed three key stages: (i) inverse probability adjustments to reflect the sample design (design weights); (ii) calibration weighting adjustments to align with the population distribution on key variables; and (iii) population size weights to allow analyses for groups of countries.

**Design weights**
Design weights are a feature of probability samples and are intended to equalise the probabilities of selection of sample units to create an unbiased sample. Unequal selection probabilities (i.e. where a particular group is sampled at a higher or lower rate relative to another) in mobile samples arise due to the variable number of mobile phone numbers each person could be reached on. Most of the population will only use one mobile phone/SIM card, however the people with multiple phone numbers will have multiple chances of being selected in the sample. The survey collected data on respondents' multiple mobile phone usage and number of phones used (questions D6 and D7). This information was then used to calculate selection probabilities. The design weight was then calculated as the inverse of these probabilities.

**Calibration weighting**
To ensure that the sample accurately reflects the socio-demographic structure of the target population, a calibration or post-stratification weighting procedure was carried out, using rim weighting on a country-by-country basis.

For a survey of the working age population like AIM-WORK, the obvious set of variables are age, gender, region and working status. Eurostat data were used as the reference source for population statistics, aligning with the targets used during fieldwork monitoring. After thoroughly reviewing the complete dataset, the socio-demographic variables in the survey data (design weighted where necessary) were compared with external population statistics. Based on this analysis, it was ultimately decided to use age, gender, region, and employment status as the final variables in the calibration weighting.

**Population size weights**
A final weight variable was created to project individual weights to the relative size of each country within the total geographical area under consideration. This comprehensive weight is designed for use in estimations involving multiple countries, such as EU27-wide analyses.

**Weighting efficiency and trimming**
A carefully designed weighting approach was implemented to maintain an optimal overall weighting efficiency. This strategy is crucial in preserving effective sample sizes and ensuring robust analytical power. To enhance weighting efficiency, weight trimming (or capping) was employed at each stage, effectively reducing the variance impact on the final weight.

Source: own elaboration based on De Cuyper et al. 2025

# 4

# The use of digital tools at work

# 4 The use of digital tools at work in the EU

In line with the ADP framework presented in section 2, the concept of platformisation of work adopted in AIM-WORK encompasses three distinct but closely related phenomena: use of digital tools at work, digital monitoring and algorithmic management. This section provides an analysis of data on the use of digital tools at work. There are several EU or national employer surveys that collect data about the level of digitalisation of companies (for instance, the EU Community Survey on ICT Usage, Eurofound's European Company Survey ECS, or CEDEFOP's European skills and jobs survey ESJS), but there is scant information about the impact of digitalisation at the level of workers (Fernández-Macías et al. 2023).

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## 4.1 Types of digital tools

The AIM-WORK survey asked workers whether, to do their job, they use the following types of digital devices, tools and equipment:

- computers or laptops;
- tablets, smartphones or other mobile computer devices that connect to the internet;
- wearable devices, such as fitness trackers, smartwatches, or body-worn cameras;
- proximity cards or smart cards;
- software tools for:
  - document editing,
  - data analysis
  - or communication and meeting platforms.
- AI-powered tools (see more details in section 5);
- advanced industrial tools such as robots, autonomous vehicles and technology for predictive purposes.

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## 4.2 Use of digital tools at work in the EU

As previously mentioned, the last few decades have witnessed the expansion of the use of digital tools at work, leading to a pervasive digitisation of work processes. The result of this trend in Europe is visible in the data collected in our survey, which reveals that an overwhelming majority of EU workers (above 90%) use some type of digital devices, tools and equipment to do their job [9]

Figure 2 shows usage of the most prevalent digital tools at work, broken down by country and occupation. On average 4 out of 5 EU workers (80.2%) use computers, 3 out of 4 EU workers (75.7%) use mobile digital devices [10], 70.4% of them use office software for editing, writing or data analysis, and 2 out of 3 (65%) use communication or meeting platforms such as Microsoft Teams, Zoom or Google Meet. As we will see in the next subsection, even the use of AI in the workplace is already quite widespread: on average 29.9% of EU workers already use AI to some extent to do their job. It is important to recall here that this concerns mostly AI chatbots and does not cover the fact that many standard digital tools used at work are AI-powered without workers necessarily being aware of this. See section 5 for more details.

Conversely, the number of workers who do not use any digital tools to do their job is very low: on average, only around 8% of EU workers report not using any digital tools to do their job. These figures are similar to the estimate derived from a recent EU-OSHA study on mental health. The EU-OSHA study found only 12% of respondents did not use any digital device for their work, and that the main digital technologies in use are computers, smart phones and other portable devices (EU-OSHA, 2024).

Unsurprisingly, the use of digital tools at work is high across all EU Member States, but there are some significant variations across countries. There is a block of countries, mostly in Northern and Central Europe, where the use of each of these tools, either individually or in various combinations, is widely spread among workers. In fact, most workers reported using both computers and mobile devices in the workplace, and many of them also reported using office software and communication platforms. This is true for workers in the countries that appear at the top of the rankings in Figure 2: Austria, Germany, Poland, Slovenia, Sweden, Czechia, Netherlands, Denmark and Finland. Southern European Member States, together with Bulgaria and Romania, lag in the use of computers and other digital tools at work, although Spain and Portugal feature high mobile device usage and, individually, some of those countries also rank relatively highly in the use of the other digital tools covered in the survey. Differences by country will be explored in more detail later in this section.

> Across Europe, an overwhelming majority of workers use digital tools daily, with widespread reliance on computers, mobile devices, software, and communication platforms.

[9] This represents a significant increase with respect to AMPWork results, where around a third of workers reported not using digital tools at work (Fernandez-Macias et al. 2023). Although the diffusion of digital tools may have slightly expanded in the last couple of years, most of this increase is probably the result of the change in the formulation of the related question in the AIM-WORK questionnaire, which referred to digital tools used in the last 12 months (whereas in AMPWork it asked for usage without specifying any time frame). In our view AIM-WORK provides a more accurate representation of digitisation of work in the EU.

[10] Included here also wearable devices, such as fitness trackers, smartwatches, or body-worn cameras.

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Figure 2.
Use of digital tools at work in the EU (% of total) by country

| | Computer | Mobile | Office software | Communic platform | AI |
|---|---|---|---|---|---|
| Austria | 88.3% | 82.7% | 77.1% | 69.8% | 36.6% |
| Germany | 86.1% | 83.5% | 72.1% | 67.9% | 33.7% |
| Poland | 85.5% | 75.9% | 73.8% | 61.8% | 27.8% |
| Slovenia | 85.5% | 75.5% | 77.3% | 64.9% | 33.3% |
| Sweden | 85.1% | 82.2% | 74.2% | 78.1% | 27.7% |
| Czechia | 84.9% | 76.9% | 70.6% | 57.2% | 33.7% |
| Netherlands | 83.9% | 87.3% | 72.1% | 68.3% | 40.1% |
| Denmark | 83.7% | 87.3% | 76.1% | 77.4% | 45.1% |
| Finland | 83.4% | 90.3% | 73.0% | 78.4% | 38.0% |
| Slovakia | 82.1% | 72.2% | 70.5% | 57.8% | 29.8% |
| Cyprus | 81.5% | 63.7% | 69.4% | 60.2% | 26.8% |
| Luxembourg | 81.4% | 65.3% | 58.5% | 61.2% | 34.5% |
| France | 81.3% | 62.8% | 71.5% | 68.7% | 25.2% |
| Estonia | 80.9% | 76.6% | 67.9% | 61.0% | 29.0% |
| Belgium | 79.8% | 77.2% | 63.7% | 67.8% | 42.9% |
| Croatia | 79.4% | 76.7% | 70.2% | 54.4% | 24.6% |
| Italy | 78.8% | 76.3% | 71.4% | 65.6% | 27.7% |
| Hungary | 78.0% | 85.2% | 75.9% | 62.6% | 31.4% |
| Lithuania | 76.4% | 77.1% | 63.4% | 61.6% | 28.5% |
| Latvia | 75.1% | 75.8% | 66.2% | 60.5% | 25.8% |
| Malta | 75.1% | 59.8% | 64.9% | 62.6% | 29.4% |
| Ireland | 74.5% | 78.1% | 63.6% | 64.1% | 27.7% |
| Portugal | 71.6% | 76.2% | 70.2% | 68.9% | 31.5% |
| Greece | 69.9% | 46.1% | 65.8% | 41.1% | 13.7% |
| Bulgaria | 69.6% | 63.9% | 56.4 | 46.6% | 19.3% |
| Spain | 69.0% | 73.8% | 68.0% | 65.0% | 29.1% |
| Romania | 68.4% | 65.2% | 53.4% | 44.6% | 17.1% |
| **EU average** | **80.2%** | **75.7%** | **70.4%** | **65.0%** | **29.9%** |

Note: Member States are ranked by use of computers at work
Source: authors' elaboration using AIM-WORK weighted data

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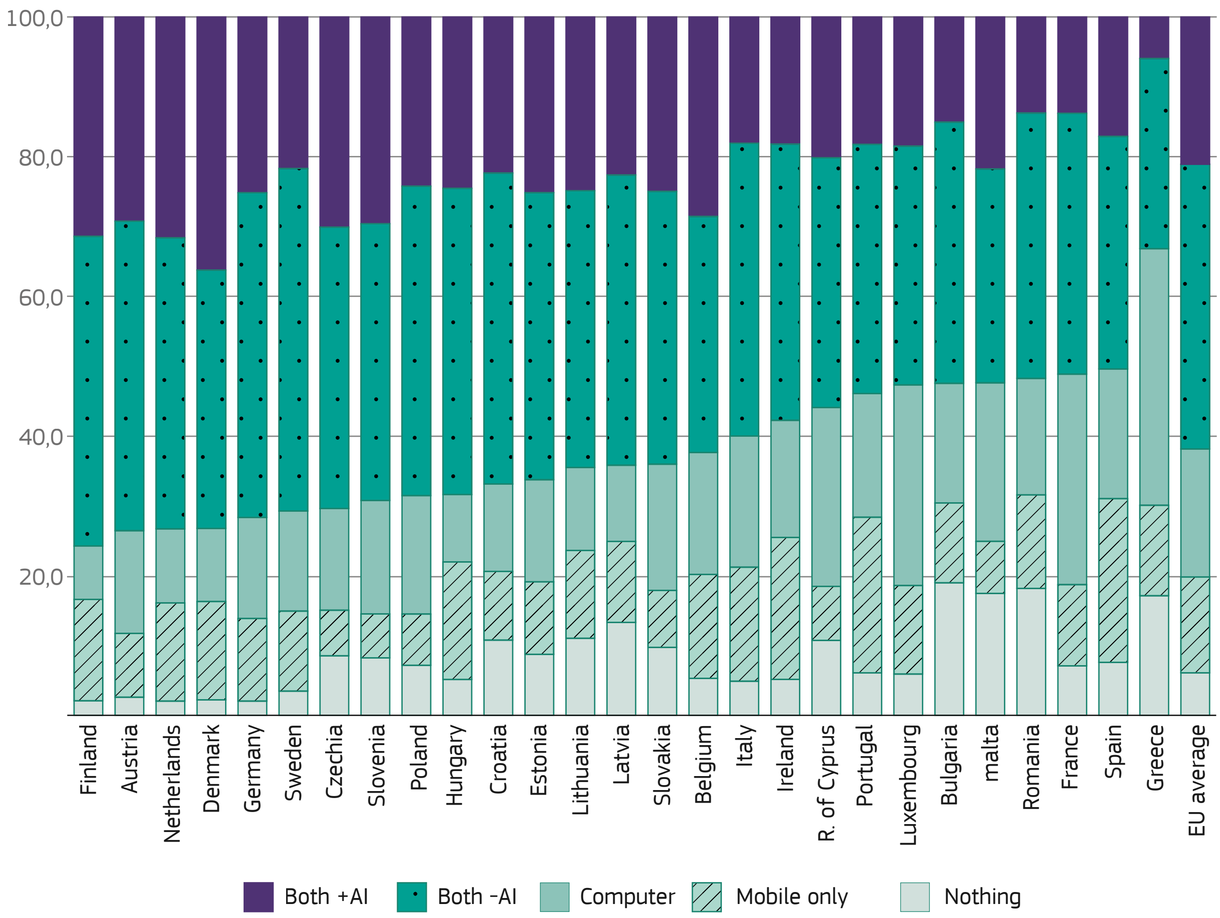
## 4.3 Who uses digital tools at work in the EU?

Based on AIM-WORK data, and for analytical purposes, we classify EU workers in four categories based on their level of digital tool usage in the workplace:

- Workers who do not use digital tools at work (around 8%)
- Workers who use only mobile digital devices (around 13%)
- Workers who use only office computers (around 17%)
- Workers who use both mobile digital devices and office computers, but no AI (around 40%)
- Workers who use mobile digital devices, office computers and AI (around 23%).

This is, of course, just one possible way to classify workers per digital tools usage, although in our view a comprehensive one [11]. Based on this classification, Figure 3 further explores the distribution of the different categories of workers across countries, reflecting the high degree of variation.

Figure 3
Use of digital tools per Member State




Source: authors' elaboration using AIM-WORK weighted data.

[11] There is, for example, a small but significant share of workers who use AI tools but only use either computers or, more importantly, mobile devices.

Looking at the two categories of workers with the highest levels of digitalisation (those with combined use of computers and mobile devices, with or without AI), one can observe a group of countries with the most advanced degree of digital device usage in the workplace: as mentioned before, these includes the Northern European Member States (Finland, Denmark and Sweden), other highly developed European countries (Austria, Netherlands and Germany), and also several Central and Eastern European countries such as Czechia, Slovenia, Poland, Hungary, Croatia or the Baltic countries.

Southern European countries are clearly lagging in the uptake of digital tool usage at work. This applies particularly to Greece and Spain, together with Bulgaria and Romania. Greece, Bulgaria and Romania (with the addition of Malta) are the countries where one can observe a higher prevalence of workers who do not use digital tools at work, which is likely, in part, to be explained by the productive structure of those countries. These are also the countries with the highest presence of workers with the most basic levels of digital tool usage (only mobiles or only computers), including also Portugal and Spain. The case of France showcases, together with Greece, a particularly high share of workers who only use computers at work. This may also have to do with the sectoral structure of the economy and the composition of the workforce.

The categories of workers by digital device usage at work is also used to identify important differences across sectors, occupations and education levels. This is shown in Figure 4.

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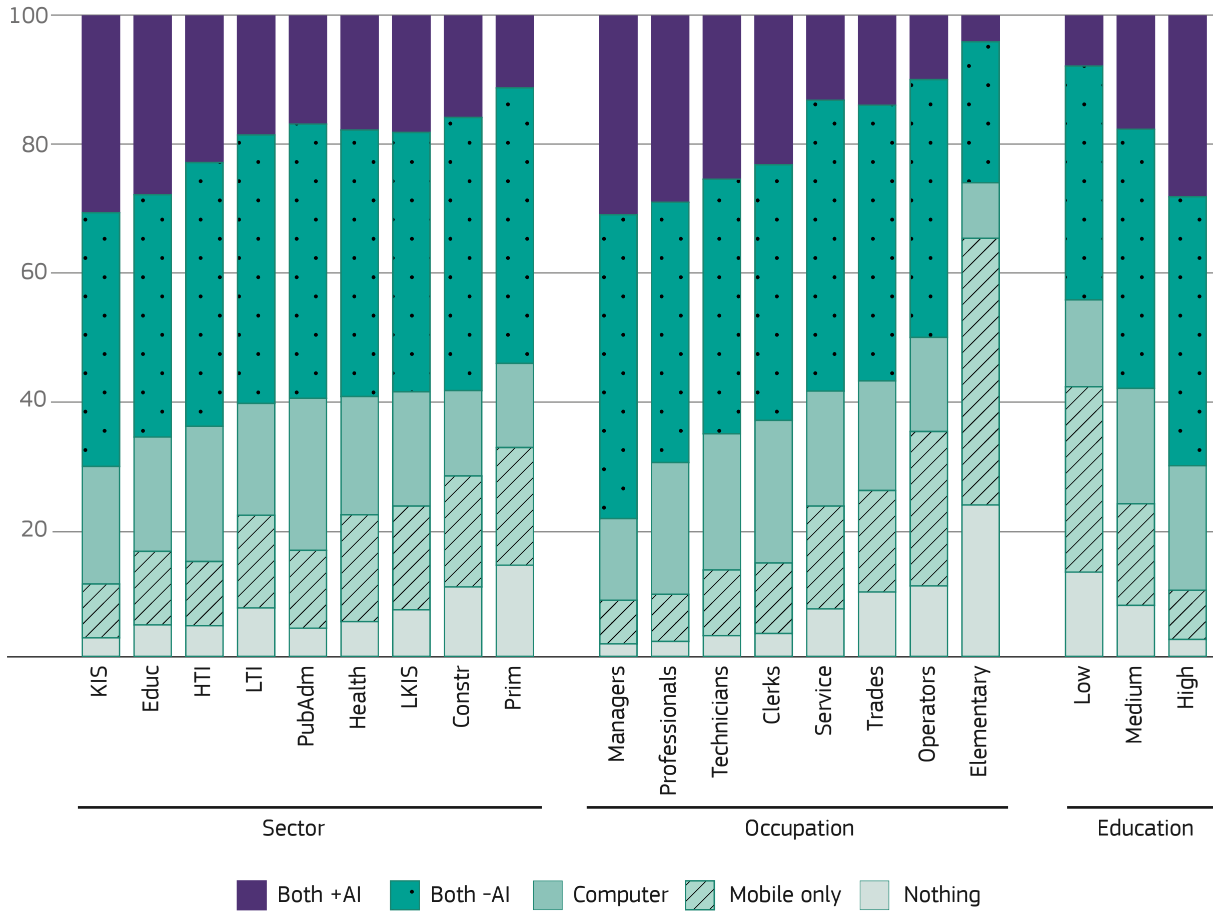
Figure 4.
Use of digital tools at work by sector, occupation and education




Note: Knowledge Intensive Services (KIS) encompass a broad range of activities including media, IT, consulting, advertising, financial, legal services and accounting. Less Knowledge Intensive Services includes activities such as wholesale and retail trade, repair of motor vehicles, land transport, warehousing, rental and leasing, real estate, travel agencies, etc. High Technology Industries (HTI) include the manufacturing of cars, chemicals, pharmaceuticals, electrical equipment, computers, machinery and others. Low Tecnhology Industries (LTI) includes, among many others, the manufacturing of food products, beverages, textiles, wearing apparel, paper and paper products, furniture, etc. The other sector categories included in the graph are Education (Educ), Public Administration (PubAdm), Health, Construction and Primary.
Source: authors' elaboration using AIM-WORK weighted data.

As was also the case with the AMPWork data for Germany and Spain, AIM-WORK results reveal a very strong gradient by education: 50% of the lowest-educated workers do not use digital tools at work or mobile devices only, compared to less than 10% for the higher-educated workers. Conversely, the prevalence of combined use of computers and mobile, with or without AI, is very high (around 70%) among workers with the highest education levels, while remaining just above 40% for the less educated workers.

Also consistently with previous results observed for Germany and Spain in AMPWork, differences in digital tool usage across occupation levels are even more remarkable, showing a very significant digital divide among different occupation levels in terms of digital device usage at work. It is relevant to note that the use of mobile devices is nevertheless quite high across the entire spectrum of occupations, including among workers at lower occupational levels. We observe that an overwhelming majority of clerks, technicians, professionals and managers are using computers at work, whereas the more advanced categories of digital device usage at work are significantly more prevalent for managers and professionals. Conversely, for

1 2 3 4 5 6 7 8 9 10

elementary occupations – and for operators – there is a clear majority of workers who use no digital tools or mobile devices only. This suggests that mobile devices are used frequently to direct and control physical labour (Fernández-Macías, et al., 2023).

Finally, differences by sector in the use of digital devices by workers are less drastic, but still important [12]. No device usage or the use of mobile devices only are most frequent in the primary sector, in construction, and in less knowledge-intensive services (LKIS), generally sectors which involve higher levels of physical activity. The use of computers only is highest in public administration and in healthcare. Unsurprisingly, and in line with AMPWork results, the two most advanced categories of digital tool usage are more prevalent in knowledge-intensive (KIS) industries, as well as also in education and high-technology (HTI) industries.

We conclude with a basic characterisation of the five categories of workers by use of digital tools at work that were identified at the beginning.

First, the workers who do not use any digital tools at work (around 8%). Arguably, this category has shrunk drastically over the last few decades but it is still significant among lower-educated, manual workers, particularly in sectors such as construction or agriculture. Unsurprisingly, these are mostly elementary occupations and operators. The share of workers who do not use digital tools at work is highest in Southern European countries, where these sectors and occupations are particularly important: Bulgaria, Romania, Greece, but also, to a lesser extent, in Spain and France.

Second, the workers who use only mobile digital devices (around 13%), a category that tends to be associated with the digitalisation of manual or physical work. As we will see later, these mobile devices are often used for digital monitoring and algorithmic management of workers, and therefore to the platformisation of work [13]. We see that this category of workers is relatively high in Southern Europe, but also in other countries such as Ireland, Luxembourg or, Hungary, among others. It is much more common among elementary occupations, also operators and the lower educated. Its distribution among sectors shows significant prevalence in less knowledge intensive services (LKIS), health, low-technology industries (LTI), as well as in the primary sector and construction.

Third, workers who use only office computers (around 17%). This category mostly captures mid-level office workers, which is why it is very significant in public administration and health. It is present among the entire range of occupations, particularly professionals and technicians and clerks, and more prevalent among highly educated workers. By country, it is quite significant across the EU, particularly in France, Greece and Spain, among others, all of which have a large public sector.

Fourth, the category of workers who use both mobile digital devices and office computers, but no AI (around 40%) is the largest and reflects a more advanced level of digitalisation at work although, for the moment, without the explicit or conscious use of AI tools at work. It is a very common category across EU countries, more present in the most developed and digitalised Member States, with significant prevalence across sectors and occupations, although less present in elementary occupations, and more prevalent in mid- and higher-educated workers.

> Digital device usage differs significantly across countries and by sector, education, and worker occupation.

[12] In the analysis we use Knowledge-Intensive Services (KIS) and Less Knowledge-Intensive Services (LKIS) as more disaggregated categories of services as well as High-Technology Industries (HTI) and Low-Technology Industries (LTI) as more disaggregated categories of manufacturing. See legend in the respective figures for more details.

[13] As mentioned above, there is also a small share of workers who use only mobile digital devices but also AI. These workers are also quite likely to be subject to platformisation of work.

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And finally, workers who use mobile digital devices, office computers and AI (around 23%). This is the most advanced of the main categories of workers based on digital tools usage, which accounts for almost one in four EU workers. This category, like the previous one, is more prevalent in the most economically developed Member States. As discussed above, it is also more prevalent in the top occupational levels (managers, professionals, technicians and clerks), and among higher-educated workers. In terms of sector, they are more common in knowledge-intensive industries (KIS), education and high-technology industries (HTI).

## 4.4 Digital device usage at work and working conditions

While digital technologies have the capacity to replace some of the most demanding and monotonous intellectual tasks, the effects on work organisation and working conditions are less clear as they can also facilitate a significant standardisation and centralisation of control for some kinds of intellectual work (Bisello, et al., 2022; Fernández-Macías, et al., 2023). Overall, recent JRC evidence on the digitisation of work processes (the second vector of change in the ADP framework) shows that digitisation tends to go together with the intensification of work effort and pace. At the same time, digitisation tends to standardise and bureaucratise work processes, and increase administrative burdens. Both effects have negative implications for workers, where the former is associated with stress and the latter latter with reduced autonomy (Fernández-Macías, et al., 2025).

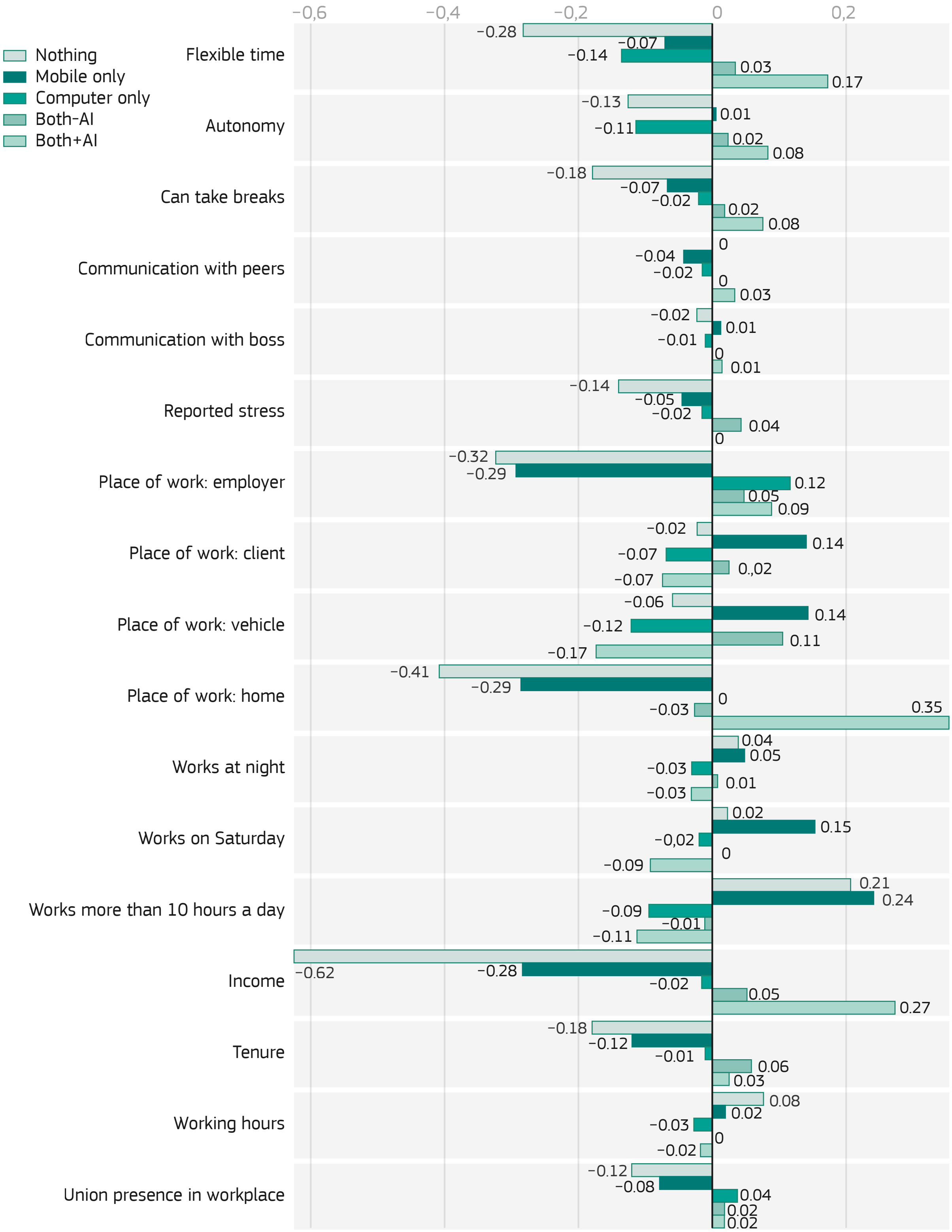
How does AIM-WORK data relate to this previous evidence? The AIM-WORK survey replicated some key questions on working conditions and job quality from the European Working Conditions Survey (EWCS) that can be linked to Eurofound's job quality framework (Eurofound, 2015) [14]. Figure 5 illustrates how the different categories of workers classified by digital device usage at work differ with respect to some key variables on working conditions. From this analysis, it can be observed that:

- Workers not using digital tools tend to have less flexibility and autonomy, work less frequently from home and often work on Saturday and more than 10 hours a day. At the same time, they report lower levels of stress and income.
- Workers using mobile tools only tend to work more frequently in a vehicle or at the premises of clients. Like workers not using digital tools, these workers are more likely to work on Saturdays and more likely to work more than 10 hours a day than workers in the other categories. At the same time, in terms of autonomy or stress, they are near the average while their level off income is significantly below the average.
- Finally, workers using more advanced digital tools (both computers and mobiles, with or without AI) tend to report greater flexibility and autonomy. They also tend to work from home more often and have shorter schedules. There are, however, no significant differences in terms of stress, while they are associated to higher levels of income.

[14] The main indicators of work organisation summarised in this section measure autonomy and routine; in particular, autonomy is measured by indicators for whether workers can: (i) choose the order in which the do things, (ii) the methods of work, (iii) and the speed of work. Routine is measured by indicators capturing whether the job involves: (i) monotonous or complex activities, (ii) complying with very detailed procedures, (iii) solving unforeseen problems. The main indicators of job quality used in this report refer to social support, (communication with peers and superiors), stress and working time flexibility, measured by variables indicating who sets working time arrangements (company/ organisation or workers), to what extent can the worker change them, and whether discretionary breaks are allowed. Other indicators (such as labour income or tenure) are also used in some sections.

An important caveat that applies here – which will also be relevant in further analyses in this report - is the significant variation in digital tools usage across countries and sectors. In this report we aim to present a first comprehensive overview of the AIM-WORK data and the main findings that stem from it. For reasons of space, it is not possible to report on specific details at the country or sectoral levels. In other words, the analysis presented in this report provides an overview at the EU-level, which inevitably masks specificities that are likely to be extremely relevant for policymakers. More detailed analysis will be undertaken in further research, to be published separately.

Figure 5.
Use of digital tools at work: impact on working conditions




Note: for illustration, correlation of the different categories of workers according to digital device usage with some key working conditions variables (z-score normalisation for comparison). The values are centred around the overall mean, and expressed as standard deviations, to facilitate the analysis and the comparison of the observed values across variables and categories.
Source: authors' elaboration using AIM-WORK weighted data.

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## 4.5 Use of advanced industrial tools at work

As already mentioned, in the AIM-WORK survey, a new, short set of three questions focusing on more advanced technologies with significant prevalence in the industrial sector was included. These are: (i) robots, (ii) autonomous vehicles, and (iii) predictive technology [15]. The aim of these questions was to complement the previous questions on digital device usage, perhaps more prevalent in office work, with a subset of additional variables depicting a more comprehensive view of technologies used in European industrial workplaces. It is important to note that, in this survey, it was not possible – for length reasons – to provide a full picture of advanced digital technologies used in manufacturing in Europe [16], but an initial approximation of the prevalence of worker usage of a selection of advanced digital technologies, aiming to complement the overall picture presented so far is provided instead.

Figure 6 illustrates the usage of these advanced industrial tools across countries, sectors and occupations. As may be ex pected, prevalence is much lower than for the other digital tools discussed in the previous two subsections. This is because these technologies are more specific, often used in mining, manufacturing and utilities (although predictive systems are also found in some services, such as professional services, finance and ICT). Across EU countries, the highest values can generally be observed in Central and Eastern European Member States. Across occupations, as could naturally be expected, higher usage levels are observed for technical jobs (technicians, trades, operators).

These results are consistent with results from employer surveys such as the 2019 Annual Business Survey which revealed for the US low adoption rates of AI and robotics, with substantial variation across industries, and concentrated in large and young firms. At the same time, the robot usage data that emerges from AIM-WORK does not seem to be fully consistent with existing data from the International Federation on Robotics (IFR) on robots in manufacturing, which shows a strong concentration in the automotive sector (while here mining and quarrying is on top) and in countries such as Germany or Austria with a strong automotive industry (see for example Fernandez-Macias et al. 2021). In AIM-WORK, Germany shows a prevalence below the EU average, with Slovakia, Slovenia and Poland on top of the ranking. The prevalence of robots in the workplace as measured by AIM-WORK is lower than reported by Eurostat for usage of robots in enterprises (Eurostat, 2025). However, it is important to note that the AIM-WORK results do not refer to number of robots used in industry as such, but to the percentage of workers that say they work alongside robots. Although the two measures should be related, there are factors that could systematically distort their relationship: for instance, more advanced robots are likely to be more independent and therefore there would be fewer workers reporting to work alongside them. In any case, a more detailed analysis would be required to fully grasp the data on robots collected in AIM-WORK, but this is outside the scope of this report and will be undertaken in a future specific study.

[15] Examples of technology for predictive purposes are the use of sensors and machine learning algorithms in factories for predicting when equipment is likely to fail; the use of predictive analytics by online retailers to forecast demand for products; the use of predictive analytics in hospital urgency services to predict patient flow and organize better the staff shifts. Examples of autonomous vehicles are those that transport items from storage to packing stations in warehouses; autonomous floor-cleaning robots in all kinds of workplaces; autonomous drones conducting safety inspections or inventory management in warehouses.

[16] Indeed, the analysis does not include other advanced digital technologies such as 3D printing, digital twins, augmented reality tools or advanced AI tools for non-predictive purposes, as well as cloud computing or cybersecurity tools.

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Figure 6.
Use of advanced industrial tools in the workplace in the EU

| | Robots | Predictive systems | Autonom. vehicles |
|---|---|---|---|
| Slovakia | 6.9% | 10.4% | 3.8% |
| Czechia | 6.7% | 9.7% | 3.4% |
| France | 5.9% | 4.2% | 4.3% |
| Slovenia | 5.8% | 10.5% | 4.2% |
| Poland | 5.7% | 10.1% | 4.8% |
| Lithuania | 5.6% | 10.5% | 4.7% |
| Estonia | 5.4% | 10.9% | 7.8% |
| Denmark | 5.4% | 13.2% | 2.4% |
| Finland | 5.4% | 7.4% | 4% |
| Latvia | 5.2% | 10.9% | 9.8% |
| Spain | 4.4% | 11.8% | 4.2% |
| Bulgaria | 4.3% | 12% | 6% |
| Netherlanc | 4.3% | 8.8% | 4.4% |
| Malta | 3.9% | 13.4% | 4.6% |
| Romania | 3.8% | 10.6% | 7.8% |
| Ireland | 3.8% | 13.7% | 3.5% |
| Croatia | 3.5% | 13.9% | 4.5% |
| Portugal | 2.9% | 10.7% | 5.2% |
| Belgium | 2.8% | 8.2% | 3.7% |
| Germany | 2.7% | 6.5% | 4.3% |
| Sweden | 2.6% | 13% | 2.2% |
| Luxembou | 2.2% | 11.6% | 1.1% |
| Hungary | 1.9% | 9% | 3.1% |
| Greece | 1.5% | 9.8% | 1.7% |
| Austria | 1.4% | 6% | 2.2% |
| Italy | 1.2% | 10.6% | 8.3% |
| Cyprus | 1.1% | 11.5% | 2.5% |
| **EU** | 3.8% | 8.8% | 4.8% |

| | Robots | Predictive systems | Autonom. vehicles |
|---|---|---|---|
| Mining and quarrying | 7.1% | 6.9% | 16.9% |
| Manufacturing | 7.8% | 10.2% | 8.5% |
| Electricity, gas, steam and air conditio | 6.5% | 13.3% | 4.4% |
| Agriculture, forestry and fishing | 4.3% | 11.1% | 8.1% |
| Water supply, sewerage, waste management | 7.1% | 3.5% | 11.9% |
| Transportation and storage | 5.5% | 8.8% | 8% |
| Not elsewhere classified | 6.0% | 10.5% | 5.2% |
| Construction | 4.2% | 9.4% | 6.9% |
| Information and communication | 3.4% | 10.4% | 5.5% |
| Professional, scientific and technical a | 3.5% | 11.5% | 2.8% |
| Activities of extraterritorial organizat | 5.1% | 11.4% | 0.3% |
| Other service activities | 1.1% | 10.9% | 4.5% |
| Administrative and support service activ | 1.6% | 6.1% | 6.1% |
| Education | 3.5% | 7.8% | 2.1% |
| Financial and insurance activities | 1.5% | 10.6% | 1.1% |
| Wholesale and retail trade; repair of mo | 2.1% | 8.0% | 2.8% |
| Public administration and defence, compu | 1.8% | 8.6% | 1.9% |
| Human health and social work activities | 3.0% | 6.8% | 2.5% |
| Arts, entertainment and recreation | 1.4% | 8.0% | 1.9% |
| Real estate activities | 1.6% | 8.1% | 0.9% |
| Accommodation and food service activitie | 0.9% | 5.8% | 3.3% |
| Activities of households as employers, u | 0.1% | 0.0% | 8% |
| Managers | 3.4% | 12.9% | 3.9% |
| Professionals | 4.6% | 9.4% | 2.5% |
| Technicians | 4.4% | 11% | 4.7% |
| Clerks | 1.4% | 11.3% | 3.5% |
| Service | 0.5% | 3.1% | 4.2% |
| Trades | 4.0% | 10.0% | 4.2% |
| Operators | 11.7% | 6.8% | 10.4% |
| Elementary | 1.2% | 1.9% | 12.3% |

Source: authors' elaboration using AIM-WORK weighted data.

Figure 7 shows a factor analysis incorporating all digital and industrial technology-use variables. The analysis clearly separates on one side office technologies, more focused on information processing (e.g. computers, mobile devices, office-related software and, to a lesser extent, also the use of communication platforms and AI) and on the other side industrial tools, more oriented towards physical handling functions (e.g. robots, predictive technologies and autonomous vehicles). Interestingly, the industrial tools factor also has relatively high correlation with the use of smartcards and wearable digital tools, tracking tools that are quite common in industrial and logistics work settings.

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Figure 7 also shows the distribution of the two types of technology by occupation (as reported in the bottom rows). We can observe on the left-hand column that the office tools factor is strikingly correlated with occupational level, being lower for elementary occupations with monotonical increases until managerial occupations, indicating that metrics of usage of digital office-related tools are surprisingly good proxies for hierarchical level. On the other hand, the use of industrial tools is high for operators and low for nearly everyone else, with moderate values for elementary, technicians and managers.

Figure 7.
Digital office and industrial tools in the workplace in the EU

| | Factor 1 (office tools) | Factor 2 (industrial tools) | Factor 2 (other tools) | Uniqueness |
|---|---|---|---|---|
| Computer | 0.69 | 0.00 | −0.02 | 0.52 |
| Mobile or tablet | 0.32 | 0.01 | 0.29 | 0.82 |
| Wearable | 0.03 | 0.23 | 0.64 | 0.54 |
| Smartcard | 0.16 | 0.30 | 0.25 | 0.82 |
| Other | −0.07 | −0.18 | 0.72 | 0.45 |
| Office docs | 0.72 | −0.03 | 0.00 | 0.49 |
| Office sheets | 0.69 | −0.02 | −0.02 | 0.52 |
| Comm. platform | 0.50 | 0.11 | 0.04 | 0.73 |
| AI | 0.38 | 0.03 | 0.01 | 0.86 |
| Robots | 0.04 | 0.60 | −0.04 | 0.64 |
| Predictive tech | 0.07 | 0.52 | 0.06 | 0.72 |
| Autonom. Vehicles | −0.14 | 0.62 | −0.05 | 0.60 |
| Variance explained | 17% | 10% | 9% | |

| | Office tools | Industrial tools | Other |
|---|---|---|---|
| Managers | 0.40 | 0.08 | 0.19 |
| Professionals | 0.34 | −0.01 | 0.02 |
| Technicians | 0.17 | 0.05 | −0.04 |
| Clerks | 0.15 | −0.05 | −0.07 |
| Service | −0.21 | −0.21 | −0.01 |
| Trades | −0.23 | −0.08 | −0.11 |
| Operators | −0.47 | 0.34 | 0.03 |
| Elementary | −1.22 | 0.06 | −0.03 |

Note: the table above shows the rotated factor loadings of principal components factor analysis of the variables shown in the rows. The table below shows the predicted values for the factor variables indicated and the categories of workers indicated in the rows. Source: authors' elaborations using AIM-WORK weighted data.
Source: authors' elaboration based on AIM-WORK weighted data.

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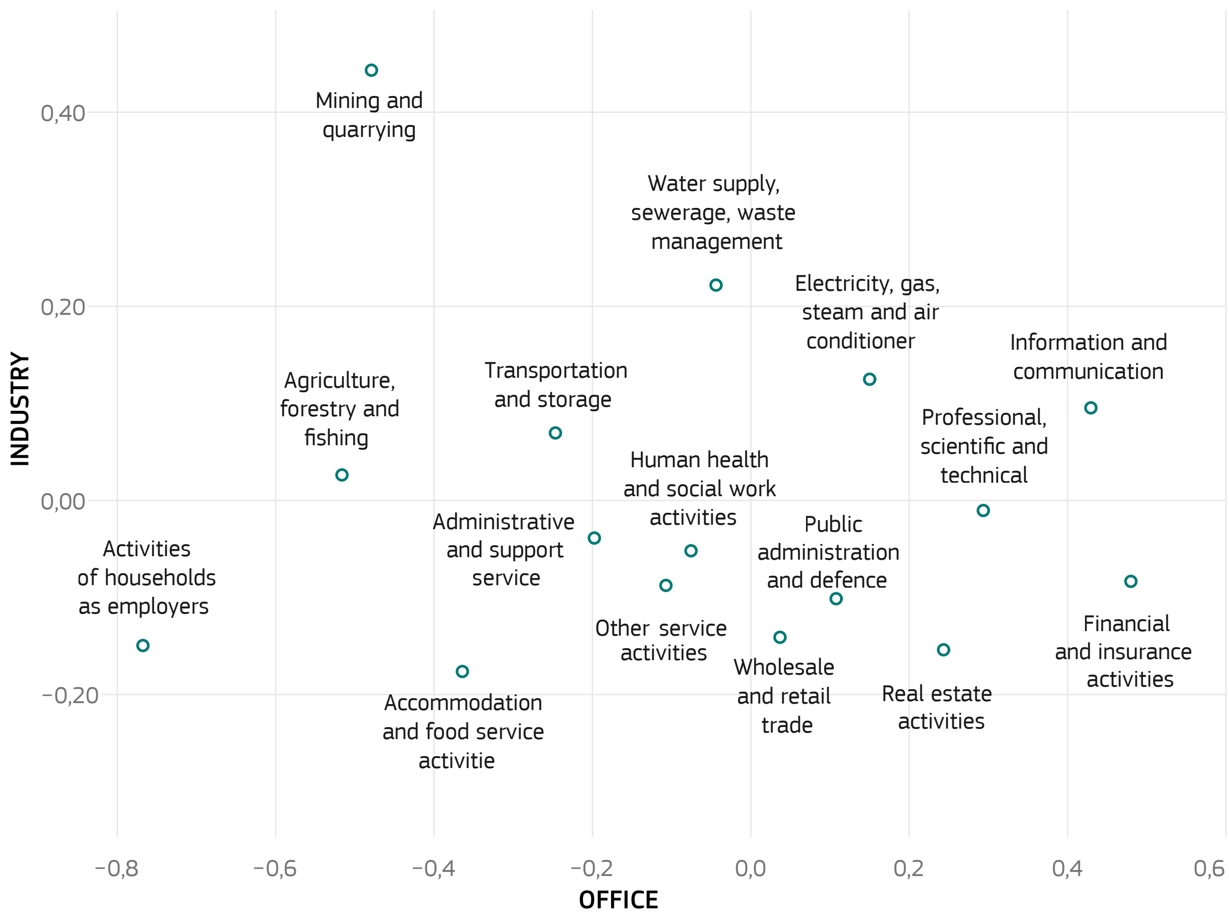
To conclude the analysis of office and industrial digital tools used in EU workplaces, Figure 8 shows the presence of the two different types of tools (i.,e. office tools including computers, mobile devices, wearables, office-related software, communication platforms and AI, and industrial tools including robots, predictive systems and autonomous vehicles) across sectors. The figure confirms that these two factors proposed in our analysis can be useful as continuous proxies for the type of technology currently used at work in the European Union, although with the caveat that the analysis is arguably more accurate and complete for office tools than it is for industrial ones, where the variables included in AIM-WORK allow only a more approximate although still illustrative analysis. As can be observed in the figure:

- Sectors such as mining, manufacturing, agriculture, and construction show, as could be expected, more prevalence of industry tools and less of office tools;
- Utilities, waste, and ICT show relevant presence of both types of tools;
- Finance, professional, real estate services and public services show, as could also be expected, more office tools and more limited presence of industry tools;
- And finally, sectors such as accommodation and food, health, retail, support services show very limited presence of both types of tools.

Figure 8
Digital office and industrial tools by sector in the EU




Source: authors' elaboration using AIM-WORK weighted data.

# 5

# Artificial Intelligence in the workplace

# 5 Artificial Intelligence in the workplace

According to the EU Artificial Intelligence Act 2024 [17], an 'Artificial Intelligence system' is defined as a machine-based system designed to operate with varying levels of autonomy, which may exhibit adaptiveness after deployment and, for explicit or implicit objectives, infer from the input it receives to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. It is widely accepted that the use of Artificial Intelligence (AI) can bring significant benefits to the economy (OECD, 2024), and its use in European workplaces is rising, which has led to vibrant discussions about the impact of this recent phenomenon in terms of net employment levels and impacts on work organisation and working conditions.

Conceptually, AI is a general purpose technology[18] with very different applications, and therefore it occupies a transversal position in our ADP framework. As a more advanced type of software algorithm that broadens the range of possibilities of digital systems, it can act as an accelerator or intensifier to the three vectors of change of the digital revolution in the world of work. First, because it has an obvious potential to automate human labour. Second, because it can be seen as a contributor to the digitisation of work: a growing number of digital devices and systems incorporate a layer of AI software which can extend considerably the range of their possible applications. The inherent flexibility of AI systems, and their capacity to learn from "experience" (to the extent that they can be fed the relevant training data), allow them to be applied to activities and processes that until recently could hardly be digitised (such as customer services or translation). Finally, we can also argue that AI is likely to contribute to the platformisation of work: AI systems could in the future achieve a level of unsupervised autonomy which is much higher than traditional software algorithms. If this happens, future generative AI systems could be particularly suited to enhance existing algorithmic management technologies. It is no coincidence that some of the earliest adopters of AI have been digital platforms, also in work contexts (we can refer to the examples of Uber in the digital labour platform domain, and MS Teams in the regular work domain).

In the AIM-WORK questionnaire and in this report we focus on AI as an aspect of the digitisation of work. As explained in section 2, the recent surge in generative AI usage for all kinds of purposes led to the inclusion in the AIM-WORK survey of a new set of questions on AI tools in the workplace aiming to quantify the prevalence of the use of AI-powered tools at work, the frequency of such use, the purpose and the impact. The approach followed for this block of questions is presented in Box 2.

[17] eur-lex.europa.eu/eli/reg/2024/1689/oj/eng
[18] While AI can be a General Purpose Technology, it is also frequently applied as an Special Purpose Technology. For the purpose of this report, the focus is on AI as General Purpose Technology

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### Box 2: AI at work in the AIM-WORK survey

In the AIM-WORK survey, AI was defined as a technology enabling smart computer programs and machines to carry out some tasks that would typically require human intelligence. In the questionnaire, the questions regarding use of AI at work refer specifically to the use of AI tools by workers when performing their work. It is important to note that this does not include a whole range of possible uses of AI by firms as systems to assist them in their management of their activities, including with respect to work, to the extent that they are not directly and explicitly used by workers. For instance, AI systems which may be used by companies to control their logistics, manage their clients, predict their demand or manage their work processes are covered in our analysis only to the extent that they are directly and explicitly operated by workers. In fact, workers may not always be aware of the existence of AI-powered systems in their workplace. More over, many common digital tools are AI-powered and this is not fully covered in the survey either.

Instead, the use of AI captured in the AIM-WORK survey refers primarily to AI-driven tools used consciously by workers to assist them in their work, mostly AI chatbots such as ChatGPT, automated data analysis systems, predictive maintenance software and automated customer support.

Specifically, the questions asked to respondents in the survey were the following:

- *Prevalence of usage of AI tools in the workplace:* In the last 12 months, did you use an AI-powered tool when performing your main paid job?
- *Frequency of usage:* In the last 12 months, on average, how frequently did you use an AI-powered tool or tools when performing your main paid job?
- *Identification of the AI-powered tool:* What is the name of the main AI-powered tool you use when performing your main job?
- *Purpose of usage:* In the last 12 months, have you personally used an AI-powered tool in your job for ...

  1. writing or synthesis of text?
  2. analysis of data and numbers? E.g. data analytics
  3. brainstorming or developing new ideas?
  4. planning and scheduling?
  5. customer advice or support?
  6. transcription?
  7. image generation or recognition?
  8. translation, interpretation or language processing?
  9. other [open end]

- *Impact:* In your opinion, has using AI-powered tools made your work tasks easier, or more difficult, or has it made no difference?

Source: own elaboration

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## 5.1 Use of AI at work in the EU

Figure 9 summarises the main results from this new data on AI usage at work in the EU. A significant finding in the AIM-WORK survey is the remarkably high number of respondents who say that they have used an AI-powered tool at work at least once in the last 12 months: on average, roughly one-third of EU workers (29.9%), as shown in the first column in Figure 9. This is a very significant number, given that these tools have been available only recently. It is no surprise that these figures are higher compared to surveys carried out only one or two years ago: until late 2022, AI chatbots were not available for general users, but now their use appears to have been normalised and is highly prevalent in the world of work. Across EU countries, the use of AI at work is particularly high (above or close to 40%) in a small number of Member States: Denmark, Belgium, Netherlands, Finland and Austria. At the other extreme we have Bulgaria, Romania and Greece, with values below 20%. Nevertheless, the degree of variation across countries is not very high: with these exceptions, most Member States showcase a prevalence which is close to or above 30%. By occupation, AI usage shows significant differences: above one third of workers in all the white-collar occupations (managers, professionals, technicians and clerks) use AI tools at work, while in the case of the rest of occupations AI usage drops to less than one fifth of workers, and it is only 6% for elementary occupations.

Furthermore, frequency of use is also high. This is shown in the second column of the Figure, where around 20% of EU workers use AI at least weekly when performing their main job. Here, again, one can observe some - but not much - variation across countries, with most of the countries showing values around or above 20%, with the notable exception of the countries with the lowest prevalence of AI usage. The third column shows an indicator of the average number of AI uses reported by respondents. As explained in the box we asked respondents about the purposes for which they use AI in the work context. On average, respondents reported the use of AI at work for around three different purposes out of all those covered in the survey. The most common use is writing followed by translation. More details are available in section 5.3.

Finally, we also asked workers if using AI-powered tools has made a difference and if it has made their work tasks easier or more difficult. This is reflected in the last column of the Figure. Workers tend to evaluate the impact rather positively: the indicator, which ranges from +1 for those saying AI had a positive impact on their work to -1 for those saying the impact was negative (and zero for those that said it had no impact at all), gets an average of +.65 for all workers, implying a generally very positive assessment.

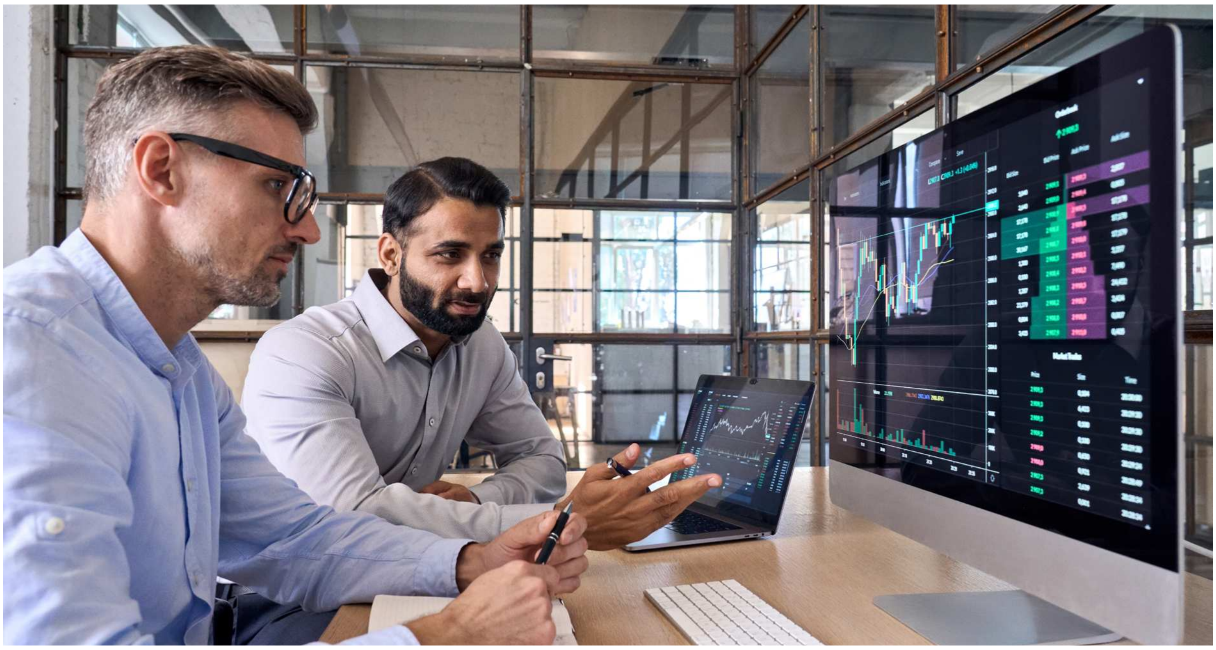

Figure 9.
Use of AI tools at work in the EU

| | Use of AI at work | Weekly use | N uses | Impact |
|---|---|---|---|---|
| Denmark | 45% | 27% | 2.7 | 0.44 |
| Belgium | 43% | 28% | 2.65 | 0.67 |
| Netherlands | 40% | 25% | 2.68 | 0.67 |
| Finland | 38% | 22% | 2.9 | 0.58 |
| Austria | 37% | 28% | 3.17 | 0.62 |
| Luxembourg | 35% | 23% | 2.65 | 0.61 |
| Czechia | 34% | 23% | 3.39 | 0.88 |
| Germany | 34% | 22% | 2.8 | 0.61 |
| Slovenia | 33% | 22% | 3.15 | 0.87 |
| Portugal | 32% | 23% | 3.32 | 0.63 |
| Hungary | 31% | 19% | 2.65 | 0.62 |
| Slovakia | 30% | 17% | 3.2 | 0.85 |
| Malta | 29% | 22% | 2.96 | 0.85 |
| Spain | 29% | 23% | 3.56 | 0.71 |
| Estonia | 29% | 19% | 3.24 | 0.78 |
| Lithuania | 29% | 17% | 3.22 | 0.71 |
| Poland | 28% | 17% | 3.33 | 0.85 |
| Italy | 28% | 17% | 2.75 | 0.64 |
| Ireland | 28% | 19% | 3.05 | 0.55 |
| Sweden | 28% | 16% | 2.97 | 0.44 |
| Cyprus | 27% | 18% | 3.21 | 0.87 |
| Latvia | 26% | 15% | 3.04 | 0.81 |
| France | 25% | 17% | 2.91 | 0.48 |
| Croatia | 25% | 14% | 3.33 | 0.86 |
| Bulgaria | 19% | 13% | 3.25 | 0.81 |
| Romania | 17% | 11% | 3.39 | 0.89 |
| Greece | 14% | 7% | 2.79 | 0.71 |
| Managers | 39% | 27% | 3.54 | 0.69 |
| Professionals | 40% | 26% | 3.34 | 0.66 |
| Technicians | 37% | 24% | 3.17 | 0.65 |
| Clerks | 34% | 23% | 2.68 | 0.63 |
| Service | 19% | 13% | 1.90 | 0.64 |
| Trades | 20% | 13% | 2.10 | 0.64 |
| Operators | 14% | 10% | 1.68 | 0.65 |
| Elementary | 6% | 4% | 2.24 | 0.58 |
| **EU average** | 30% | 20% | 2.99 | 0.652 |

Source: authors' elaboration using AIM-WORK weighted data.

How do our findings relate to other recent data? Looking at worker-level surveys, a recent OECD worker survey on AI in the workplace offers a relevant point of comparison. The survey covered two sectors in 7 OECD countries (Austria, Canada, France, Germany, Ireland, the United Kingdom and the United States). Overall, 42% of workers in the financial sector and 29% in the manufacturing sector state that they have used AI at work, very much in agreement with AIM-WORK data (Lane et al. 2023). Our finding that approximately one third of EU workers utilised AI tools in their work over the past 12 months also sits comfortably within the 20% to 40% range generally reported by recent worker-level surveys in the US, as highlighted in a review by Crane et al. (2025) for the Federal Reserve. For instance, the Real-Time Population Survey (Bick et al., 2024) indicated 28% of US working-age adults used Generative AI for work by August 2024, and a Conference Board survey (2023) reported 31% of workers using generative AI by August 2023. According to Hartley et al. (2025) LLM adoption at work among U.S. survey respondents above 18 has increased rapidly from 30.1% as of December 2024, to 43.2% as of March/April 2025.

The overall adoption level according to the AIM-WORK survey appears broadly consistent with these US figures, especially considering the rapid growth in AI uptake noted across most recent studies. The specific scope of the AIM-WORK survey, focusing on AI tools directly and explicitly operated by workers rather than broader firm-level AI systems used for management or logistics, is crucial for interpretation. This distinction aligns with observations by Crane et al. (2025) that worker-level surveys often yield different insights than firm-level ones, and that measurement nuances (like focusing on generative AI vs. all AI, or different lookback periods) can explain variations. For example, while some US surveys like Morning Consult (He, 2024) reported a higher 44% of US adults using AI at work by January 2024, others like Pew Research Center (McClain, 2024) found 20% of US adults had ever used ChatGPT for work tasks by February 2024. Our EU-wide average, with national variations from over 40% in countries like Denmark to under 20% in others like Bulgaria, mirrors the heterogeneity seen in the US and underscores the importance of detailed, worker-centric data to understand the practical application of AI in daily work. Another recent online survey by Gillespie et al. (2025) carried out in 48 countries also reflects these national variations although in general the prevalence of AI usage reported by respondents is higher than in AIM-WORK and Crane et al. (2025) and McClain (2024). On average 58% of employees report intentionally using AI tools in their work on a regular basis. The EU countries covered in the sample show AI usage between 33% in Czechia and 54% in Poland. This higher prevalence is likely influenced by the methodological and sampling approach, with online surveys often overrepresenting the prevalence of digital phenomena.

As far as firm-level surveys are concerned, in 2024 a European study found Denmark and Finland had the highest share of enterprises utilising at least one AI technology, both above 25%. The European Union average was 13.5%, an increase of 5.45 percentage points with respect to 2023 (Eurostat, 2024). A separate study, covering all firms in Germany, found that only 5.8% used AI (Rammer, et al., 2022).

## 5.2 Factors explaining AI usage at work

What are the factors explaining the use of AI at work? Figure 10 complements the above picture with an econometric analysis of the factors that are associated with higher or lower prevalences of AI at work. We run a logistic model in which the use of AI (binary variable) is regressed over the level of education, the occupational title (1-Digit ISCO), sex, age, the size of the firm, nationality (national/foreign), the income level, tenure and country fixed effects.

The analysis confirms the central role played by occupation, where there is a major difference in the prevalence of AI use between the four top occupational levels (managers, professionals, technicians and clerks, i.e. all white-collar workers) and the rest of occupational groups, where AI usage is significantly lower, especially for operators and elementary occupations. These findings are consistent with recent assessments of occupational exposure to AI (for instance, Felten et al. 2021 or Tolan et al. 2022), which tend to find that the most exposed occupations consist almost entirely of white-collar positions.

Country differences also play a significant role, confirming the above picture in general terms. Differences by sector are significant but not major once controls are applied, with knowledge intensive services (KIS) standing above the rest. Preliminary analysis suggests that gender, age, firm size and country of origin are not significant factors explaining AI use differentials, controlling for the other factors.

> AI use at work is higher for white-collar workers.

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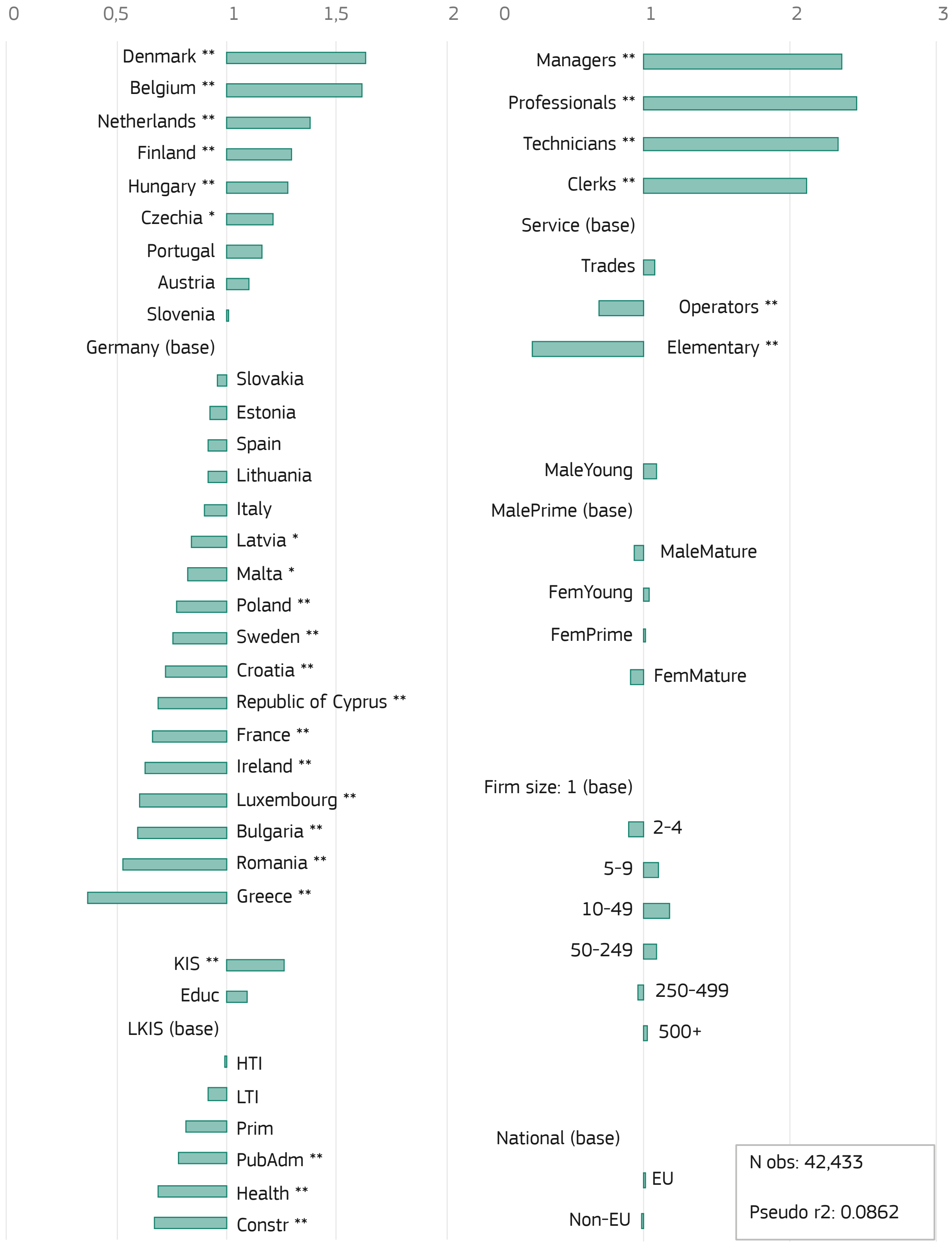
Figure 10.
Factors behind the use of AI tools at work in the EU




Note: Logistic regression of use of AI at work (binary measure), with country dummies and many other regressors (additional controls by income and tenure not shown). Odds ratios shown (chance of using AI relative to base category = 1), with asterisks indicating significance.
Source: authors' elaboration using AIM-WORK weighted data

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## 5.3 The purposes of AI use at work

As explained in Box 2, in AIM-WORK we also asked respondents about the use they make of AI tools. As shown in Figure 11, on average the most frequent use of AI for work purposes is writing (accounting for 65% of all uses), followed by translation (59%), the processing of data and discussion of ideas (38%), transcription (28%), image generation (27%), planning and scheduling (24%) and customer advice (19%). The figure also shows a principal components analysis (PCA) suggesting three broad types of use of AI: text-related uses (which covers writing, translation and - to a lesser extent - transcription of text and brainstorming of ideas), technical uses (planning, data analysis and customer advice) and other, which includes image generation or recognition as well as any other usage reported by respondents (see Box 2). The first of these factors (text-related usage of AI tools) is mostly associated with white-collar occupations, while technical uses are more polarised, with higher levels for top and bottom occupations, such as operators and even elementary occupations. The purposes reported by respondents are fully consistent with the type of AI usage captured in our survey, mostly related as discussed above to worker-led, AI chatbot usage.

Figure 11. Purpose of AI usage in the workplace in the EU

| | Prevalence | Factor 1 (text) | Factor 2 (technical) | Factor 3 (Other) | Uniqueness |
|---|---|---|---|---|---|
| writing | 65% | 0.697 | −0.097 | 0.007 | 0.504 |
| translation | 59% | 0.679 | −0.048 | −0.197 | 0.498 |
| data | 38% | 0.159 | 0.533 | −0.22 | 0.637 |
| ideas | 38% | 0.382 | 0.164 | 0.517 | 0.559 |
| transcription | 28% | 0.465 | 0.282 | 0.295 | 0.616 |
| image | 27% | 0.288 | 0.238 | 0.305 | 0.767 |
| planning | 24% | −0.127 | 0.662 | −0.005 | 0.545 |
| advice | 19% | −0.080 | 0.521 | 0.034 | 0.721 |
| other | 1% | −0.174 | −0.129 | 0.735 | 0.412 |
| Variance explained: | | 0.163 | 0.132 | 1.120 | |

| | Factor 1 (text) | Factor 2 (technical) | Factor 3 (Other) |
|---|---|---|---|
| Managers | 0.321 | 0.121 | 0.144 |
| Professionals | 0.228 | 0.015 | 0.183 |
| Technicians | 0.140 | 0.024 | 0.009 |
| Clerks | −0.029 | −0.209 | −0.471 |
| Service | −0.723 | −0.193 | −0.010 |
| Trades | −0.750 | 0.097 | −0.243 |
| Operators | −1.044 | 0.123 | −0.381 |
| Elementary | −0.700 | 0.175 | −0.364 |

Note: the table above shows the rotated factor loadings of principal components factor analysis of the variables shown in the rows. The table below shows the predicted values for the factor variables indicated and the categories of workers indicated in the rows.
Source: authors' elaborations using AIM-WORK weighted data.

While limited in comparison to AIM-WORK coverage, and using different analytical categories, the recent OECD AI surveys of employers and workers captured the views of 5334 workers and 2053 firms in the manufacturing and finance sectors of seven countries (Austria, Canada, France, Germany, Ireland, the United Kingdom, and the United States) about the current and future impact of AI on their workplaces (Lane, et al., 2023). Amongst employers that said that they used AI, it was most commonly for data analytics (52%) and fraud detection (50%) in the finance sector, while in manufacturing it was most common in production processes (60%) and maintenance tasks (40%). In most cases, employers reported multiple uses for AI, with just 26% in finance 32% in manufacturing indicating that AI was limited to a single use within the company (Lane, et al., 2023). In these two sectors, AI results in a high degree of task reorganisation, with 66% and 72% of employers in finance and manufacturing, respectively, reporting that AI had automated tasks that workers used to do, while around half of employers in each sector reported that AI had created tasks that were not previously done by workers.

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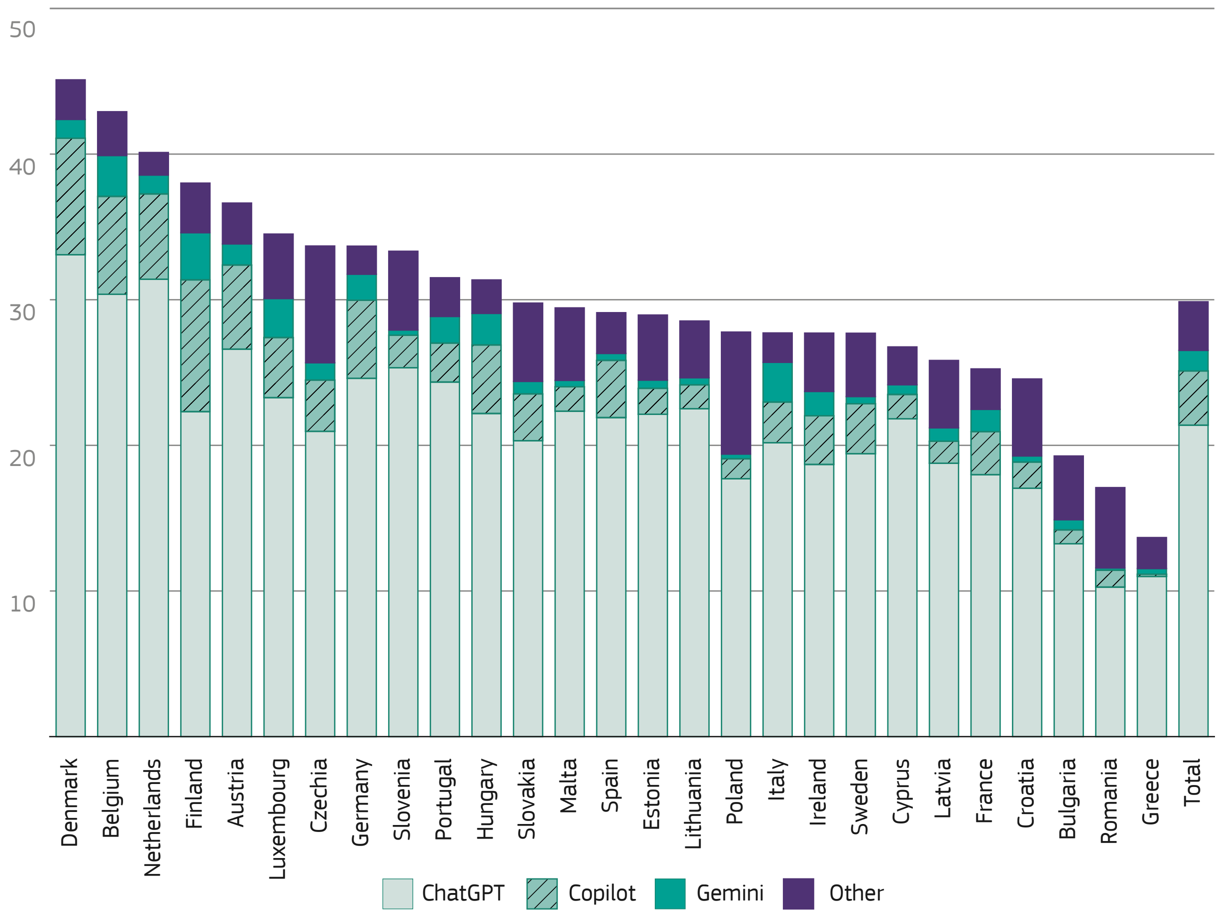
# 5.4 AI tools commonly used by workers

The most used AI tool among workers in the EU is clearly ChatGPT, according to AIM-WORK data. As shown in Figure 12, the use of ChatGPT is predominant in all Member States, with Copilot and Gemini lagging considerably behind. The widespread use of ChatGPT over the last couple of years, and its extremely rapid adoption for all kinds of purposes among broad segments of the population, explain this result in the AIM-WORK data. At the same time, the type of AI usage that we are capturing in AIM-WORK is probably in most cases at the personal initiative of workers, and in many cases even using their own personal devices. This suggests an increasing number of EU workers are spontaneously and proactively accessing AI tools to get assistance to carry out some of their work tasks.

At the same time, it is important to consider the rapidly evolving landscape of AI interfaces. At the time of the survey, tools such as DeepSeek had not yet been introduced or were available only to a very limited extent. It is likely that the landscape of the most widely used platforms will continue to evolve in the coming years. Further research is needed to determine the extent to which corporate or personal usages shape AI adoption in the workplace in the future.

Figure 12
Most common AI platform per country




Source: authors' elaboration using AIM-WORK weighted data.

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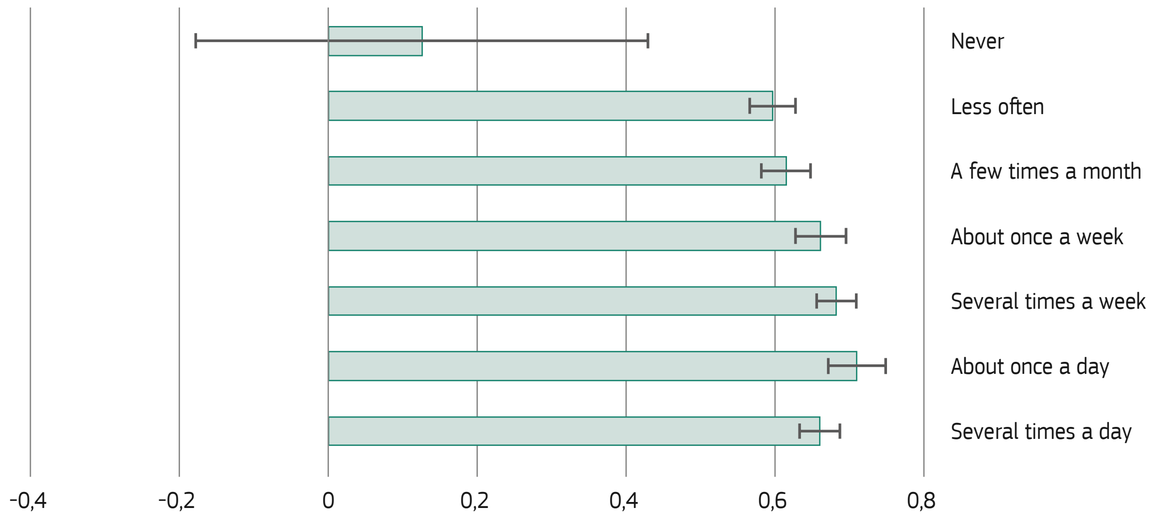
## 5.5 Frequency of usage and perceived impact of AI tools on work

Finally, the AIM-WORK survey also asked respondents to report the frequency of use of AI tools at work and to also assess their perceived impact on work. Figure 13 shows a combined analysis of these variables. It is surprising to see that, although the general assessment of impact of AI on work is positive (.65 on average, on a scale going from -1 for negative impact, +1 for positive and zero for neutral), this does not change by frequency of use. This is somewhat surprising: we may have expected a more positive perception of the impact of AI at work among the most frequent users, but this does not seem to be the case. In fact, it is almost the opposite, as the most frequent users tend to be slightly less positive about the perceived impact on their work. As seen below, those workers who say AI makes their work easier tend to use it for text-related tasks. Those that say it makes their work more difficult tend to use it for technical tasks [19].

Figure 13.
Frequency of use vs. assessment of impact




| | Text related usage | Thencical usage | Other uses |
|---|---|---|---|
| AI makes work more difficult | −0.081 | 0.217 | −0.046 |
| AI makes no difference | −0.120 | −0.080 | −0.069 |
| AI makes work easier | 0.032 | 0.030 | 0.018 |

Note: the above figure shows the average impact by frequency of use. Bars show mean impact, confidence intervals superimposed.
Source: authors' elaboration using AIM-WORK weighted data.

[19] It is not clear what drives this assessment of impact on the side of workers. It may be related to the fact that text-related usage is more likely to be self-driven, thus perceived more positively, whereas technical usage may be related to the use of more complex, corporate-driven tools where usage may be obligatory and not completely clear, and thus considered burdensome by the workers. However, these are just preliminary observations that require further research.

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How do these results compare to those of other studies? In OECD surveys of employers and workers, both workers and their employers in finance and manufacturing are generally very positive about the impact on AI on performance and working conditions. About four-in-five workers say that AI improved their performance at work, compared to 8% who said that AI had worsened it. Three-in-five say that AI increases their enjoyment at work (Lane, et al. 2023). Across all indicators of working conditions considered (job satisfaction, physical health, mental health, fairness in management), AI users were four more times likely to say that AI had improved working conditions than worsened them. Lane et al. (2023) suggests that AI, if used correctly, could contribute to higher productivity and better job quality. Moreover, both training workers and worker consultation were found to be associated with better outcomes for workers (Lane, et al., 2023). It is important to point out that the fieldwork of the OECD surveys took place before November 2022 when ChatGPT was released to the broad public, which hampers comparability with AIM-WORK.

Based on the analysis of digital tools usage at work conducted in section 4 and the more specific insights related to AI usage presented in this section, the next section presents a more detailed analysis of the two remaining aspects of the platformisation of work concept: digital monitoring and algorithmic management.

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# Digital monitoring of work

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# 6 Digital monitoring of work

Digital monitoring, the second key dimension of the platformisation of work, entails the use of the data collected through digital devices about the production process to monitor different aspects of work and workers themselves. As discussed in section 2, digital monitoring implies an explicit or implicit intent of influencing, managing, or evaluating workers, and follows a logic of control. Relevantly, while some forms of digital monitoring are common and legal, and can support a more efficient organisation of work, others can represent intrusive forms of worker surveillance raising concerns about worker privacy, blurring of work/life boundaries, and deterioration in working conditions (Aloisi & Gramano, 2019; Ball, 2010 & 2021; Bernhardt, et al., 2021; Kellogg, et al., 2020; Bailey, 2022).

Previous studies have found that excessive monitoring can have negative psycho-social consequences, including increased resistance, decreased job satisfaction, increased stress, decreased organisational commitment and increased turnover (Ball, 2021). Ball (2021) highlights how surveillance of employees working remotely during the pandemic intensified, with the deployment of keystroke, webcam, desktop and email monitoring, calling for more studies which examine these recent phenomena.

In 2023, data from the AMPWork survey revealed that the combined use of computers, mobile and wearable devices was strongly associated with the monitoring of work activities (Fernández-Macías, et al., 2023). AMPWork estimates showed that in Germany and Spain, the most common type of digital monitoring was the tracking of working times. This was followed by use of swipe cards for tracking entry/exit/movements in the workplace and the use of devices to monitor vehicle locations and CCTVs or webcams.

In the AIM-WORK survey we asked respondents a battery of questions about digital monitoring of work, understood as the company use of electronic devices to gather information about work performance and activities. Specifically, the questionnaire asked respondents if their employer uses digital tools to monitor [20]:

- the number of hours worked
- keystrokes, screen, or document usage
- calls or e-mails
- internet usage during working hours, e.g. websites visited, social media use
- workers' activities through cameras in the workplace
- workers' entry, exit and/or movement, e.g. through swipe cards
- workers' location through sensors or other devices in the workplace
- workers' location when driving the vehicle used for work purposes, e.g. through a GPS device, smartphone or biometrics; and
- social media profiles or online public activities.

[20] Our measure of digital monitoring is based on the information available to workers: we asked them about their knowledge about presence of these practices at work. It is therefore possible that lack of awareness on the side of workers may to some extent lead to an underestimation of prevalence. At the same time, the prevalence data showed in this section is similar to the one reported by the OECD based on their employer survey (Milanez et al. 2025).

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## 6.1 Digital monitoring of work across the EU

As shown in Figure 14, results from AIM-WORK depict an overall picture which is quite similar to the one presented in both AMPWork as well as the OECD survey of employers. Looking at the EU-27 as a whole, the most common forms of digital monitoring at work involve the automatic monitoring of working hours and the use of track cards to monitor workers' entry, exit and/or movement (respectively, 37% and 36% of EU workers are subject to these forms of monitoring), while 14% of EU workers have their activities monitored through cameras. A similar percentage (14%) report being subject to monitoring of internet usage. The other forms of digital monitoring have a prevalence around or below 10%, including the monitoring of calls or e-mails (12%), of computer use (11%), of location in corporate vehicles (9%), and the monitoring of social media usage (7%). The use of sensors in the workplace is the least common form of digital monitoring in the EU, reported by just 4% of EU workers.

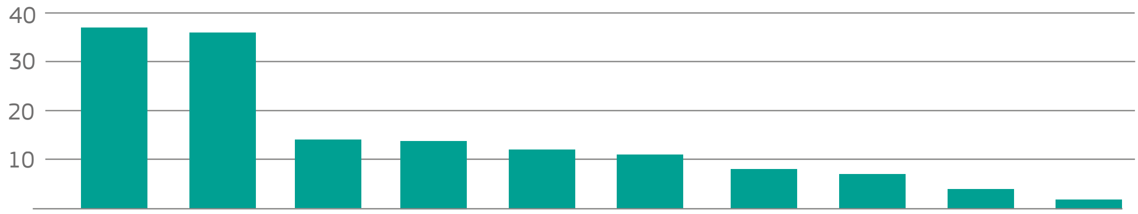
AIM-WORK data provides a comprehensive picture of digital monitoring across EU Member States, also shown in Figure 14. The highest levels of digital monitoring are reported in Central and Eastern European Member States, in particular Slovenia, Czechia, Poland, Romania, Bulgaria, Slovenia and Latvia, as well as in Malta and Cyprus. These are countries where a significant prevalence of several forms of digital monitoring beyond the two most common ones (working time and entry/exit/movements through swipe cards) is observed. Indeed, the monitoring of internet usage, the use of CCTV and the monitoring of calls, internet use, and vehicle location are all quite common in this block of Member States. Slovenia stands out as the Member State with the highest prevalence of monitoring of working time (57%), followed by Spain (54%), and one of the highest in monitoring through swipe cards (54%), only behind Slovakia and Czechia (57%). It is particularly noteworthy that forms of digital monitoring that are generally considered to be more intrusive (e.g. the use of CCTV) are significantly above the EU average in countries such as Romania, Malta and Bulgaria (where as much as half of the workforce is subject to CCTV surveillance), also in other countries such as Poland, Latvia or Cyprus. The monitoring of internet usage, calls or e-mails is significantly above the EU average,in countries such as Malta, Poland, Bulgaria, Romania and Czechia.

In the other EU countries, the monitoring of time and location remains quite significant and usually around the EU average (as is the case in Spain, Portugal, Ireland, Luxembourg, Italy, France, Belgium, Finland etc), but the other forms of monitoring are much less prevalent. The countries where the lowest levels of digital monitoring are observed are in Northern and Western Europe, in particular Austria, Germany, Netherlands, Denmark and Sweden, together with Greece. Relevantly, the low level of digital tools usage in Greece is connected to a low prevalence of digital monitoring, and as will be discussed later, also a low level of algorithmic management. On the other hand, it is possible that lower levels of monitoring have to do with specific work organisation practices that characterise these countries, and also with the regulatory framework in place. For example, restrictions to digital monitoring in countries such as Germany or Greece could be playing a role in the low levels observed in these countries [21].

In AIM-WORK we also asked respondents if their employer had informed them about the digital monitoring practices followed in the workplace. Roughly 50% of respondents say that their employers informed them explicitly about their monitoring practices at work, with some variation across countries which tends to be related to the intensity of monitoring practices: countries such as Czechia, Slovakia or Poland with high levels of monitoring intensity tend to also have above average levels of explicit information (above 60% have been explicitly informed by their employers), whereas countries such as Austria, Netherlands or Belgium where levels of monitoring are comparatively low have also lower levels of explicit information according to our survey (less than 50% of workers who say they are monitored say they have been explicitly informed about it).

[21] www.eurofound.europa.eu/en/resources/article/2024/regulatory-responses-algorithmic-management-eu
www.eurofound.europa.eu/en/resources/article/2024/employee-monitoring-moving-target-regulation

Figure 14.
Digital monitoring of work in the EU



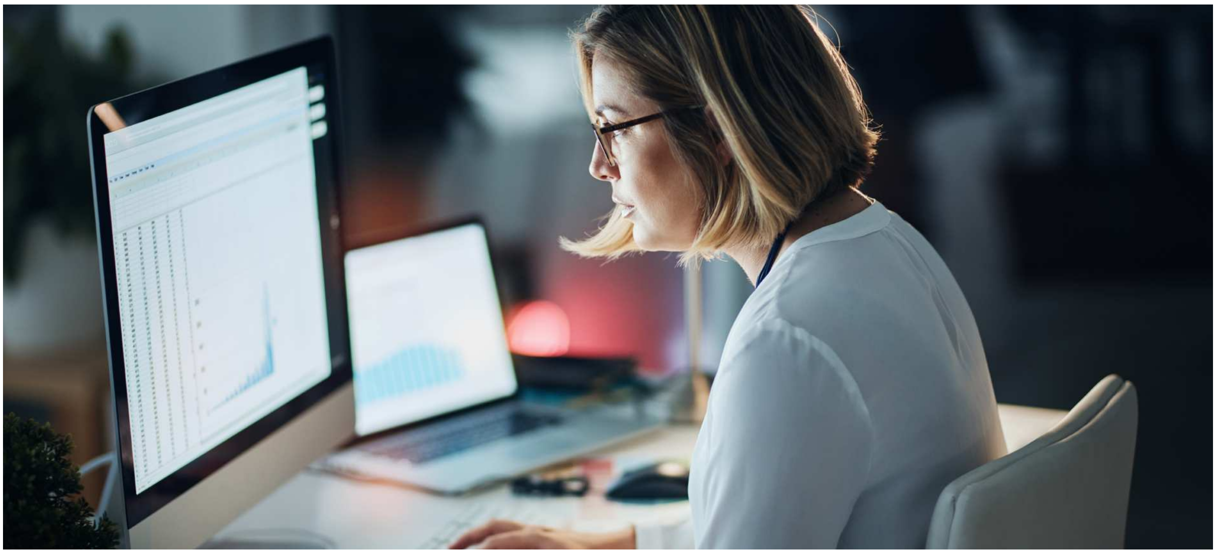

| | Monitor time | Track card | Monitor internet | CCTV | Monitor calls emails | Monitor computer use | Tracking vehicles | Monitor social media | Tracking sensors | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| EU27 | 37% | 36% | 14% | 14% | 12% | 11% | 8% | 7% | 4% | 2% |
| Malta | 40% | 37% | 22% | 49% | 25% | 20% | 8% | 12% | 12% | 5% |
| Slovakia | 48% | 57% | 20% | 30% | 14% | 14% | 21% | 5% | 12% | 6% |
| Czechia | 43% | 57% | 24% | 25% | 17% | 13% | 24% | 6% | 9% | 7% |
| Poland | 37% | 41% | 23% | 39% | 19% | 10% | 18% | 8% | 14% | 13% |
| Romania | 35% | 29% | 22% | 50% | 14% | 16% | 19% | 7% | 11% | 4% |
| Bulgaria | 24% | 32% | 19% | 47% | 18% | 13% | 18% | 9% | 14% | 4% |
| Cyprus | 33% | 43% | 19% | 32% | 18% | 16% | 13% | 11% | 8% | 3% |
| Slovenia | 57% | 54% | 12% | 15% | 13% | 10% | 11% | 9% | 7% | 4% |
| Latvia | 25% | 32% | 15% | 34% | 13% | 7% | 20% | 10% | 12% | 5% |
| Luxembourg | 42% | 41% | 22% | 5% | 14% | 20% | 6% | 12% | 2% | 0% |
| Spain | 54% | 42% | 17% | 12% | 11% | 12% | 4% | 10% | 2% | 0% |
| Croatia | 25% | 36% | 13% | 28% | 14% | 8% | 16% | 9% | 11% | 3% |
| Lithuania | 25% | 30% | 13% | 29% | 12% | 7% | 16% | 11% | 10% | 4% |
| Ireland | 38% | 38% | 18% | 13% | 15% | 13% | 4% | 7% | 4% | 0% |
| Portugal | 45% | 39% | 15% | 8% | 15% | 10% | 5% | 9% | 2% | 0% |
| Estonia | 21% | 32% | 9% | 25% | 9% | 9% | 16% | 8% | 10% | 5% |
| France | 33% | 37% | 18% | 10% | 11% | 16% | 4% | 7% | 2% | 0% |
| Belgium | 33% | 36% | 11% | 6% | 11% | 15% | 6% | 8% | 2% | 0% |
| Italy | 35% | 38% | 9% | 6% | 12% | 10% | 6% | 9% | 1% | 0% |
| Finland | 38% | 43% | 10% | 7% | 6% | 7% | 5% | 5% | 3% | 1% |
| Hungary | 26% | 35% | 14% | 7% | 10% | 4% | 6% | 8% | 3% | 1% |
| Austria | 38% | 31% | 12% | 5% | 9% | 10% | 5% | 5% | 1% | 0% |
| Germany | 41% | 30% | 9% | 5% | 11% | 8% | 4% | 3% | 1% | 0% |
| Denmark | 21% | 29% | 14% | 7% | 9% | 10% | 9% | 6% | 3% | 0% |
| Netherlands | 27% | 29% | 5% | 6% | 7% | 14% | 8% | 6% | 1% | 1% |
| Sweden | 24% | 23% | 11% | 5% | 6% | 9% | 7% | 8% | 3% | 2% |
| Greece | 18% | 19% | 10% | 14% | 7% | 7% | 3% | 8% | 1% | 0% |

Source: authors' elaboration using AIM-WORK weighted data.

## 6.2 Main types of digital monitoring of work

AMPWork analysis (Fernández-Macías, et al., 2023) showed that the eight simple types of monitoring observed could be combined into two underlying factors, which were named physical monitoring and activity monitoring. Figure 15 reflects a similar principal components factor analysis using the new and more encompassing AIM-WORK data. In this case, as shown in Figure 15, three main types of digital monitoring at work are identified departing from the nine (plus one residual) variables of digital monitoring [22]:

- Physical monitoring: this refers to tracking and monitoring systems of the physical location of workers, either in the workplace (mostly through CCTV and sensors), or in corporate vehicles through GPS, mobile devices, etc. Physical monitoring is most common for industrial occupations (trades and operators) and for workers who do not use digital tools at work or use mobile digital tools only. This type of monitoring is primarily focused on the monitoring of the location of the workers themselves, rather than the activity/activities they perform while using digital tools.
- Activity monitoring: this refers specifically to the monitoring of activities carried out with digital tools, typical of office settings (and not to worker activities generally speaking). This includes the monitoring of computer use (keystrokes, screen, or document usage), the monitoring of calls and e-mails, the monitoring of internet usage, and the monitoring of social media profiles or online public activities. Since this is very common in office work, activity monitoring is highest for clerks, and relatively high also for professionals, managers and technicians. This type of digital monitoring is strongly associated (as could be expected) with the use of computers and more advanced combinations of digital tools at work.
- Time monitoring: this type of monitoring refers to the use of digital systems to monitor working time as well as workers' entry, exit and/or movement, for instance with track cards, which of course implies a monitoring of the time spent in various locations (as well as the physical presence of workers in those locations). It is the most common type of monitoring, quite present across different occupation types and profiles of workers per digital tool usage.



[22] Of course the two main types (physical monitoring and activity monitoring) are in reality often intertwined and not completely distinct. A software could use physical monitoring to assess whether an activity has been completed (e.g., picking in a warehouse or item delivery).

Figure 15. Main types of digital monitoring of work in the EU

| | Prevalence | Factor 1 (physical) | Factor 2 (activity) | Factor 3 (Time) | Uniqueness |
|---|---|---|---|---|---|
| Monitor time | 37% | 0.050 | 0.015 | 0.761 | 0.418 |
| Monitor computer use | 11% | -0.007 | 0.583 | 0.075 | 0.654 |
| Monitor calls emails | 12% | 0.070 | 0.589 | 0.065 | 0.644 |
| Monitor internet | 14% | 0.070 | 0.607 | 0.107 | 0.614 |
| CCTV | 14% | 0.542 | 0.155 | 0.089 | 0.674 |
| Track card | 36% | 0.052 | 0.085 | 0.720 | 0.471 |
| Tracking sensors | 4% | 0.710 | 0.064 | 0.083 | 0.485 |
| Tracking vehicles | 8% | 0.679 | -0.074 | 0.025 | 0.532 |
| Monitor social media | 7% | 0.022 | 0.448 | -0.099 | 0.789 |
| Other | 2% | 0.404 | 0.225 | -0.065 | 0.781 |
| Variance explained: | | 18% | 11% | 10% | |

| | Factor 1 (physical) | Factor 2 (activity) | Factor 3 (time) | Monitoring intensity |
|---|---|---|---|---|
| Managers | -0.040 | 0.113 | -0.092 | 1.43 |
| Professionals | -0.112 | 0.157 | -0.033 | 1.45 |
| Technicians | -0.014 | 0.085 | 0.008 | 1.50 |
| Clerks | -0.205 | 0.230 | 0.024 | 1.50 |
| Service | 0.052 | -0.100 | -0.027 | 1.39 |
| Trades | 0.208 | -0.366 | 0.073 | 1.35 |
| Operators | 0.533 | -0.195 | 0.184 | 1.80 |
| Elementary | -0.055 | -0.429 | -0.004 | 1.05 |
| No digital tools use | 0.172 | -0.283 | -0.058 | 1.28 |
| Mobile tools use only | 0.055 | -0.175 | 0.005 | 1.34 |
| Computer use only | -0.068 | 0.140 | 0.058 | 1.55 |
| Both -AI | 0.023 | -0.014 | -0.009 | 1.44 |
| Both +AI | -0.070 | 0.099 | -0.020 | 1.44 |

Note: the table above shows the rotated factor loadings of principal components factor analysis of the variables shown in the rows. The table below shows the predicted values for the factor variables indicated and the categories of workers indicated in the rows.
Source: authors' elaborations using AIM-WORK weighted data.

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## 6.3 Prevalence of digital monitoring of work in the EU by sector

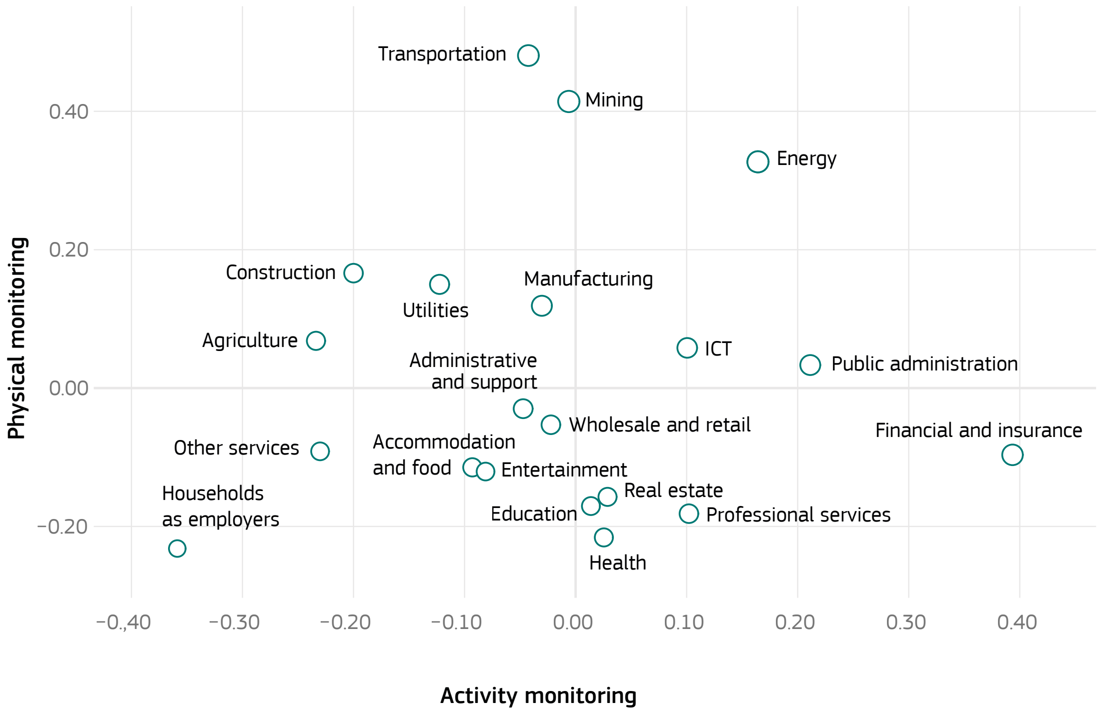
Figure 16 uses the above taxonomy of digital monitoring types in the EU to map the prevalence across sectors of physical and activity monitoring [23], confirming that physical monitoring is a typical feature of industrial activities. That is, it is particularly high in transport, mining, energy, construction, utilities, manufacturing. Conversely, high levels of activity monitoring are observed in sectors with office workplaces. That is, finance, public administration, ICT, professional services. The energy sector stands out as the clearest case of high levels of both types of monitoring.

The figure also allows to identify how different types of monitoring combine in specific sectors. The upper-left quadrant shows sectors with high levels of physical monitoring combined with low levels of activity monitoring. This combination is particularly strong in sectors such as construction, utilities and manufacturing, although the sectors with the highest levels of physical monitoring are transport and mining (both showing average levels of activity monitoring). In the upper-right quadrant the sectors which show high levels of both physical and activity monitoring can be seen. Here, as mentioned above, it is remarkable to note the presence of the energy sector, although also ICT to a lesser extent. Public administration shows high activity monitoring, as could be expected given the centrality of office work in this sector, but average levels of physical monitoring (which can be explained by the presence of a small but significant share of very physical occupations within the public sector, such as policemen or firefighters, who often use sophisticated forms of physical monitoring). Sectors showing a combination of high activity monitoring and low physical monitoring are finance and insurance and professional services, with health, real state and education showcasing average levels of activity monitoring. In the lower-left quadrant, which shows the sectors with low levels of both physical and activity monitoring, we see particularly households as employers (domestic cleaning), as well as accommodation, entertainment and other personal services.

> Physical monitoring is typical of office settings, while activity monitoring is more prevalent in offices.


[23] As indicated above, time monitoring is the most common type of monitoring, and as such is it widely present across all sector of activity.

Figure 16. Digital physical and activity monitoring in the EU by sector




Legend: size of bubbles reflects the intensity of monitoring
Source: authors' elaboration using AIM-WORK weighted data.

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## Box 3.
## Digital monitoring in selected sectors and occupations: some illustrations

Figure 17 Impact by sector and occupation: a selection of examples

| | Factor 1 (physical) | Factor 2 (activity) | Factor (3 time) |
|---|---|---|---|
| **NACE 3 digit examples** | | | |
| 242 Manufacture of tubes, pipes and related | 0.70 | -0.02 | 0.44 |
| 494 Freight transport by road and removal | 1.08 | -0.27 | 0.02 |
| 641 Monetary intermediation | 0.06 | 0.67 | 0.20 |
| 920 Gambling and betting activities | 0.73 | 1.03 | 0.00 |
| **ISCO 4 digit examples** | | | |
| 2422 Policy Administration professionals | 0.12 | 0.64 | 0.04 |
| 4211 Bank Tellers and related clerks | 0.11 | 0.68 | 0.44 |
| 5412 Police Officers | 0.71 | 0.41 | 0.06 |
| 8332 Heavy Truck and lorry drivers | 2.00 | -0.58 | 0.11 |
| Overall mean | 0.00 | 0.00 | 0.00 |

| | Monitoring intensity | Monitor time | Monitor computer use | Monitor call emails | Monitor internet | CCTV |
|---|---|---|---|---|---|---|
| **NACE 3 digit examples** | | | | | | |
| 242 Manufacture of tubes, pipes and related | 2.24 | 45% | 14% | 9% | 14% | 38% |
| 494 Freight transport by road and removal | 1.94 | 47% | 11% | 10% | 11% | 21% |
| 641 Monetary intermediation | 2.15 | 41% | 21% | 31% | 31% | 13% |
| 920 Gambling and betting activities | 2.84 | 43% | 40% | 23% | 43% | 73% |
| **ISCO 4 digit examples** | | | | | | |
| 2422 Policy Administration professionals | 2.06 | 40% | 19% | 30% | 33% | 6% |
| 4211 Bank Tellers and related clerks | 2.40 | 55% | 28% | 27% | 29% | 31% |
| 5412 Police Officers | 2.37 | 43% | 14% | 18% | 33% | 34% |
| 8332 Heavy Truck and lorry drivers | 2.38 | 56% | 10% | 5% | 6% | 25% |
| Overall mean | 0.00 | 37% | 11% | 12% | 14% | 14% |

| | Track card | Tracking sensors | Tracking vehicles | Monitor social media | Other | Number of cases |
|---|---|---|---|---|---|---|
| **NACE 3 digit examples** | | | | | | |
| 242 Manufacture of tubes, pipes and related | 63% | 13% | 15% | 7% | 7% | 100 |
| 494 Freight transport by road and removal | 30% | 21% | 34% | 5% | 5% | 886 |
| 641 Monetary intermediation | 49% | 6% | 8% | 9% | 6% | 683 |
| 920 Gambling and betting activities | 30% | 6% | 13% | 8% | 5% | 128 |
| **ISCO 4 digit examples** | | | | | | |
| 2422 Policy Administration professionals | 39% | 4% | 17% | 11% | 6% | 180 |
| 4211 Bank Tellers and related clerks | 50% | 5% | 4% | 6% | 5% | 131 |
| 5412 Police Officers | 39% | 12% | 26% | 18% | 2% | 240 |
| 8332 Heavy Truck and lorry drivers | 32% | 32% | 60% | 3% | 8% | 606 |
| Overall mean | 36% | 4% | 8% | 7% | 2% | 70316 |

Source: authors' elaboration using AIM-WORK weighted data.

A detailed look at very specific economic sectors and occupations allows a better understanding of how the different forms of monitoring combine in specific work environments:

- The manufacturing of tubes and pipes provides a good example of physical monitoring in industry: we can observe very high (more than twice the average) levels of CCTV, tracking cards, sensors, and vehicles.

- Freight transport is a good example of the very high levels of physical monitoring in transport: one in three workers in this sector uses a digitally tracked vehicle, and one in five uses tracking sensors.

- Monetary intermediation and gambling and betting, on the other hand, are good examples of high levels of activity monitoring typical of some types of services. Gambling and betting are particularly interesting as they are also under very high levels of physical monitoring, in particular CCTV, which is probably related to the sensitive nature of the activity in terms of theft and fraud.

The specific occupational examples also provide good illustrations. Lorry drivers have extremely high levels of physical monitoring (60% of them use tracking systems in their vehicles, and more than 30% tracking sensors). Physical monitoring is also very high for police officers (who also are under intense activity monitoring), whereas policy administration professionals and bank tellers are more than twice as likely to be monitored in their activity than the general working population.

Source: own elaboration

## 6.4 Digital monitoring and working conditions

To conclude this section, a preliminary analysis of the correlation of the different types of monitoring with key working conditions variables points in the direction of a mild negative association of digital monitoring with worker autonomy [24]. Figure 18 illustrates how physical monitoring is strongly linked to working on vehicles, working at nights, working more than 10 hours a day, long working hours and low income. At the same time, activity monitoring is more common for those working from home, with standard schedules and relatively standard (near the average) conditions. Here, however, the same caveat applies as in the previous section: this just an exploratory analysis for the average EU worker and the situation will differ significantly across different sectoral and geographical contexts.

Figure 18. Impact of digital monitoring on working conditions in the EU

| | Factor 1 (physical) | Factor 2 (activity) | Factor (3 time) | Intensity |
|---|---|---|---|---|
| Flexible time | −0.06 | −0.07 | −0.03 | −0.09 |
| Autonomy | −0.04 | −0.04 | −0.04 | −0.07 |
| Can take breaks | −0.04 | −0.02 | −0.04 | −0.05 |
| Communication with peers | 0.02 | −0.01 | −0.02 | 0.00 |
| Communication with boss | 0.03 | 0.00 | −0.01 | 0.01 |
| Reported stress | 0.04 | 0.02 | 0.01 | 0.04 |
| Place of work: employer | −0.19 | 0.06 | 0.02 | −0.05 |
| Place of work: client | −0.04 | −0.09 | 0.00 | −0.07 |
| Place of work: vehicle | −0.21 | −0.10 | 0.00 | 0.05 |
| Place of work: home | −0.13 | 0.10 | −0.02 | −0.02 |
| Works at night | 0.15 | 0.02 | 0.04 | 0.11 |
| Works on Saturday | −0.03 | −0.04 | 0.03 | −0.02 |
| Works more than 10 h a day | 0.07 | −0.05 | 0.02 | 0.02 |
| Income | −0.14 | 0.03 | −0.01 | −0.06 |
| Tenure | −0.03 | 0.03 | 0.00 | 0.00 |
| Working hours | 0.12 | 0.04 | 0.01 | 0.09 |
| Union presence in workplace | −0.01 | 0.05 | 0.03 | 0.04 |

Source: authors' elaboration using AIM-WORK weighted data.

[24] In AIM-WORK worker autonomy is measured in terms of autonomy over order of tasks, method of work, speed or rate of work, in line with the European Working Conditions Survey, while communication refers to both manager and peers.

Box 4.
Self-employed workers and digital monitoring

As mentioned, the main objective of this report is to provide preliminary evidence on digital monitoring, algorithmic management, and the platformisation of work among European employees. Employees account for the majority of the workforce, and their situation is particularly relevant for our analysis given the ways in which digital technologies are currently deployed in standard employment relationships. For this reason, the main analysis of the report focuses exclusively on employees, excluding self-employed workers.

However, this does not imply that similar analysis, when applied to self-employment, lacks relevance. On the contrary, the self-employed (particularly those working through digital platforms) are often at the forefront of algorithmic management and monitoring practices. Many platform workers operate under conditions that blur the line between dependent and independent employment, with algorithms determining access to tasks, evaluating performance, and setting pay, despite the formal absence of an employment relationship. Moreover, the regulatory ambiguity surrounding self-employed workers makes them an essential group for understanding the evolving nature of digital control in the labour market. We therefore provide some initial analysis for self-employed workers, while aware of the fact that further analysis is required.

Table 1 shows the prevalence of ten different forms of digital monitoring across European countries. In relative terms, the table reveals close similarities with the analysis performed for employees, although the share of self-employed workers subject to digital monitoring tend to be considerably lower than in the case of employees.

Overall, time monitoring is the most common practice, with an EU average of 17.8%, and particularly high levels in Germany (30.8%) and France (25.2%). Card-based access systems are also widely used in Finland (20.2%) and Sweden (13.6%), pointing to high rates of physical access control in Nordic countries. Romania, Poland, and Bulgaria stand out for having higher levels of more intrusive forms of monitoring, such as internet surveillance, CCTV, and social media tracking. For example, Romania leads in both internet monitoring (18.3%) and CCTV usage (21.2%). This pattern may reflect weaker data protection enforcement or the legacy of more hierarchical management styles.

In contrast, Western and Northern European countries like Austria, the Netherlands, and Finland tend to report lower levels of most digital monitoring forms, with some exceptions (e.g., the Netherlands shows relatively high PC monitoring at 12.5%). PC monitoring and monitoring of communications (emails and calls) are relatively less common across the board (with a few outliers like France (21% PC monitoring), while, sensor-based tracking and social media monitoring remain limited, though notable in countries like Slovenia, Cyprus, and Spain.

Source: own elaboration

1 2 3 4 5 6 7 8 9 10

Table 1. Digital monitoring of work in the EU (share of self-employed workers who are subject to digital monitoring).

| | Monitor Time | Track Card | Monitor Internet | CCTV | Monitor Calls Emails | Monitor PC use | Track vehicle | Monitor Social Media | Track Sensor | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| Belgium | 17% | 14% | 2% | 9% | 8% | 10% | 3% | 2% | 0% | 0% |
| Bulgaria | 10% | 10% | 16% | 12% | 7% | 6% | 12% | 6% | 10% | 1% |
| Czechia | 14% | 11% | 3% | 10% | 8% | 5% | 7% | 5% | 6% | 4% |
| Denmark | 18% | 13% | 2% | 1% | 6% | 11% | 10% | 9% | 1% | 1% |
| Germany | 31% | 6% | 1% | 0% | 1% | 3% | 7% | 4% | 0% | 0% |
| Estonia | 5% | 1% | 2% | 4% | 0% | 0% | 2% | 2% | 1% | 0% |
| Ireland | 12% | 5% | 4% | 4% | 4% | 1% | 5% | 6% | 4% | 1% |
| Greece | 6% | 6% | 3% | 6% | 1% | 0% | 3% | 2% | 1% | 1% |
| Spain | 14% | 6% | 9% | 2% | 6% | 7% | 1% | 11% | 0% | 0% |
| France | 25% | 3% | 1% | 0% | 4% | 21% | 0% | 2% | 0% | 0% |
| Croatia | 8% | 3% | 3% | 6% | 5% | 3% | 9% | 6% | 6% | 1% |
| Italy | 18% | 4% | 0% | 0% | 2% | 2% | 8% | 0% | 0% | 0% |
| Cyprus | 12% | 11% | 11% | 13% | 9% | 7% | 12% | 9% | 6% | 3% |
| Latvia | 10% | 9% | 6% | 15% | 8% | 5% | 9% | 8% | 5% | 4% |
| Lithuania | 7% | 9% | 1% | 12% | 3% | 2% | 5% | 8% | 6% | 2% |
| Hungary | 3% | 6% | 2% | 2% | 1% | 0% | 3% | 2% | 1% | 0% |
| Malta | 9% | 2% | 2% | 9% | 7% | 4% | 5% | 9% | 4% | 3% |
| Netherlands | 11% | 6% | 6% | 5% | 9% | 13% | 4% | 6% | 0% | 2% |
| Austria | 4% | 3% | 0% | 1% | 3% | 4% | 7% | 3% | 3% | 1% |
| Poland | 17% | 14% | 14% | 19% | 11% | 6% | 8% | 7% | 7% | 3% |
| Portugal | 16% | 11% | 6% | 0% | 6% | 3% | 5% | 11% | 6% | 0% |
| Romania | 13% | 9% | 18% | 21% | 11% | 7% | 12% | 5% | 12% | 2% |
| Slovenia | 14% | 8% | 3% | 3% | 7% | 3% | 8% | 11% | 2% | 2% |
| Slovakia | 16% | 13% | 5% | 11% | 6% | 5% | 9% | 3% | 4% | 3% |
| Finland | 14% | 20% | 1% | 10% | 11% | 9% | 5% | 2% | 0% | 1% |
| Sweden | 4% | 14% | 2% | 1% | 4% | 1% | 9% | 1% | 1% | 0% |
| EU Average | 18% | 7% | 5% | 5% | 5% | 7% | 6% | 5% | 2% | 1% |

Note: Luxembourg was excluded due to the low number of observations
Source: authors´ elaboration based on AIM-WORK weighted data

As for the case of employees, different types of digital monitoring cluster together. Table 2 reports the results of a principal component analysis. As it is for employees, the ten digital monitoring variables cluster into three factors also for self-employed: activity monitoring (including the monitoring of PC, calls, internet, social media and other forms of control), physical monitoring (CCTV, tracking sensors and vehicles) and time monitoring (time monitoring and track cards). This implies that the type of monitoring, more than the employment relationship (employee vs. self-employed), is important in determining the way in which different forms of monitoring tend to cluster. The main difference with the above analysis is that in the case of self-employed the main factor is activity monitoring and not physical monitoring, which in the case of self-employed is the second most important one.

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Table 2. Main types of digital monitoring of work in the EU.

| | Factor1 (Activity) | Factor2 (Physical) | Factor3 (Time) | Uniqueness |
|---|---|---|---|---|
| Monitor Time | 0.043 | −0.050 | 0.602 | 0.633 |
| Monitor Computer use | 0.545 | −0.048 | 0.094 | 0.692 |
| Monitor Calls Emails | 0.423 | 0.074 | 0.364 | 0.683 |
| Monitor Internet | 0.552 | 0.117 | 0.251 | 0.618 |
| CCTV | 0.306 | 0.423 | 0.360 | 0.599 |
| Track card | −0.018 | 0.129 | 0.723 | 0.460 |
| Tracking sensor | 0.092 | 0.747 | 0.122 | 0.418 |
| Tracking vehicle | −0.009 | 0.768 | −0.029 | 0.409 |
| Monitor social media | 0.580 | 0.054 | −0.225 | 0.610 |
| Other | 0.547 | 0.147 | −0.022 | 0.679 |

Source: authors' elaboration based on AIM-WORK weighted data

Table 3 shows that the degree of monitoring intensity increases with the number of digital tools employed at the workplace. This is understandable, as more digital tools enables more forms of digital control. As to the relationship between tools usages and the three factors of digital control mentioned above, it is interesting to focus on the two extremes. Self-employed workers who do not use explicitly digital tools have much lower activity monitoring than the average as expected, but more time monitoring. At the other end of the spectrum, the most digitalised workers (who use mobiles, computers and AI) record relatively high level of both activity and time monitoring, with levels of physical monitoring only slightly below the average. This reinforces the idea that more digitalised working environments are associated to higher monitoring. In between categories offer a more variegated picture.

Table 3. Mean of each factor of digital monitoring by tools categories (self-employed only).

| Tools categories | Factor 1 (Activity) | Factor 2 (Physical) | Factor 3 (Time) | Monitoring Intensity | Share |
|---|---|---|---|---|---|
| Nothing | −0.149 | −0.033 | 0.093 | 0.369 | 5.5% |
| Mobile only | −0.168 | 0.127 | −0.080 | 0.363 | 14.4% |
| Computer only | 0.056 | −0.166 | −0.033 | 0.416 | 14.1% |
| Both -AI | 0.001 | 0.033 | −0.037 | 0.406 | 42.5% |
| Both +AI | 0.099 | −0.026 | 0.107 | 0.546 | 23.5% |

Note: Monitoring intensity is defined as the total number of monitoring types to which each worker is subjected.
Source: authors' elaboration based on AIM-WORK weighted data

Finally, Table 4 presents correlation coefficients between various working conditions and the three factors of digital monitoring intensity. Activity monitoring is positively associated with income (0.128) and working from home (0.120). In other words, higher-income self-employed workers or those in remote roles are more likely to be subject to activity-tracking tools, possibly due to the nature of knowledge-intensive or informational tasks. Conversely, autonomy and the ability to take breaks show slightly negative correlations, indicating that activity monitoring may come at the expense of worker discretion.

1 2 3 4 5 6 7 8 9 10

Physical monitoring shows its strongest positive correlation with working from a vehicle (0.238), which is intuitive given that such roles (e.g., delivery or field services) often involve tools such as GPS tracking. This category links to works such as drivers who, in their job, are highly monitored and directed by digital devices. Physical monitoring is also moderately associated with working long hours (0.102) and working at night (0.112), possibly reflecting closer surveillance in jobs with safety concerns or irregular schedules.

With respect to time monitoring, the results tends to show negative correlations with aspects related to flexibility and autonomy, such as flexible time (-0.076), autonomy (-0.080), and ability to take breaks (-0.049). This pattern suggests that time tracking is more common in rigid or tightly scheduled work environments. Positive but weak correlations with communication with peers (0.044) and working hours (0.038) might indicate that time monitoring coexists with coordinated, time-bound tasks.

Overall, the coefficients are small in magnitude, indicating weak associations, but some interpretable patterns emerge. Activity monitoring is more common in remote and high-income settings; physical monitoring aligns with mobile, lower-wage work while time monitoring appears inversely related to job autonomy.

Table 4. Correlation between digital monitoring and working conditions in the EU (self-employed workers only).

| | Factor 1 (Activity) | Factor 2 (Physical) | Factor 3 (Time) |
|---|---|---|---|
| Flexible time | 0.006 | 0.065 | −0.076 |
| Autonomy | −0.030 | 0.034 | −0.080 |
| Can take breaks | −0.017 | 0.018 | −0.049 |
| Communication with Boss | 0.004 | 0.007 | 0.013 |
| Communication with peers | −0.007 | −0.002 | 0.044 |
| Reported stress level | 0.018 | 0.041 | 0.007 |
| Place of work: client | −0.025 | −0.037 | −0.036 |
| Place of work: vehicle | −0.013 | 0.238 | −0.010 |
| Place of work: home | 0.120 | −0.001 | −0.021 |
| Place of work: public spaces | 0.071 | −0.003 | −0.037 |
| Works at night | 0.081 | 0.112 | 0.025 |
| Works on Sunday | 0.010 | 0.069 | −0.063 |
| Works on Saturday | −0.023 | 0.030 | −0.051 |
| Works more than 10 h a day | 0.000 | 0.102 | −0.007 |
| Income | 0.128 | −0.095 | 0.039 |
| Tenure | −0.025 | 0.004 | −0.042 |
| Working hours | 0.025 | 0.153 | 0.038 |

Source: authors' elaboration based on AIM-WORK weighted data

# 7

# Algorithmic management of work

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# 7 Algorithmic management of work

Having analysed digital tool usage and how data collected through these tools is often mobilised to monitor workers in different ways, this section examines the third pillar of the platformisation of work concept: algorithmic management. As advanced in section 2, algorithmic management usually refers to the use of data-driven technologies, which may include AI, to at least partially automate some aspects of the management and coordination of the workforce, going hand in hand with data collection and, very often, digital monitoring (Bernhardt, et al., 2021; Milanez, et al., 2025). The origins of algorithmic management are closely linked to the advent of the platform economy, where on top of acting as matchmakers between consumers and workers, platforms rely on using digital technologies to capture and analyse worker data, monitor workers, and manage them using algorithms (Rahwan, et al, 2019; Adams-Prassl, et al., 2023; Bernhardt, et al., 2021). As Rahwan, et al. (2021) point out, an algorithm is just a set of instructions for transforming data into an output, however recent advancements in AI have resulted in more complex techniques that enable computer systems to exhibit varying degrees of autonomy and adaptation, including in interactions with humans.

Algorithmic management has increased in recent years and extended to different kinds of work environments, not only in digital labour platforms. Its rapid uptake has been linked to the promise of efficiency and productivity gains, however this proliferation has also raised concern for workers (Milanez, et al., 2025; Adams-Prassl, et al., 2023; Bernhardt, et al., 2021; Rahwan, et al., 2021). While so far fears of widespread unemployment driven by the rise of AI prove to be unfounded, the rise of algorithmic management can have a fundamental impact on the organisation of work, including the potential automation of some traditional management functions, from hiring workers and managing day-to-day operations of the enterprise through to the termination of the employment relationship. There are also concerns about the impact of algorithmic management – including AI – on worker safety and health. Todoli-Signes (2019) classifies occupational risks linked to algorithmic management into six groups: constant monitoring, work intensification, lack of autonomy, bias and discrimination caused by the algorithm, complexity and lack of transparency; and malfunctions and ethical questions.

According to AMPWork data collected from workers, in 2022 algorithmic management was much less common than digital monitoring, although not marginal (Fernández-Macias, et al., 2023). Around one in five workers in Germany, and one in three in Spain, were subject to one or more automated forms of management in 2022. The automated allocation of work was the most widespread form of algorithmic management. More than 10% of German workers and almost 20% of Spanish workers were automatically allocated their shifts or working time via a digital device. A recent OECD employer survey found a very high prevalence of algorithmic management in European countries (an average adoption rate of 79% of firms across France, Italy, Germany and Spain [25]), with the tools mostly used to automate tasks or shift task allocation (Milanez, et al., 2025). However this prevalence data are based on a much broader

> Algorithmic management uses advanced data-driven technologies, including AI and machine learning, to automate workforce coordination, raising efficiency and productivity, but also concerns about working conditions.

[25] The rate of algorithmic management was lower in the four European countries surveyed compared to the United States (with an adoption rate of 90% of firms), yet higher than in Japan (40%). Moreover, the intensity with which algorithmic tools are used (i.e. the number of tools adopted) varied across countries. While more than three-quarters of US firms used ten or more of the 15 tool categories covered in the OECD survey, intensity of use is moderate in Europe (with most firms using 3 to 5 tools), and low in Japan (with most firms using only 1 tool).

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definition of algorithmic management, which refers to companies implementing any of a number of digitally-enabled managerial practices covered in the survey (Milanez, et al., 2025). In contrast, in this report we distinguish digital monitoring and algorithmic management [26], and focus on the accumulation and interaction between the different practices in order to classify workers by level of platformisation, as we will see in the next section.

In the AIM-WORK survey the algorithmic management questions followed the same conceptual approach of its predecessor AMPWork survey, asking respondents whether in their workplace some of the activities that typically are carried out by managers or supervisors are sometimes performed by 'automatic' systems, with little or no human input. In particular, we asked workers whether:

- Their rosters or shift hours are automatically allocated to them via a digital device such as a computer, tablet, smartphone or app
- Their work tasks are automatically allocated to them via a digital device
- The speed or rate at which they must complete tasks at work are automatically determined by a digital device
- They must follow automated instructions or directions from a digital device to complete their work
- They are automatically ranked on a leaderboard or dashboard so that their work can be compared to the work of their colleagues
- They are automatically awarded points, prizes, stars, or similar, for meeting targets or different levels of work performance
- Online customer ratings are used to automatically allocate projects, tasks, work, or shifts to them
- And, finally, whether their shifts could be automatically cancelled or suspended if they do not maintain a minimum performance rating or score.

## 7.1 Prevalence of algorithmic management in the EU

Based on AIM-WORK data, Figure 19 shows the prevalence of these different forms of algorithmic management, both for the EU-27 average and across countries. A key overall finding is that, looking at each of the eight indicators reported in the figure, the prevalence of algorithmic management in the EU is lower than the prevalence of digital monitoring, although it is still quite significant (especially, for some specific practices). By far the most common form of algorithmic management is the automatic allocation of working time (rosters or shifts): around one in four (24%) EU workers are automatically allocated their work schedules via algorithmic systems. The automatic allocation of tasks is also relatively common, with one in five

[26] While this broad definition of algorithmic management is conceptually sound, the definition of algorithmic management as the implementation of one or more out of a very comprehensive list of digitally-enabled monitoring, coordination and control practices in the workplace complicates in our view a nuanced and detailed analysis of a complex reality. This broad definition encompasses very different uses of algorithmic management tools, ranging from companies that simply collect data about working time using digital tools to companies that implement intrusive forms of worker surveillance combined with algorithmic direction and evaluation systems. It is difficult on this basis to analyse country-specific and sector-specific variation as well as to assess the impact of these tools as such an aggregated analysis combines practices with limited consequences for work organisation (and thus benign impacts on working conditions) with others that are very consequential for both work organisation and workers themselves. For these reasons we distinguish between digital monitoring on one hand and algorithmic management (direction and evaluation) on the other, combining all dimensions in the analysis of Platformisation presented in the next section.

EU workers (21%) being subject to it. The other types of algorithmic management are much less frequent: 13% of EU workers are subject to automated systems of reward (automatic assignment of points, prizes or stars), 12% of EU workers are subject to forms of automated benchmarking (e.g. ranks in dashboards), and 10% receive automated instructions for carrying out their work. The automatic cancellation of shifts (7%), the automatic determination of work speed (5%) and the use of online customer ratings (4%) are the least common forms of algorithmic management in the EU now, as reported by workers themselves.

The overall picture of algorithmic management across EU Member States is diverse. It is most frequent in Spain, Poland, Ireland and Romania, where most types of algorithmic management are around or above the EU average. In Poland and Finland, for example, 40% and 35% of workers respectively are automatically assigned their work tasks. Explaining the factors behind these differences is beyond the scope of this report (and will be the focus of subsequent research), but we can speculate that the observed differences are probably the result of a combination of factors such as degree of digitalisation, labour market flexibility, cultural values, and institutional norms.

Focusing on the two most common types of algorithmic management (automatic allocation of working time and work tasks) an additional group of Member States showing above-average prevalence includes Portugal, Luxembourg, Sweden, Finland, Denmark or Austria. In these countries, however, the other forms of algorithmic management show very low prevalence. Overall, the presence of algorithmic management is lowest in Greece, Bulgaria, Hungary and Netherlands, with further exploration required to understand the underlying reasons.

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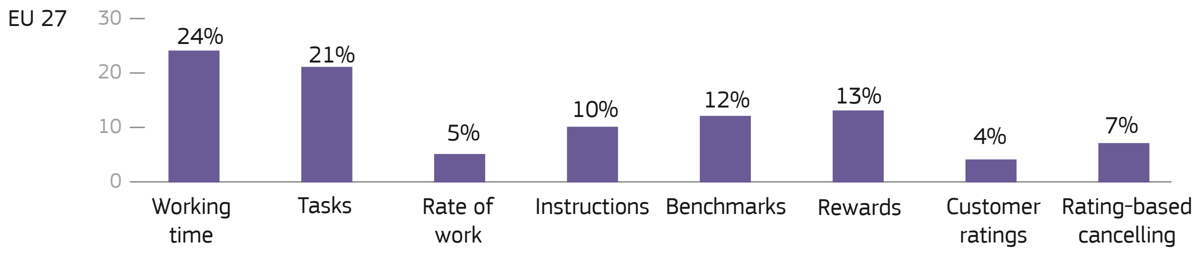
Figure 19. Algorithmic management in the European Union




| | Working time | Tasks | Rate of work | Instruc-tions | Bench-marks | Rewards | Customer ratings | Rating-based cancelling |
|---|---|---|---|---|---|---|---|---|
| Spain | 32% | 30% | 7% | 13% | 12% | 21% | 6% | 16% |
| Poland | 27% | 40% | 12% | 18% | 12% | 10% | 6% | 5% |
| Ireland | 30% | 26% | 6% | 11% | 13% | 17% | 4% | 10% |
| Romania | 23% | 20% | 8% | 16% | 15% | 20% | 7% | 5% |
| Portugal | 23% | 26% | 4% | 9% | 18% | 19% | 5% | 9% |
| Czechia | 21% | 22% | 6% | 12% | 16% | 17% | 5% | 5% |
| Republic of Cyprus | 21% | 18% | 7% | 11% | 12% | 17% | 11% | 5% |
| Malta | 19% | 23% | 9% | 12% | 8% | 16% | 7% | 5% |
| Slovakia | 21% | 21% | 7% | 12% | 10% | 9% | 5% | 13% |
| Luxembourg | 27% | 26% | 3% | 7% | 11% | 12% | 2% | 11% |
| Croatia | 14% | 21% | 5% | 14% | 11% | 14% | 5% | 10% |
| France | 27% | 13% | 6% | 9% | 12% | 13% | 4% | 11% |
| Lithuania | 18% | 16% | 6% | 13% | 12% | 18% | 4% | 6% |
| Belgium | 28% | 19% | 4% | 7% | 10% | 11% | 2% | 11% |
| Latvia | 14% | 17% | 7% | 17% | 11% | 14% | 7% | 4% |
| Sweden | 30% | 23% | 2% | 8% | 10% | 8% | 2% | 5% |
| Finland | 28% | 35% | 2% | 4% | 7% | 8% | 2% | 1% |
| Germany | 23% | 22% | 4% | 7% | 11% | 12% | 3% | 3% |
| Slovenia | 15% | 16% | 6% | 13% | 12% | 17% | 3% | 3% |
| Denmark | 24% | 23% | 3% | 9% | 10% | 8% | 1% | 5% |
| Italy | 20% | 15% | 1% | 8% | 13% | 16% | 3% | 5% |
| Austria | 25% | 23% | 1% | 3% | 13% | 6% | 2% | 2% |
| Estonia | 11% | 13% | 6% | 13% | 9% | 10% | 6% | 3% |
| Netherlands | 21% | 13% | 3% | 6% | 7% | 9% | 2% | 8% |
| Hungary | 18% | 15% | 3% | 5% | 9% | 10% | 3% | 6% |
| Bulgaria | 10% | 7% | 4% | 8% | 9% | 13% | 8% | 8% |
| Greece | 10% | 7% | 2% | 4% | 4% | 7% | 3% | 2% |

Source: authors' elaboration using AIM-WORK weighted data.

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## 7.2 Main types of algorithmic management in the EU

Are there systems or types of algorithmic management which consist of particular combinations of these different practices? Using data from the AMPWork pilot, the predecessor of this AIM-WORK survey, two main types of algorithmic management were identified: algorithmic direction, where the algorithms provide instructions to workers, and algorithmic evaluation, where the algorithms assess the performance of workers (Fernández-Macías, et al., 2023). A principal components factor analysis using the new AIM-WORK data (shown in Figure 20) confirms across all of the EU the presence of the same two main types of algorithmic management:

- Algorithmic direction: this refers to the use of automated systems to allocate working time (shifts or rosters), instructions or directions to workers, and to a lesser extent, work tasks and the pace of work. Algorithmic direction is most common for industrial operators and least common for elementary workers, managers and professionals. It is associated with workers who use only mobile digital tools.
- Algorithmic evaluation: this refers to systems for automatic rewarding and benchmarking of workers, and to assign them tasks according to customer ratings. The automated allocation of work pace based on performance scores and the cancellation of shifts based on performance scores are also associated with this type of algorithmic management. Algorithmic evaluation it is most common for clerical workers, but also quite frequent for industrial operators and service workers. It is mildly associated with the use of computers at work.

Figure 20 also shows an intensity indicator of algorithmic management, which is a simple count of the number of algorithmic management systems to which the respondent is subject.

The highest values are for industrial operators and clerks, although intensity is high for all occupation groups aside from elementary occupations - which can be linked to their lower use of digital tools - and trades.

Undoubtedly, the most intense algorithmic management is observed for workers who use mobile tools only. This suggests that one important way through which algorithmic management practices are being deployed in traditional workplaces resembles the algorithmic management features typical of on-location work mediated through digital labour platforms. These workers are equipped with mobile devices that can (and often are) used to collect data on work performance. This data is then fed into algorithmic systems that automate some management functions (Fernández-Macias, et al., 2025). At the same time, intensity is not particularly high for workers using AI tools. This, of course, is also explained by the type of AI usage captured by the survey (generative AI chatbots proactively used by workers).

> Two main algorithmic management types emerge: algorithmic direction allocating and scheduling work and algorithmic evaluation assessing performance and compliance, with varying intensities.

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Figure 20. Main types of algorithmic management in the EU

| | Prevalence | Factor 1 (direction) | Factor 2 (evaluation) | Uniqueness |
|---|---|---|---|---|
| Working time | 24% | 0.762 | −0.062 | 0.416 |
| Tasks | 21% | 0.423 | 0.111 | **0.809** |
| Rate of work | 5% | 0.350 | 0.387 | 0.728 |
| Instructions | 10% | 0.747 | 0.115 | 0.430 |
| Benchmarks | 12% | 0.064 | 0.555 | 0.688 |
| Rewards | 13% | −0.042 | 0.603 | 0.635 |
| Customer ratings | 4% | 0.102 | 0.569 | 0.666 |
| Rating-based cancelling | 7% | −0.009 | 0.406 | **0.835** |
| Variance explained: | | 21% | 14% | |

| | Factor 1 (direction) | Factor 2 (evaluation) | AM intensity indicator |
|---|---|---|---|
| Managers | −0.116 | 0.017 | 0.90 |
| Professionals | −0.053 | −0.060 | 0.91 |
| Technicians | 0.033 | 0.000 | 0.98 |
| Clerks | 0.111 | 0.235 | **1.14** |
| Service | 0.034 | 0.131 | 1.05 |
| Trades | 0.036 | −0.145 | 0.86 |
| Operators | 0.161 | 0.142 | **1.19** |
| Elementary | −0.107 | −0.272 | 0.69 |
| No digital tools use | −0.403 | −0.071 | 0.54 |
| Mobile tools use only | 1.024 | −0.215 | **1.62** |
| Computer use only | −0.166 | 0.110 | 0.90 |
| Both -AI | −0.137 | 0.029 | 0.87 |
| Both +AI | −0.130 | 0.005 | 0.87 |

Note: the table above shows the rotated factor loadings of principal components factor analysis of the variables shown in the rows. The table below shows the predicted values for the factor variables indicated and the categories of workers indicated in the rows.
Source: authors' elaborations using AIM-WORK weighted data.

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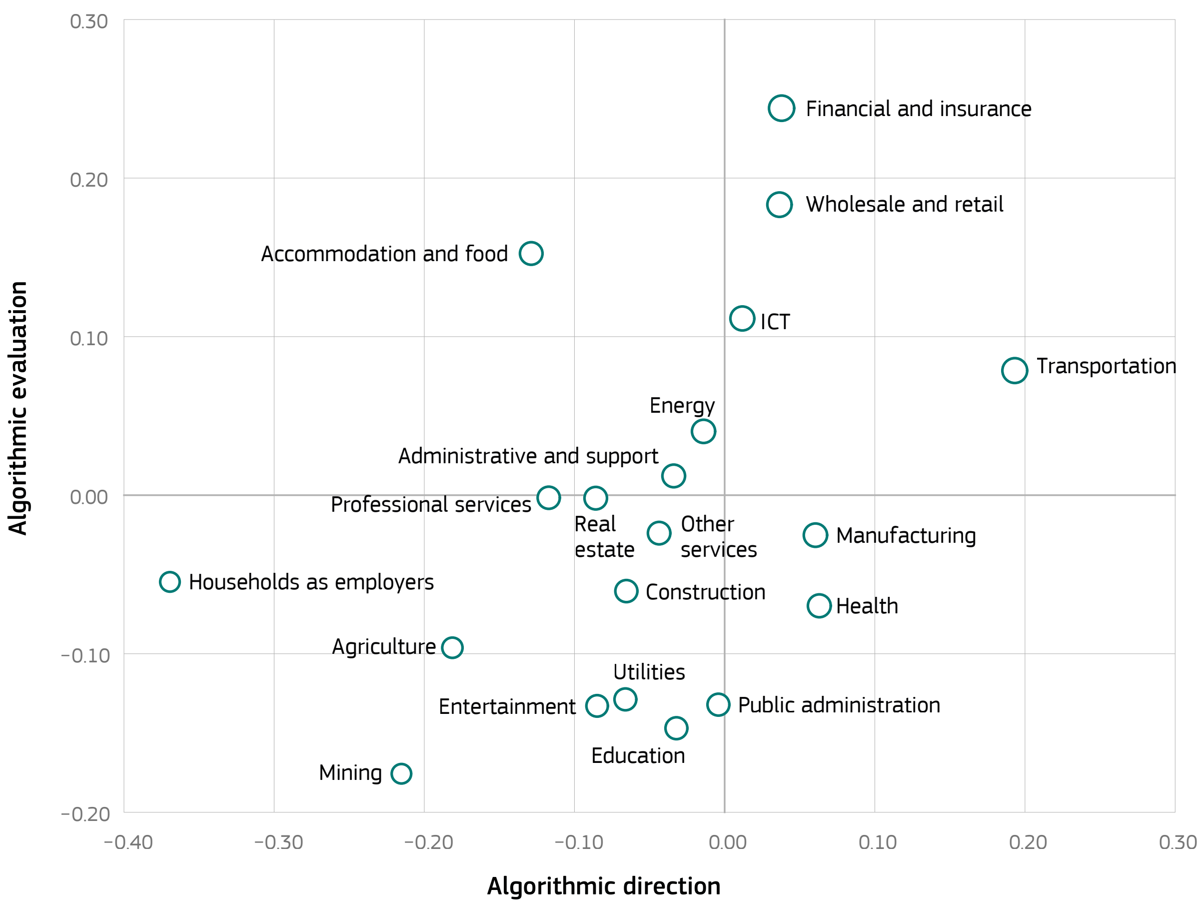
Previous research has shown that algorithmic management practices differ significantly across sectors and institutional contexts (see section 2). Qualitative studies have also shown that the impact of these technologies is quite diverse and sector-specific (see for example Rani, et al., 2024). Figure 21 shows that the sectors with the highest levels of both algorithmic direction and algorithmic evaluation are transport (leaning towards direction) as well as finance, both wholesale and retail trade, and ICT (leaning towards algorithmic evaluation). This is in line with existing literature that documents the use of algorithmic direction and evaluation in these sectors in the European context (Rani, et al., 2024). Accommodation and food is located in the upper-left quadrant with a high level of algorithmic evaluation and low algorithmic direction. The lower-right quadrant is also important as it showcases sectors with a combination of high algorithmic direction and low algorithmic evaluation. Health and manufacturing are prominent in this quadrant. Again, this confirms previous findings from qualitative studies that have shown a significant degree of algorithmic management in both sectors in several European countries (Cirillo, et al., 2022; Rani, et al., 2024, Nilsson et al. 2025). Finally, the lower left quadrant shows the sectors with low prevalence of both forms of algorithmic management. Mining, agriculture, domestic cleaning, but also education, utilities and construction, appear in this quadrant.

Figure 21. Algorithmic management by sector in the EU




Source: authors' elaboration using AIM-WORK weighted data.

## Box 5.
## Algorithmic management in selected sectors and occupations

Figure 22.
Impact by sector and occupation: a selection of examples

| | | Factor 1 direction | Factor 2 evaluation |
|---|---|---|---|
| **NACE 3 digit examples** | | | |
| 264 | Manufacture of consumer electronics | 0,60 | −0,03 |
| 476 | Retail sale of cultural and recreation goods | 0,49 | 0,06 |
| 473 | Retail sale of automotive fuel | −0,02 | 0,58 |
| 822 | Activities of call centres | 0,16 | 0,71 |
| **ISCO 4 digit examples** | | | |
| 3255 | Physiotherapy technicians and assistants | 0,67 | −0,26 |
| 8311 | Locomotive Engine Drivers | 0,75 | 0,19 |
| 4224 | Hotel Receptionists | 0,00 | 1,04 |
| 5244 | Contact Centre Salespersons | 0,37 | 0,86 |
| Overall mean | | 0,00 | 0,00 |

| | | AM intensity indicator | Working time | Tasks | Rate of work | Instructions |
|---|---|---|---|---|---|---|
| **NACE 3 digit examples** | | | | | | |
| 264 | Manufacture of consumer electronics | 1.49 | 54% | 23% | 1% | 22% |
| 476 | Retail sale of cultural and recreation goods | 1.41 | 40% | 23% | 11% | 24% |
| 473 | Retail sale of automotive fuel | 1.26 | 11% | 20% | 6% | 21% |
| 822 | Activities of call centres | 1.55 | 24% | 35% | 15% | 10% |
| **ISCO 4 digit examples** | | | | | | |
| 3255 | Physiotherapy technicians and assistants | 1.39 | 46% | 34% | 0% | 28% |
| 8311 | Locomotive Engine Drivers | 1.79 | 41% | 41% | 21% | 37% |
| 4224 | Hotel Receptionists | 1.44 | 24% | 21% | 20% | 9% |
| 5244 | Contact Centre Salespersons | 1.81 | 30% | 30% | 17% | 22% |
| Overall mean | | 0.95 | 24% | 21% | 5% | 10% |

| | | Bench-marks | Rewards | Customer ratings | Rating based cancelling | Number of cases |
|---|---|---|---|---|---|---|
| **NACE 3 digit examples** | | | | | | |
| 264 | Manufacture of consumer electronics | 30% | 7% | 2% | 9% | 49 |
| 476 | Retail sale of cultural and recreation goods | 4% | 22% | 1% | 16% | 77 |
| 473 | Retail sale of automotive fuel | 23% | 25% | 15% | 5% | 94 |
| 822 | Activities of call centres | 32% | 16% | 16% | 7% | 69 |
| **ISCO 4 digit examples** | | | | | | |
| 3255 | Physiotherapy technicians and assistants | 11% | 10% | 0% | 8% | 44 |
| 8311 | Locomotive Engine Drivers | 34% | 28% | 5% | 20% | 49 |
| 4224 | Hotel Receptionists | 12% | 24% | 37% | 5% | 188 |
| 5244 | Contact Centre Salespersons | 32% | 26% | 16% | 9% | 128 |
| Overall mean | | 12% | 13% | 4% | 7% | 70316 |

Source: authors' elaboration using AIM-WORK weighted data.

As previously done for digital monitoring practices, a detailed look at very specific economic sectors and occupations allows a better understanding of how the different forms of monitoring combine in specific work environments:

- The manufacturing of consumer electronics provides a good example of algorithmic management in an industrial setting, with higher than average automated schedules and instructions, but also automated benchmarking.
- Call centres are often discussed in the specialised literature as examples of the most advanced (and negative) practices in terms of algorithmic management, and the AIM-WORK data confirms this assessment, with higher than average levels of automated allocation of tasks and rates of work, and higher than average levels of automated evaluation in terms of benchmarks or customer ratings.
- The occupations of physiotherapy technicians and locomotive drivers show similarly high levels of algorithmic direction (with automated allocation of working time, tasks and instructions). Locomotive drivers are also subject to some degree of algorithmic evaluation (automated rewards and ratings-based cancelling).
- Finally, hotel receptionists and contact centre salespersons provide good examples of service-sector algorithmic evaluation, with high use of automated benchmarks, rewards and customer ratings.

Source: Source: own elaboration

## 7.3 Algorithmic management and working conditions

The impact on working conditions of algorithmic management is particularly relevant in both research and policy discussions. Previous research, often drawing from studies of platform work or qualitative studies in conventional workplaces, has pointed towards potential impacts such as increased work intensity, diminished worker autonomy, heightened surveillance leading to psychosocial risks like stress and anxiety, and shifts in information asymmetries and industrial relations (Baiocco and Fernández-Macías 2022; Milanez, et al., 2025). However, systematic and broad-based evidence on the actual extent and nature of these impacts across the wider economy is still emerging.

Figure 23 presents an initial analysis of the correlation of the two main types of algorithmic management (i.e. algorithmic direction and algorithmic evaluation) with the main working conditions variables covered in the AIM-WORK survey. As in the case of digital monitoring, the analysis is for the EU as a whole, and therefore, does not take into account the extremely important country- and sector-specific circumstances which will be analysed in future research. For the EU as a whole, all observed associations are very weak, although both types of algorithmic management show a mild negative correlation with flexibility and autonomy at work. Both forms of algorithmic management are positively correlated with long working hours and unsocial schedules (in particular, working at night), and negatively correlated with income and tenure. Algorithmic direction is associated with both working in a vehicle and working at night. This finding is consistent with the high prevalence in transport previously observed, whereas algorithmic evaluation is mildly correlated with working from home.

Overall, as previously found in the AMPWork survey, algorithmic management tends to correlate mildly with negative working conditions, although the analysis conducted so far does not allow establishing any causal links. Indeed, these results should be understood just as an initial exploration, and they need to be confirmed (in subsequent research) by more in-depth analysis that considers the possible confounding effects of sector and occupational composition, as well as big country differences and other factors, which may tend to weaken the observed associations.

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Figure 23. Algorithmic management and working conditions

| | Factor 1 direction | Factor 2 evaluation | AM intensity indicator |
|---|---|---|---|
| Flexible time | −0.03 | −0.01 | −0.03 |
| Autonomy | −0.04 | −0.04 | −0.05 |
| Can take breaks | −0.04 | −0.02 | −0.04 |
| Communication with peers | −0.02 | −0.01 | −0.02 |
| Communication with boss | 0.00 | −0.01 | −0.01 |
| Reported stress | 0.03 | −0.01 | 0.01 |
| Place of work: employer | −0.02 | −0.01 | −0.02 |
| Place of work: client | −0.01 | −0.03 | −0.01 |
| Place of work: vehicle | 0.03 | 0.01 | 0.03 |
| Place of work: home | −0.01 | 0.04 | 0.03 |
| Works at night | 0.07 | 0.04 | 0.07 |
| Works on Saturday | 0.01 | 0.03 | 0.04 |
| Works more than 10 hours a day | 0.01 | −0.01 | 0.00 |
| Income | −0.03 | −0.05 | −0.03 |
| Tenure | −0.01 | −0.02 | −0.02 |
| Working hours | 0.03 | 0.02 | 0.03 |
| Union presence in workplace | 0.03 | 0.00 | 0.02 |

Note: Pearson correlations for an initial exploration.
Source: authors' elaboration using AIM-WORK weighted data.

## 7.4 Main factors behind algorithmic management intensity

Finally, to conclude this section, Figure 24 shows the main factors explaining algorithmic management intensity. Similar to the analysis conducted for AI use, we run a logit regression to examine whether a worker is subject to algorithmic management (binary variable), using a range of explanatory variables: industry, education level, sex, age, occupation, firm size, nationality (national vs. foreign), and use of digital tools.

The explanatory power of the model is relatively low (r2 around 13%), but ceteris paribus, the greatest variability is found in the coefficients associated to country fixed effects The countries that particularly stand out are Spain and Poland, two Member States that are characterised by high levels of labour market segmentation (with a significant segment of temporary and precarious employment). This evidence hints to the fact that cross-country differences in labour market institutions can play an important role in the prevalence of algorithmic management. As could be expected, the use of digital tools at work also plays an important role in explaining the use of algorithmic management. The highest prevalence of algorithmic management is for those using mobile devices only: as previously mentioned, this suggests that the use of mobile devices to coordinate on-location, physical work tasks, is associated with the extension of algorithmic management outside of digital labour platforms. The rest of coefficients associated to other explanatory variables are relatively small or not statistically significant, although it is worth noticing that algorithmic management is positively associated with trade union presence, an interesting result that will be analysed in more detail in future research.

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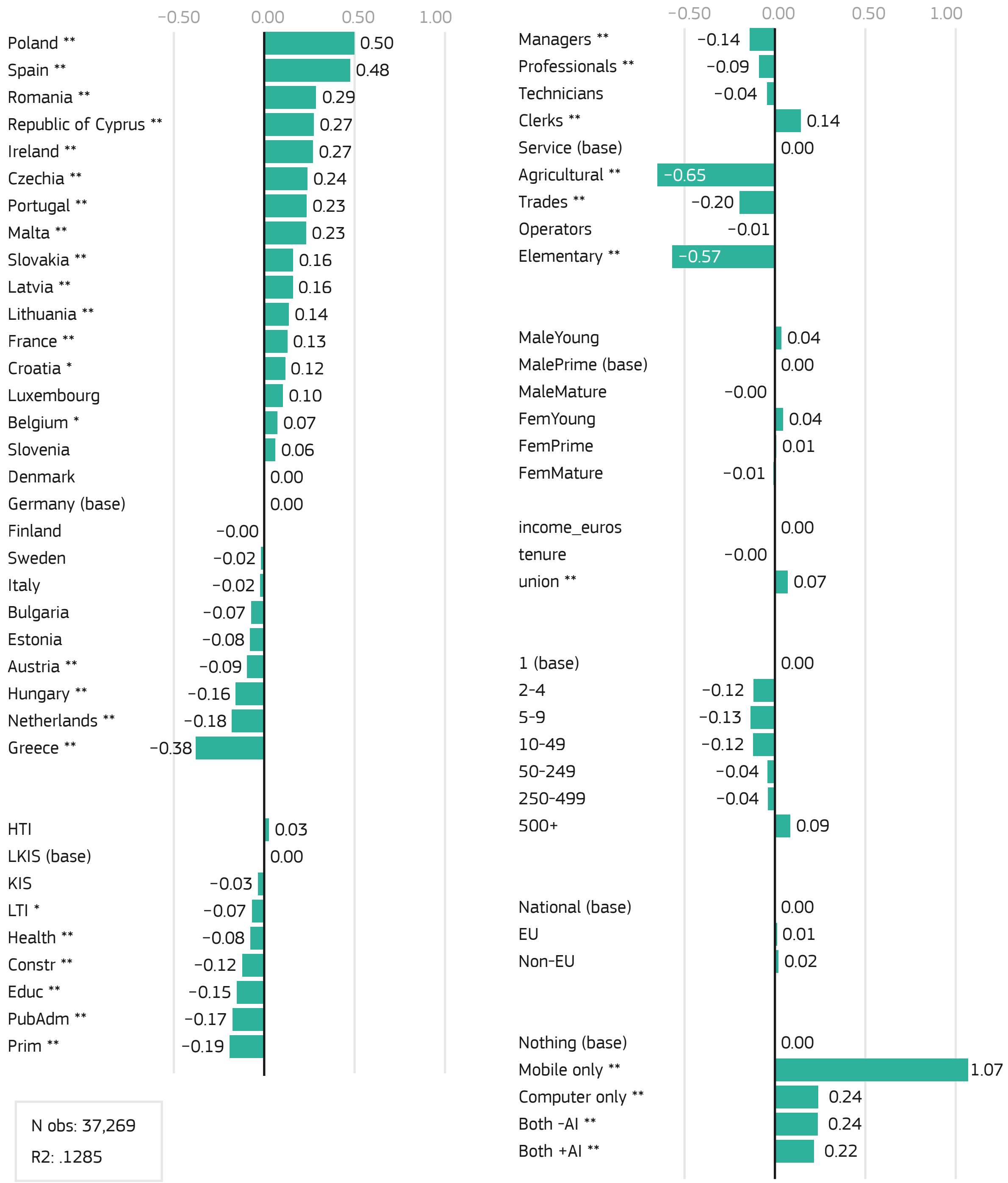
Figure 24.
Main factors explaining algorithmic management intensity




Note: Regression with the simple count of Algorithmic Management systems reported by the worker as dependent variable.
Source: authors' elaboration using AIM-WORK weighted data.

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# The platformisation of regular work

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# 8 The platformisation of regular work

In the previous pages, we have provided an overview of the situation in Europe with respect to three important aspects of the digitisation of work. First, we have presented new data on the diffusion of digital tools at the workplace level: we have seen that the vast majority of workers use some type of digital tool, even in non-office environments; and that more advanced applications such as online communication platforms or AI chatbots are also increasingly used. Second, we have discussed the different types of digital monitoring associated with those tools, differentiating between the monitoring of physical work, the monitoring of digital activity and the monitoring of time at work, categories with distinct sector and occupational profiles and different implications in terms of job quality. Third, we have presented new data on the practices of algorithmic management at work, which is less prevalent than digital monitoring but by no means marginal. We also identified different types of algorithmic management: algorithmic direction (where the worker is automatically fed instructions via digital devices) and algorithmic evaluation (where the work is automatically evaluated with digital tools). Again, these had distinct sectoral and occupational profiles, and different implications for job quality and work organisation.

Each of these three aspects of the digitalisation of work is important and relevant in its own terms, but the three of them have points of connection and overlap which should also be reflected in our analysis. The practices of digital monitoring and algorithmic management are implemented via digital devices; conversely, digital devices are in many cases designed to monitor their environment and can be used to provide algorithmic instructions to their users. Also, the information collected by digital monitoring is in most cases necessary for managerial algorithms to function; and finally, algorithmic management also produces data which can be used to monitor workers. In short, the three phenomena are intertwined and interrelated in many ways.

On this basis, we have therefore proposed our concept of platformisation of work, which encapsulates the idea that the three aspects are interrelated in particular ways and often act in combination. The concept of platform, which applies to all kinds of digitally connected environments, provides a good framework to understand this idea of combination of digitally-enabled practices of labour management. A platform is a connected application embedded in digital devices which allows interactions between users, collecting information on the interacting parties and algorithmically coordinating these interactions. In the specific context of work, a platform is a connected application (embedded in digital devices) which coordinates interactions at work (understood as work activities or tasks) simultaneously collecting information on workers and algorithmically coordinating them. Therefore, we refer to platformisation of work when a platform is connected to digital devices which collect information and algorithmically coordinate and/or govern workers activities.

In this final section, we will try to identify and measure the extent and types of platformisation of regular work in Europe. We will do this in a series of steps. First, we will analyse the associations between the three elements of our concept of platformisation: the use of digital devices at work, the digital monitoring of work and the algorithmic management of work. Then, based on this analysis, we will propose a categorisation of workers according to the extent and type of platformisation of their work. Then, we will describe the distribution of the different categories of platformised workers by country, occupation and sector. Finally, we will briefly explore the implications for job quality and work organisation.

> The platformisation of work links digital tools, monitoring, and algorithmic management, highlighting interconnected practices shaping work in the EU.

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## 8.1 How are digital tools, digital monitoring and algorithmic management interrelated?

Both digital monitoring and algorithmic management are practices that (in principle) must be implemented through digital devices. We saw earlier that the use of digital devices is almost universal across European workplaces (more than 90% of workers use them in one way or another), whereas the practices of digital monitoring and algorithmic management are considerably less common. In other words, there are many workers who use digital tools but are neither digitally monitored nor algorithmically managed. How often are digital tools used for those purposes? And more importantly: how do the different types of digital tools correlate with the different practices of digital monitoring and algorithmic management? Are there specific combinations of tools and practices which tend to appear together?

Figure 25 below shows the pairwise correlations between each of the indicators of digital tools usage and the main types of practices of digital monitoring and algorithmic management, summarised here by the factors obtained in the two principal component analyses carried out in sections 6.2 and 7.2 of this report. As could be expected, different tools are linked to different forms of digital monitoring:

- The digital monitoring of physical work is strongly correlated with wearable devices, and moderately with smartcards, robots and autonomous vehicles. This type of digital monitoring is negatively correlated with office-type digital devices such as computers, and with all the categories of software analysed. On the other hand, the use of mobiles or tablets shows no negative or positive correlation, reflecting the fact that mobiles and tablets are used both in office and physical work environments.
- The monitoring of activity in computing devices is, as could be expected, correlated with use of computers and all the office-type software tools measured in AIM-WORK, including AI.
- The monitoring of working times is only correlated with the use of smartcards. All the other correlations are moderate or nil.
- We have also included an indicator of "monitoring intensity" (a simple count of the number of monitoring practices reported by each worker). Its strongest correlation is with smartcards and wearables, with some moderately high correlation with advanced industrial technologies. This suggests that the most monitored workers are those in advanced industrial settings, and the most commonly used tools for monitoring are smartcards and wearable devices.

With respect to algorithmic management, there are also particular patterns of association between practices and digital technologies:

- Algorithmic direction is positively correlated with the use of mobiles and to a lesser extent wearables, and negatively with the use of computers. This evidence reinforces the idea that algorithmic direction can be strongly associated with the use of mobile devices, commonly used in the transportation and logistics sectors.
- Algorithmic evaluation, on the other hand, does not display such strong positive or negative correlations, but it tends to be positively associated with the use of computers and wearables, and negatively (mildly) with mobiles and tablets.
- Finally, the overall indicator of "algorithmic intensity" shows a clear positive correlation with mobiles and wearables, and negative with computers. There is also a very moderate correlation with advanced industrial technologies. In other words, the most "algorithmically managed" workers are those who use mobile or wearable digital tools, whereas the use of computers and office-type technology is either not associated or negatively associated with it.

These patterns suggest a pairing of practices and technologies around two types of work. On the one hand, digital monitoring and algorithmic direction are similarly linked to mobile and wearable digital devices, as well as advanced industrial technologies, but not to office computing. On the

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other hand, activity monitoring and (to a lesser extent) algorithmic evaluation are similarly linked to office computing devices, and the associated software systems. This suggests two broad categories of practices, one linked to physical occupations in industrial or at least physical work environments, the other linked to information-processing occupations in office environments.

Figure 25. Digital tools, digital monitoring and algorithmic management

| | | Computer | Mobile or tablet | Wearable | Smartcard | Office docs | Office sheets | Comm. platform | AI | Robots | Predictive tech | Autonom. vehicles |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digital monitoring | Physical | −0.046 | 0.005 | 0.187 | 0.066 | −0.047 | −0.044 | −0.062 | −0.064 | 0.076 | 0.052 | 0.085 |
| | Activity | 0.104 | −0.020 | 0.056 | 0.071 | 0.102 | 0.097 | 0.064 | 0.073 | 0.046 | 0.062 | −0.007 |
| | Time | 0.008 | −0.017 | 0.006 | 0.115 | −0.006 | 0.000 | −0.009 | −0.011 | 0.035 | 0.031 | 0.042 |
| | Intensity | 0.043 | −0.019 | 0.130 | 0.143 | 0.034 | 0.036 | −0.002 | 0.001 | 0.087 | 0.082 | 0.067 |
| Algorithmic management | Direction | −0.286 | 0.130 | 0.070 | 0.035 | 0.034 | 0.046 | 0.043 | 0.006 | 0.053 | 0.048 | 0.035 |
| | Evaluation | 0.084 | −0.037 | 0.069 | 0.034 | 0.017 | 0.030 | −0.021 | 0.009 | 0.042 | 0.051 | 0.037 |
| | Intensity | −0.143 | 0.074 | 0.088 | 0.051 | 0.037 | 0.053 | 0.030 | 0.016 | 0.065 | 0.068 | 0.049 |

Source: authors' elaboration using AIM-WORK weighted data.

To probe this idea, we can explore directly the correlations between digital monitoring and algorithmic management practices, as shown in Figure 26. As could be expected, because all of these practices are part of the same underlying process of digitisation and platformisation of work, all of the correlations are positive. They are moderate rather than strong, which is also expected because they are after all different practices (embedded in different tools and requiring different forms of work organisation, etc). The highest associations are between the two intensity indicators, which is very significant in itself, and supports the concept of platformisation: those workers who are subject to more forms of digital monitoring also tend to be subject to more forms of algorithmic management. In other words, these practices tend to appear in combination: this is precisely the implicit hypothesis behind the concept of "platformisation of regular work", which we will operationalise into an empirical classification in the next section.

Figure 26 also shows that the practices are more likely to pair in a particular way, along the lines of what we already observed earlier. Physical monitoring is more correlated with algorithmic direction than with algorithmic evaluation. The difference is not large, but it supports the idea that this pair of practices tends to go together. In fact, the reason why the difference is not large is precisely the fact that all of the practices tend to go together for some workers who are strongly "platformised", as we will discuss later. This "strong platformisation", where all types of practices accumulate, tends to blur the specific pairwise correlations associated with physical and informational platformisation as previously discussed. Similarly, activity monitoring is particularly associated with algorithmic evaluation. Time monitoring, on the other hand, shows the lower levels of correlation with any of the other practices, supporting the idea that this is a type of monitoring which is highly transversal and common and not particularly useful for classifying workers according to the degree of platformisation.

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Figure 26. Correlations between digital monitoring and algorithmic management factors

| | | Digital monitoring | | | |
|---|---|---|---|---|---|
| | | Physical | Activity | Time | Intensity |
| Algorithmic management | Direction | 0.134 | 0.103 | 0.074 | 0.173 |
| | Evaluation | 0.115 | 0.136 | 0.084 | 0.189 |
| | Intensity | 0.162 | 0.165 | 0.114 | 0.248 |

Source: authors' elaboration using AIM-WORK weighted data.

In Figure 27, the horizontal axis represents the degree of physical monitoring (as measured by the factor constructed by principal components in section 6.2), whereas the vertical axis represents algorithmic direction. Each bubble represents a specific sector, with the size of the bubble representing its employment share in the EU as a whole. It is immediately clear that the sectors form a diagonal, reflecting a sector-level correlation between physical monitoring and algorithmic direction. The sector where both practices are more common simultaneously is transportation and storage, followed by manufacturing and ICT. On the other hand, professional services, accommodation, real estate and entertainment have low values for both physical monitoring and algorithmic direction. In the other diagonal, the health sector has relatively high values of algorithmic direction but low values of physical monitoring, whereas the opposite happens in mining, construction, utilities and agriculture. As previously argued, the combination of digital monitoring and algorithmic direction is quite prevalent in transport and industry, sectors where manual/physical work is more common.

In Figure 28, the same sectors are displayed in the space defined by activity monitoring (horizontal axis) and algorithmic evaluation (vertical axis). In this case the sector-level correlation between activity monitoring and algorithmic evaluation is not so strong: the sectors do not form a diagonal line as in the previous case. However, it must be noted that the correlation within sectors is stronger than in Figure 27 across sectors. The sectors of finance, ICT and energy show a combined incidence of activity monitoring and algorithmic evaluation, that we can call "informational platformisation". On the other hand, retail, accommodation and transport have high values of algorithmic evaluation but average values of activity monitoring, whereas public administration has high levels of activity monitoring but low values of algorithmic evaluation. Where this particular combination of practices is less common is in more physical sectors: agriculture, construction, utilities and manufacturing.

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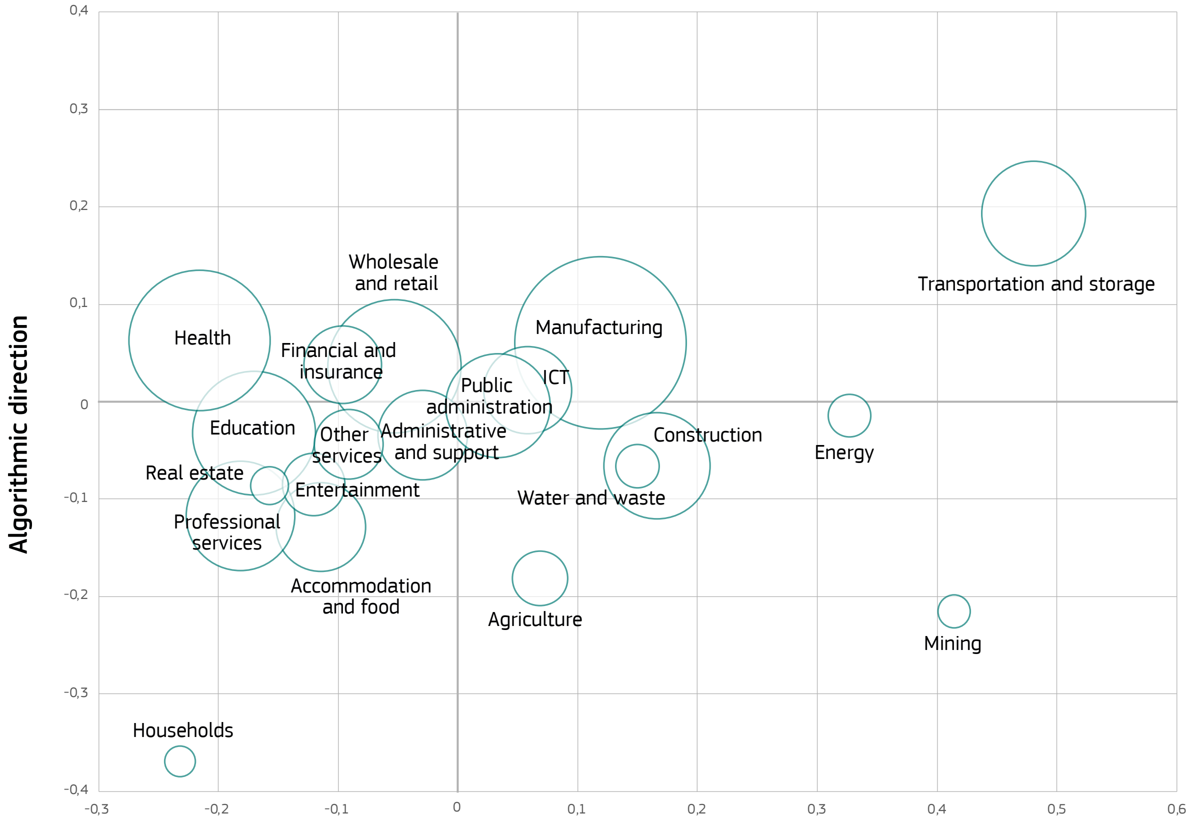
Figure 27. Physical monitoring and algorithmic direction: platformisation of physical work




Note: size of bubbles reflects employment
Source: authors' elaboration using AIM-WORK weighted data.

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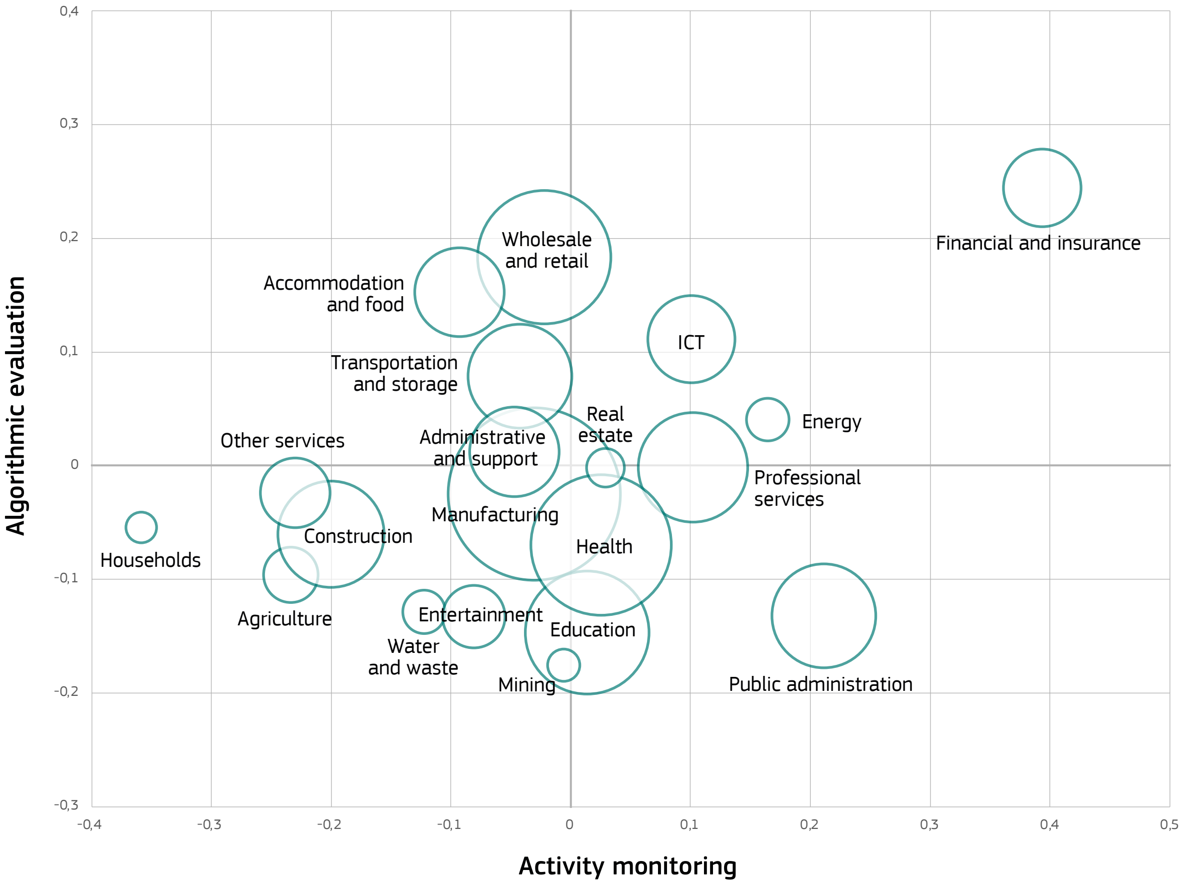
Figure 28. Activity digital monitoring and algorithmic evaluation: platformisation of informational work




Note: size of bubbles reflects employment
Source: authors' elaboration using AIM-WORK weighted data.

## 8.2 Measuring the platformisation of work in the EU: a classification of workers and their working conditions

Having established that, as expected, the use of digital tools and the practices of digital monitoring and algorithmic management tend to overlap and combine in particular ways, it seems justified to try to use the combined information on those three aspects to classify workers by their level of platformisation.

For doing this, we have generated a series of binary variables holding a value of zero if the worker is not subject to a given category of practice, and one otherwise. The categories of practices are four: 1) physical monitoring, which gets a value of 1 if the worker is subject to at least 1 of the four variables measuring the monitoring of his/her physical presence; 2) activity monitoring, with a value of 1 if the worker is subject to one of the four variables measuring the monitoring of his/her activity in computing devices; 3) algorithmic direction, with a value of 1 if the worker is subject to one of the four variables measuring automated allocation of work; 4) algorithmic evaluation, with a value of 1 if the worker is subject to one of the four variables measuring automated benchmarking.

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For this analysis, we will not consider the two variables measuring the digital monitoring of working times: as we saw in previous pages, this type of digital monitoring is so widespread and transversal (uncorrelated) to other practices that it is not as useful to classify workers. What we do consider additionally is whether the worker uses any digital tool at all: those workers not using any digital tool will be in a category on their own separated from the rest in our classification by levels of platformisation (because our definition of platformised work requires the use of digital tools).

The combined values of these different categories are shown in Figure 29. For instance, the first row shows the 6% of workers who use no digital tools at all (and which, therefore, are categorised as a zero in the classification of platformisation: if there are no digital tools, there can be no platform). All the other rows refer to workers who use some digital tools, classified according to the four binary variables related to the different practices of digital monitoring and algorithmic management. Thus, the second row holds the 23% of workers who use digital tools but are not subject to any of those practices; the third row holds the 7% of workers who use digital tools and are only subject to algorithmic evaluation; and so on. The final row in the figure shows the 2% of workers who use digital tools and are simultaneously subject to all four types of practices (in other words, the most "platformised" workers).

Figure 29. Digital monitoring, algorithmic management, platformisation categories and working conditions outcomes

| | | | | | Working conditions variable | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Physical monitoring | Activity monitoring | Algorithmic direction | Algorithmic evaluation | Platformisation category | Stress | Autonomy | Flexibility | Income | Tenure | % employment |
| No digital tools | | | | 0 | −0.146 | −0.123 | −0.302 | −0.628 | −0.212 | 6.13 |
| 0 | 0 | 0 | 0 | 1 | −0.007 | 0.080 | 0.125 | 0.074 | 0.010 | 23.08 |
| 0 | 0 | 0 | 1 | 1 or 2 | −0.022 | −0.018 | 0.045 | 0.115 | 0.022 | 7.17 |
| 0 | 0 | 1 | 0 | 1 or 2 | 0.027 | 0.044 | 0.099 | 0.038 | 0.008 | 14.78 |
| 0 | 0 | 1 | 0 | 1 or 2 | 0.010 | −0.002 | −0.006 | 0.233 | 0.079 | 8.75 |
| 0 | 1 | 0 | 0 | 1 or 2 | −0.007 | 0.030 | −0.158 | −0.349 | −0.031 | 4.83 |
| 0 | 1 | 0 | 1 | 2 | −0.082 | −0.006 | −0.085 | −0.199 | −0.113 | 1.37 |
| 0 | 1 | 1 | 0 | 2 | 0.021 | −0.048 | −0.036 | 0.270 | 0.060 | 6.84 |
| 0 | 1 | 1 | 1 | 2 | −0.016 | −0.007 | 0.109 | 0.060 | 0.029 | 5.93 |
| 1 | 0 | 0 | 0 | 2 | 0.099 | −0.072 | −0.242 | −0.253 | −0.013 | 2.72 |
| 0 | 1 | 0 | 1 | 3 | −0.099 | 0.019 | 0.016 | 0.231 | 0.072 | 4.01 |
| 0 | 1 | 1 | 1 | 3 | −0.083 | −0.041 | −0.065 | 0.157 | 0.036 | 3.88 |
| 1 | 1 | 0 | 1 | 3 | 0.046 | −0.063 | −0.207 | −0.163 | 0.010 | 1.18 |
| 1 | 0 | 1 | 0 | 4 | 0.118 | −0.005 | −0.074 | −0.248 | −0.051 | 3.17 |
| 1 | 0 | 1 | 1 | 4 | 0.001 | −0.122 | −0.117 | −0.262 | −0.069 | 1.53 |
| 1 | 1 | 1 | 0 | 4 | 0.154 | −0.093 | −0.144 | −0.163 | 0.017 | 2.45 |
| 1 | 1 | 1 | 1 | 5 | 0.208 | −0.265 | −0.201 | −0.440 | −0.157 | 2.18 |

Source: authors' elaboration using AIM-WORK weighted data.

The column "Platformisation category" shows the allocation of the different combinations to each category. Category zero (not digitised) corresponds to those who use no digital tools at all. Category 1 (digitised but not platformised) corresponds to those that use digital tools but are subject at most to one of the practices. Category 2 (digitised but only partly platformised) corresponds to workers who are subject to more than one type of practice, but not to the extent of being "platformised" by falling into the specific combinations corresponding to categories 3, 4 and 5. Category 3 corresponds to workers who are simultaneously subject to activity monitoring and algorithmic evaluation: this is the category of "informational" or "office work" platformisation that we already discussed in the previous section. Category 4 corresponds to workers who are simultaneously subject to physical monitoring and algorithmic direction: this is the category of "physical" or "manual work" platformisation which we already discussed in the previous section. And finally, category 5 corresponds to workers who are subject simultaneously to all the practices shown: we call this category "full" or "strong" platformisation.

On the basis of our analysis, Box 6 proposes six categories of workers by level of platformisation, indicating the share of employment for the EU as a whole that they represent.

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Box 6.
EU workers by level of platformisation of work

1. No use of digital tools and no platformisation: this category includes all those workers who use no digital tools at work and are not subject to either algorithmic management, or digital monitoring. 6% of EU workers fall under this category.

2. Use of digital tools but no platformisation: this category includes those workers who use digital tools, but which are not under digital monitoring or algorithmic management systems. 33% of EU workers are in this category.

3. Partial platformisation: this category includes those workers who use digital tools and are under mild forms of digital monitoring and algorithmic management, meaning that they are subject to at least one form of digital monitoring and one form of algorithmic management. This is the largest category of all, as 42% of EU workers are classified here.

4. Informational platformisation: in line with the analysis shown above, this category is a specific type of partial platformisation that, however, deserves to be characterised separately as it specifically features simultaneously digital activity monitoring and algorithmic evaluation and is typical of office work. 9% of EU workers are subject to this type of platformisation.

5. Physical platformisation would also be a specific type of partial platformisation that deserves to stand out as a separate category. This includes workers who are simultaneously subject to digital physical monitoring and algorithmic direction, a category typical of industrial activities under which 7% of EU workers can be classified.

6. Full platformisation: this category includes those workers who use digital tools and are under strong forms of both digital monitoring and algorithmic management, meaning that they are simultaneously under all the four main types of digital monitoring and algorithmic management. 2% of EU workers are fully platformised according to AIM-WORK data (considering that the EU27 has around 200 million workers, this would correspond to three or four million workers overall).

Source: own elaboration

As a general comment on this overall prevalence, we can say that we are referring to a phenomenon that is small but not marginal. The much more common but partial categories of "physical" and "informational" platformisation have a scale which is three or four times larger, standing around 7-9% of overall employment, respectively. Given that "physical platformisation", in particular, seems to imply similar conditions to full platformisation, it requires particular attention whereas "informational platformisation" seems like a more common, but in principle less consequential phenomenon in terms of working conditions, as we will see in the next sections.

To assess the consistency of these categories, Figure 29 shows the normalised (Z) values of five outcome variables measuring different employment and working conditions: stress, autonomy, flexibility, labour income and tenure. A quick visual inspection of the values of these variables for the different combinations of practices should allow a simple assessment of their consistency, with the implicit assumption that *similar combinations should produce more*

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*or less similar outcomes*. And the results shown confirm the consistency of the classification according to this approach. In most cases, the different categories are systematically associated with different outcomes. Importantly, the highest values of stress, and the lowest values of autonomy and flexibility tend to be associated with categories 5 (full platformisation) and 4 (physical platformisation).

The two extremes of the table are similar and different in peculiar ways. Workers who use no digital tools at all have also low values of autonomy, flexibility, income (the lowest of the table) and tenure (also the lowest): these values are surprisingly similar to those at the other extreme of the table, the fully platformised workers. But with respect to stress, the non-digitised and the fully platformised are in the complete opposite extremes, with the lowest and highest values respectively.

As could be expected, the most heterogeneous categories are 1 and 2 (digitised but not platformised or partly platformised), although they tend to be close to the overall average in most cases (as the outcome variables are Z-normalised, the average values are represented as zeroes). There are two peculiar combinations which stand out from the rest because of a higher wage than expected: both are cases of activity monitoring (one alone, the other combined with algorithmic direction). Activity monitoring, on its own or in combination, seems to be often associated with higher wages (as can be also seen by the relatively high wage levels of category 4, the "informational platformised").

Clearly, the patterns of Figure 29 show that the worse outcomes in terms of working conditions are associated with the "fully platformised" and the "physical platformised" categories. Both look roughly similar, with high levels of stress, low autonomy and time flexibility, low pay and low tenure on average. Then, the category of "informational platformised" looks in fact either around the average or even better than average in terms of outcomes (in particular, in terms of wages and tenure).

The intermediate categories of "digitised but not platformised" and "partly platformised" look slightly more heterogeneous than the rest (to be expected, since they have been constructed as residuals from the other categories), but they tend to be around the average in general terms (with the two exceptions previously explained). Finally, the residual category of those using no digital tools at all tends to have worse outcomes than the rest except for stress at work: this can be probably be explained by the fact that this category holds less technologically advanced forms of work, and paradoxically technical sophistication is associated with better conditions in terms of employment and work, but also with more intensity and stress.

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## Box 7. Algorithmic management and platformisation for self-employed workers

In principle, the self-employed manage themselves. Therefore, the meaning of algorithmic management in this case should be rather different from the employees which are analysed in the main body of this report. For instance, it may be that self-employed workers use algorithms to manage their activity more efficiently: this would be a purely voluntary and self-directed use of managerial algorithms, which is obviously rather different from algorithms used by third parties and presumably imposed to the worker from above. But it can also be that some self-employed workers are subject to systems of algorithmic management imposed by their clients: this is a very different possibility which is much closer to the situation of an employee being subject to managerial algorithms, and which may in fact conceal a situation of de facto dependent employment (masked under an apparently independent relationship). This is, in fact, very close to the situation of many independent contractors and freelancers working for digital labour platforms according to previous research, which has argued that in many cases platform workers should be considered as dependent employees (Urzi Brancati et al. 2020). In this box, we will explore the levels of algorithmic management and platformisation of self-employed workers according to the AIM-WORK data.

First, in Table 5 we compare the share of workers (employees and self-employed) who are subjected to different forms of algorithmic management. For both categories, time and task allocation are the two most common, where approximately 20-24% have answered positively to these forms of management. Although the prevalence of algorithmic management is generally lower for the self-employed, the magnitude is surprisingly similar.

Table 5. Prevalence of different forms of algorithmic management (share of workers who answered positively).

| | Self- Employed | Employees |
|---|---|---|
| Time allocation | 20% | 24% |
| Task allocation | 18% | 21% |
| Speed allocation | 4% | 5% |
| Direction allocations | 7% | 10% |
| Ranking | 9% | 12% |
| Points & prizes | 10% | 13% |
| Customer ratings | 5% | 4% |
| Shift allocation | 6% | 7% |

Source: authors' elaboration based on AIM-WORK weighted data

As with employees, the eight indicators of algorithmic management tend to cluster similarly into algorithmic direction and evaluation (analysis not reported). In Table 6 we correlate these dimensions with the three factors of digital monitoring (i.e. physical, activity and time monitoring). In line with the expectations, digital monitoring and algorithmic management are correlated. Higher coefficients are recorded for algorithmic direction (especially with time monitoring), rather than algorithmic evaluation. These values are similar in magnitude than they are for employees. This aspect evidences the importance of algorithmic management also for self-employed workers. Even though we cannot reject the possibility that these algorithmic tools are freely used by some self-employed workers to organise themselves more efficiently, it seems plausible that these figures reveal a surprisingly high level of dependency of self-employed workers on external forms of control, in this case implemented through digital devices. Further research is needed to disentangle these aspects and characterise the modalities in in which algorithmic management operates in the context of self-employed workers.

Table 6. Correlations between digital monitoring and algorithmic management factors (self-employed workers only).

| | Digital monitoring | | | |
|---|---|---|---|---|
| Algorithmic Management type | Physical | Activity | Time | Intensity |
| Direction | 0.085 | 0.099 | 0.119 | 0.143 |
| Evaluation | 0.053 | 0.093 | 0.057 | 0.143 |
| Intensity | 0.125 | 0.137 | 0.122 | 0.263 |

Source: authors' elaboration based on AIM-WORK weighted data

As discussed in the main body of the text, a central concept is the introduction of the idea that workers can be platformised even if they do not actively work for platforms. We have determined the degree of platformisation by the combination of using digital tools, and being subject to digital monitoring and algorithmic management. Table 7 shows how the level of platformisation of self-employed workers (constructed in a similar way as the classification for employees discussed in the main body of this report) is correlated with some indicators of working conditions. First, the share of not platformised is much higher for self-employed than for employees (56% vs. 33%), but on the other hand the share of fully platformised is much larger (4.4% compared to 2% for employees), as well as the share of manual platformised (10% compared to 7%). The high prevalence of these platformisation categories suggests that some of these self-employed workers may be in quasi-dependent relations with their clients or other intermediaries, in a situation similar to that of platform workers (or indeed, identical: many of these workers may in fact be platform workers even if they do not consider themselves so).

The relationship with working condition variables follows a similar pattern as for employees. Manual and full platformised workers tend to have higher level of stress and lower level of autonomy.

Table 7. Digital monitoring, algorithmic management, platformisation categories and working conditions outcomes (self-employed workers only)

| Platformisation category | Stress | Autonomy | Flexibility | Income | Tenure | % of Self-employed workers |
|---|---|---|---|---|---|---|
| 0. No digital tools | -0.11 | -0.09 | -0.14 | -0.60 | 0.09 | 5.4 |
| 1. Digital tools, no platformisation | 0.01 | 0.11 | 0.10 | 0.01 | 0.03 | 56.0 |
| 2. Partial platformisation | -0.06 | -0.19 | -0.17 | 0.07 | -0.10 | 17.9 |
| 3. Informational platformisation | -0.16 | -0.08 | -0.09 | 0.14 | -0.12 | 6.4 |
| 4. Physical platformisation | 0.15 | -0.15 | -0.15 | 0.07 | 0.02 | 9.8 |
| 5. Full platformisation | 0.19 | -0.03 | 0.00 | -0.03 | 0.00 | 4.4 |

Source: authors' elaboration based on AIM-WORK weighted data

Source: own elaboration

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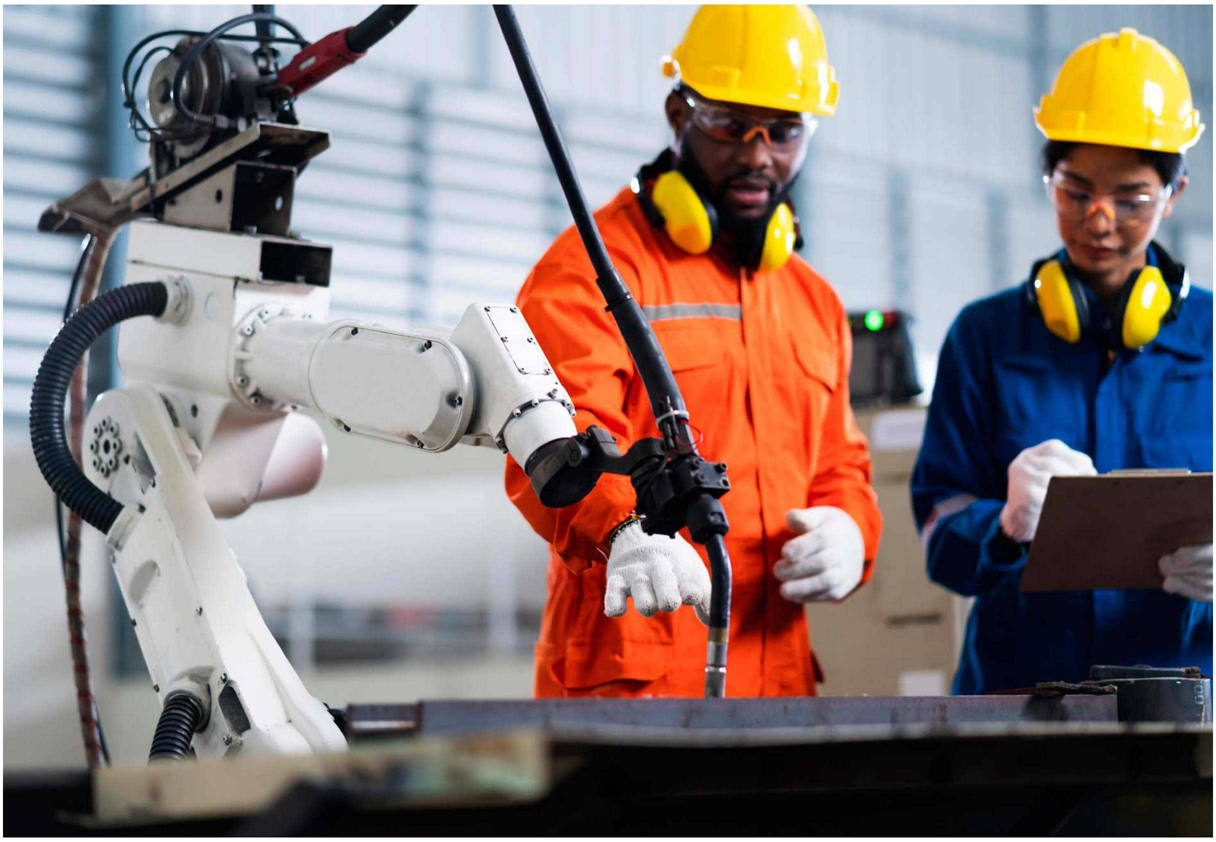
## 8.3 The prevalence of platformisation of work across the EU

Now that we have classified workers by the level and type of platformisation of their work, we can proceed to discuss the prevalence of this phenomenon across Europe, and its distribution by occupation and sector. Estimates by country of the different categories of platformisation are shown in Figure 30. The figure shows a very clear geographic pattern: the platformisation of work is high in most Central and Eastern Member States, and low in Continental and Northern Europe. There is a clear and strong divide. Only some Southern-Western European Member States (particularly Spain, Portugal, France, Belgium and Ireland) have intermediate values of platformisation, although in these countries the share of employment in fully platformised or physical platformised work is rather low, so that they are only high in overall platformisation because of a relatively high share of the more benign "informational platformisation".

In contrast, most Central and Eastern European Member States (with the partial exceptions of Hungary and Slovenia) have high percentages of workers in "full platformisation" (between 5 and 10% in many cases, which is three to five times larger than the EU average), as well as high percentages of workers in "physical platformisation" (in many cases above 10%: in the case of Poland, it goes beyond 20%) [27]. In contrast, the category of "partial platformisation", also shown in the figure, does not conform to any obvious geographic pattern.



[27] As could be expected (and we will show in the following chart), physical platformisation is strongly linked to the prevalence of manufacturing, which is generally higher in Eastern Europe. However, this would imply that physical platformisation should be also high in Germany, which is not the case. A possible explanation would be the mediating role of labour market institutions in shaping the impact of technology at work. Qualitative studies (see for example, De Stefano and Taes; 2022; Doellgast and Kämpf, 2023/24; Doellgast, et al., 2024; Wotschack, et al., 2024) show that in the case of Germany, work councils have played a key role in limiting the scope of digital monitoring and algorithmic management in the workplace. This may help explain the lower prevalence physical platformisation in Germany, which as seen above has negative implications in terms of working conditions.

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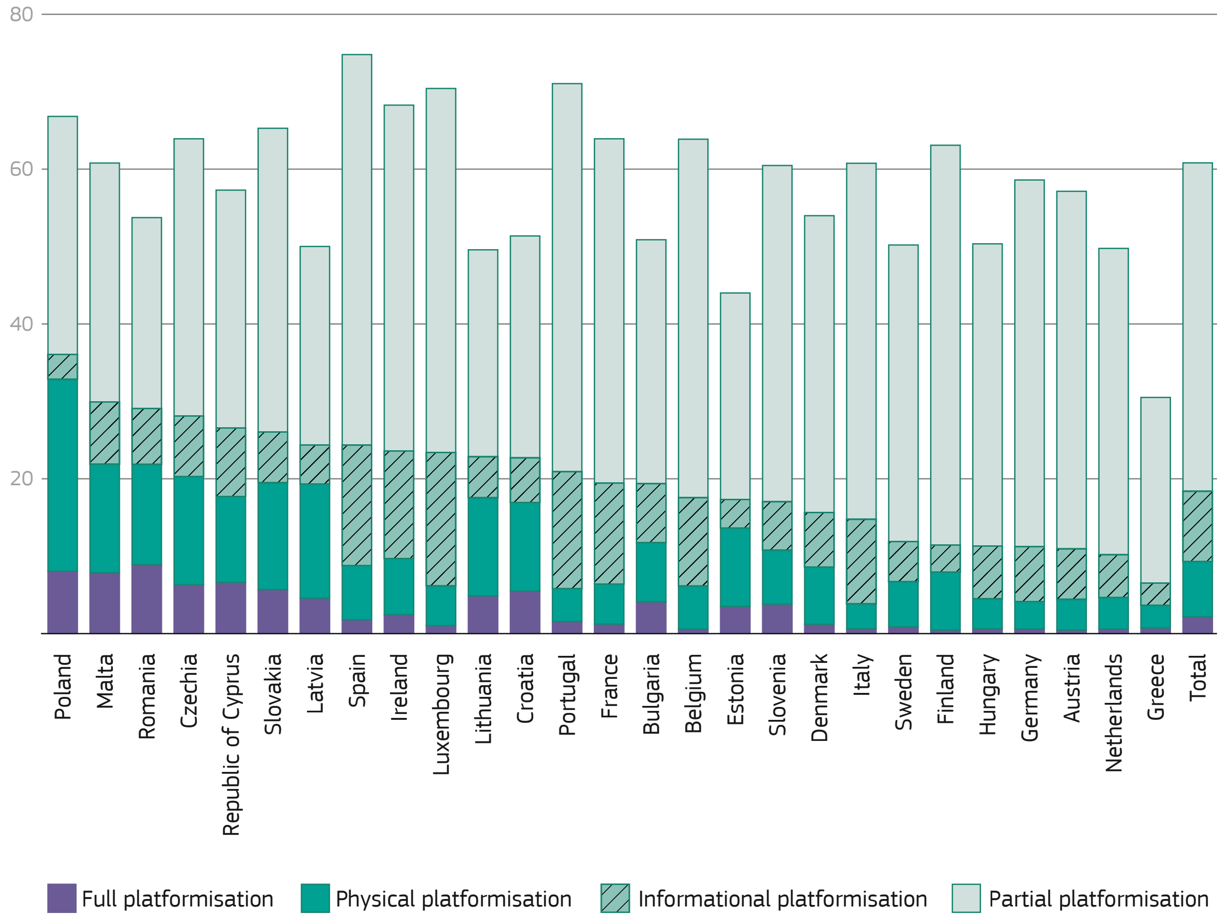
Figure 30. Prevalence of platformisation of work by country

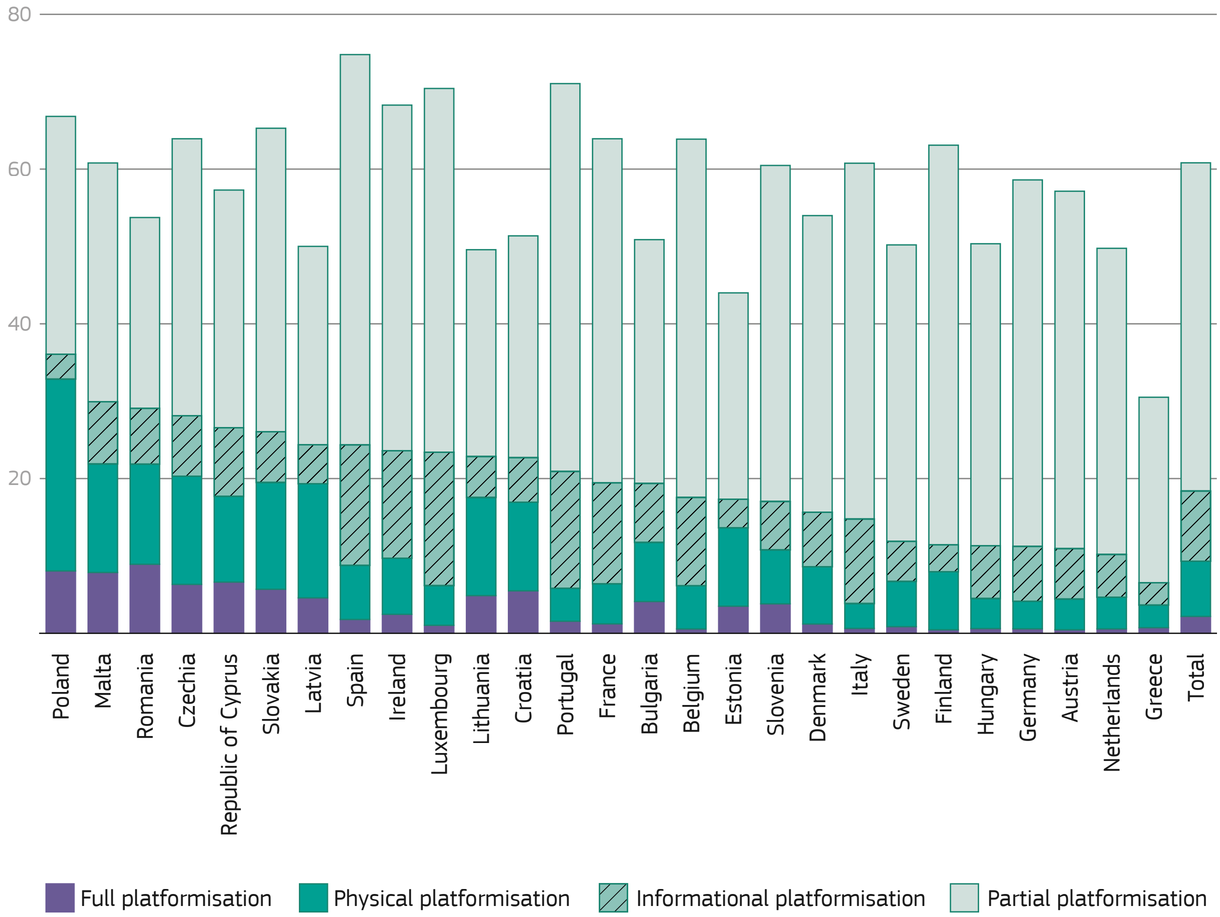



Note: countries sorted by the sum of the three platformised categories
Source: authors' elaboration using AIM-WORK weighted data.

Figure 31 complements this analysis of the prevalence of the different categories of platformisation, showing the values for occupations and sectors (at 1 digit). By occupation, we can see that platformisation is stronger for mid-level positions: industrial operators and drivers have the highest levels of platformisation overall, followed by clerks. But as could be expected, the type of platformisation is different in both cases: whereas operators are comparatively high in terms of physical and full platformisation, clerks are only high in terms of informational platformisation. The following three categories are managers and technicians. The case of managers is very peculiar and may be misleading because the classification is constructed on the basis of the presence of digitally enabled managerial practices: it is not entirely clear whether in the case of managers, these practices apply to their own work or to the work of others (see box 7 for a specific analysis of platformisation for self-employed workers).

In the case of technicians, it is the category with a more balanced prevalence of both physical and informational platformisation, which may reflect the fact that their work is simultaneously manual and cognitive in many cases. Finally, it should be noted that service and trades workers, which do not stand out in the overall picture because they have very low values of full and informational platformisation, have relatively high levels of physical platformisation (just below the values for operators). We can, in fact, say that except for elementary and agricultural workers, all other occupational categories have overall levels of platformisation around 20%, with occupational differences mostly concerning the type of platformisation which is more relevant in each case.

Figure 31. Prevalence of platformisation by occupation and sector in the EU




Note: occupation and sector sorted by the sum of the three platformised categories. Knowledge Intensive Services (KIS) encompass a broad range of activities including media, IT, consulting, advertising, financial, legal services and accounting. Less Knowledge Intensive Services includes activities such as wholesale and retail trade, repair of motor vehicles, land transport, warehousing, rental and leasing, real estate, travel agencies, etc. High Technology Industries (HTI) include the manufacturing of cars, chemicals, pharmaceuticals, electrical equipment, computers, machinery and others. Low Tecnhology Industries (LTI) includes, among many others, the manufacturing of food products, beverages, textiles, wearing apparel, paper and paper products, furniture, etc.
Source: authors' elaboration using AIM-WORK weighted data.

By sector, there are also visible patterns and differences, although not as salient as for occupation. Again, we see the biggest differences in the type of platformisation rather than in its overall prevalence. Transport, high tech industries and utilities have very high levels of physical platformisation and moderately high levels of full platformisation. On the other hand, finance and professional services have the highest levels of informational platformisation (finance also has very high values of full platformisation, which is remarkable given that this tends to go together with physical platformisation instead in other cases). There are several sectors with high values for both: public administration, ICT and water and sewage are all sectors with relatively high shares of informational and physical platformisation. The reasons are sector-specific. In the case of the public sector, the high share of "physical platformisation" is because of the high percentage of workers in security-related public services (policemen, firefighters, etc), which tend to have higher-than- average levels of physical monitoring and algorithmic direction. In the case of ICT, its dual nature as a technical but also cognitive activity, and the fact that it is more digitised than other sectors, are factors that likely explain its high share of both physical and informational platformisation. On the other extreme of the chart, sectors such as household cleaning, health, HORECA and construction all have relatively low levels of platformisation, reflecting both the type of work they involve (some of them involve a high degree of social interaction, others highly unstructured and non-standardised work processes) and, in some cases, their relatively low levels of digitisation in general (which as we have repeatedly explained, is a precondition for platformisation).

## 8.4 A more thorough look at platformisation and working conditions

Finally, we will close this section with a more detailed analysis of the associations between the different categories of platformisation and working conditions. In a previous section (8.1), we already explored this issue when we tried to assess whether the combinations of practices produced consistent outcomes. In this section, we will focus directly on the outcomes associated with each of the platformisation categories, extending the range of issues analysed from just 5 to 17, and complementing it with a small econometric exercise to assess whether the observed outcomes could be related to the composition of platformised jobs in terms of sector, occupation and other factors, or to the platformisation itself.

Figure 32 presents the analysis of 17 z-normalised variables measuring different conditions of work and work organisation, for each of the six groups of workers defined by the level of platformisation (from “not digitised” to “fully platformised”). As in previous cases, the z-normalisation means that the results for a given group of workers can be interpreted as distance to the overall mean in standard deviations. For instance, the value of -0.3 for “non-digitised” workers for “flexible time” means that the extent of flexible time of “non-digitised” workers is 0.3 standard deviations below the mean. A value of 0.3 is moderate-low for a z-normalised variable. For reference, 68% of data falls within +/- 1 standard deviations of the mean in a variable which follows a normal distribution.

Most of the values shown in Figure 32 are moderate or low, meaning that in this simple approximation the differences in outcomes between the different categories of platformisation are not large. However, they are noticeable and, in most cases, statistically significant. And perhaps most importantly, they are consistent across the classification and across the different outcome variables.

> “Full platformisation and physical platformisation are associated with negative working conditions, particularly increased stress and diminished autonomy and flexibility, whereas other forms of partial platformisation do not seem to have significant negative implications'.”

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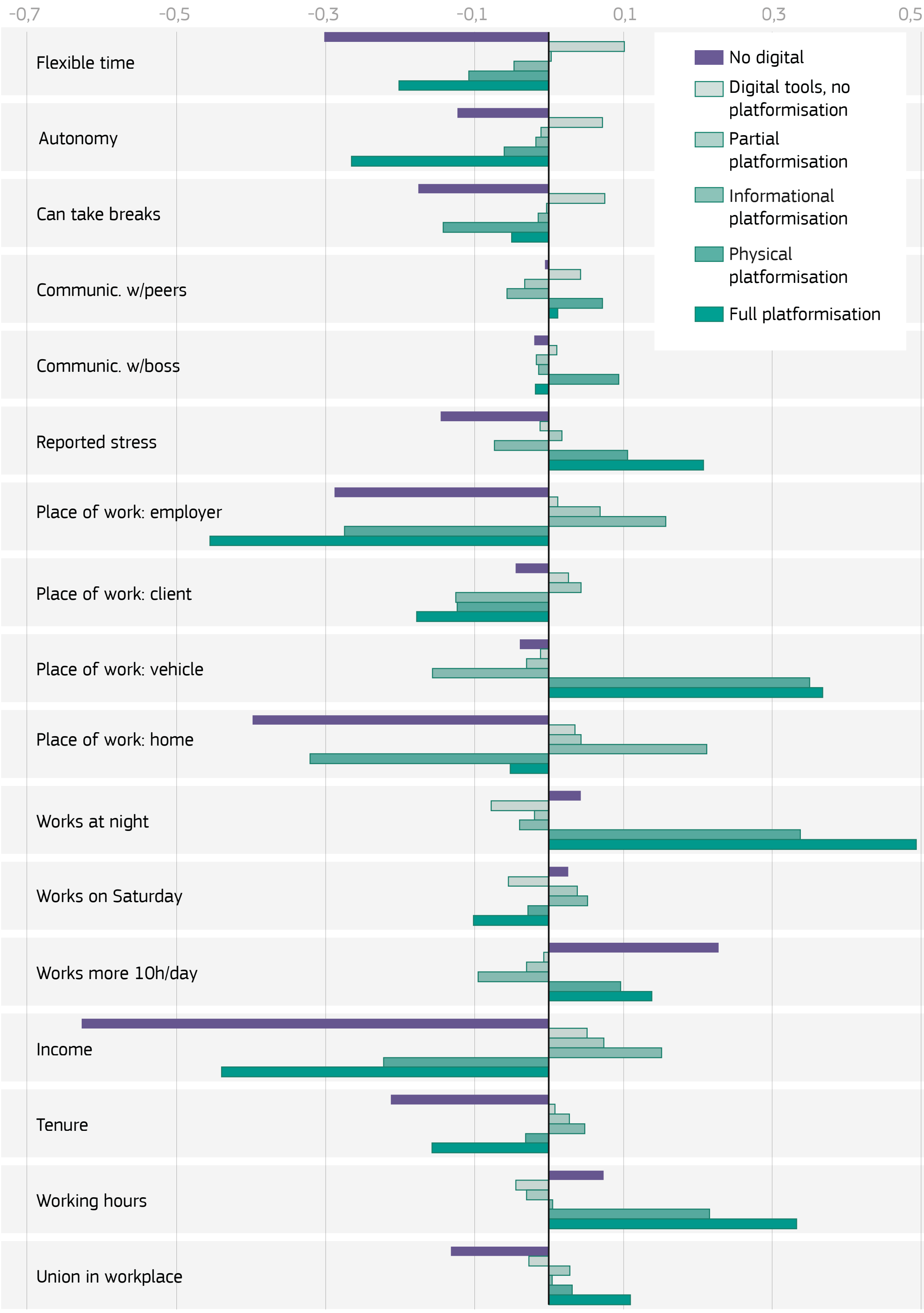
Figure 32. Platformisation of work and working conditions




Source: authors' elaboration using AIM-WORK weighted data.

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The three variables at the top of Figure 32 can be understood as different aspects of autonomy: whether the worker has flexibility to choose his/her working times, whether the worker has autonomy in three key domains (order, pacing and content of tasks), and whether the worker can take a break if necessary. There is a consistent pattern, by which the highest level of autonomy tends to be for "digitised, but not platformised" workers (slightly but consistently above the average in the three cases), consistently declining with increasing levels of platformisation until values close to -0.3 standard deviations in the case of fully platformised workers. The residual category of "non-digitised" workers (who are on the one hand a kind of "absolute zero" in terms of platformisation, while on the other hand they simply are out of the concept altogether) have values of autonomy as low or even lower as those of fully platformised workers. Therefore, we can say that the level of autonomy decreases almost linearly with platformisation, except for those who do not use digital tools at all (and thus are not even classified).

The two following variables concern communication at work, with peers and managers. These variables are important aspects of job quality on their own, but they are significant because the ostensible purpose of digital platforms is often to provide a new channel of communication. The results shown in figure 32 suggest that platformisation has no significant association with communication at work, neither positive nor negative. This is perhaps surprising, and may reflect a typically paradoxical effect of digital communication technologies: on the one hand, they open new channels of communication and thus they expand possibilities for (non-direct) communication; on the other hand, they tend to reduce direct social interaction and thus direct communication. The relative strength of those two counterbalancing effects will produce the net result, which can in fact be neutral if they are of similar (but opposite) magnitude.

The next variable, stress, is very important as a key psychosocial outcome, as well as an indirect measure of work intensification, which is an aspect which is consistently found to be associated with digitisation and even more broadly technical change (Fernández-Macías et al. 2025). The values, while not being very large, go in the expected direction: the levels of stress reported by fully platformised workers are higher than the average, as well as those of physical platformised. On the other hand, informational platformisation is associated with levels of stress which are slightly lower than average. We will later try to confirm these patterns by conducting a multivariate econometric analysis with controls for the composition of employment.

The four following variables measure the usual place of work. Again, we find consistent differences by levels of platformisation. Informational platformisation is positively associated with working in the employer's premises and at home: as we have been arguing all along, these practices of digital monitoring and algorithmic management are more frequent in the office, but also in cases of telework. On the other hand, full platformisation and physical platformisation are strongly correlated with working in a vehicle, or in any case outside of employer's premises. The kind of monitoring and automated management of the physical location and physical activity of workers is most common in cases where the work takes place in a vehicle or on the move: as we saw in the previous subsection, "physical" platformisation is not only very common in transport, but also in public security services and other types of work which take place on the go.

The following 3 variables measure different aspects of working time. What immediately stands out is a strong association between full and physical platformisation and working at night. This (as well as the variables discussed in the previous paragraph) confirms the idea that the categories of full and physical platformisation of regular work are in practice very similar to the kind of work typically related to digital labour platforms. The type of regular work which is most frequently platformised tends to take place outside regular employer premises (in vehicles or on the go) and with unusual work schedules, characteristics which are shared with platform workers in delivery, transport and personal service activities.

Finally, there are four more variables related to employment conditions. Full and physical platformised workers have lower wages than average (although the lowest wages are those of non-digitised workers), whereas informational platformised workers have the highest wage level of all categories. We have already observed contrasting outcomes in several cases (stress, place of work, time), but in this case the contrast is very stark and confirms the idea that not all types of platformisation are the same (even if in terms of its technological basis and of the

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associated practices they are similar). Full and physical platformisation tend to be associated with worse work and employment conditions, but informational platformisation does not appear to be so. Similar results are found for the indicators of tenure and working hours: full and physical platformised workers tend to have lower tenure and longer hours, whereas informational platformised workers have average or even better than average outcomes. Finally, fully platformised workers are slightly more likely than average to work in places with union representation, but the difference here is very small.

The issue of statistical significance is important because several of the observed associations between platformisation and outcomes may be spurious, simply resulting from differences in the composition of the different categories of platformisation in terms of occupation, sector or other aspects. We must be really careful to assume that what explains these different outcomes is platformisation itself, and not those associated factors. Conducting a detailed statistical analysis that controls for compositional effects is beyond the scope of this report, but to close this section we have conducted a simple econometric analysis for a subsample of salient working conditions variables, with a series of controls for possible confounding variables. The result of this analysis is shown in Figure 33. In each case, model 1 is a simple model with only the classification by platformisation as predictor (essentially, the same as previously shown in Figure 32), whereas model 2 is a multivariate model which also controls for a series of possible confounders, namely: country, sector (1d), occupation (1d), age, sex, income, tenure, union representation, firm size and country of birth.

Figure 33. A multivariate approximation to platformisation and some key outcome variables

Significance levels: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

| Platformised Category | Stress (Model 1) | Stress (Model 2) | Autonomy (Model 1) | Autonomy (Model 2) | FlexTime (Model 1) | FlexTime (Model 2) | Income (Model 1) | Income (Model 2) | Tenure (Model 1) | Tenure (Model 2) |
|---|---|---|---|---|---|---|---|---|---|---|
| No digital | -0.107** | -0.067* | -0.183*** | -0.171*** | -0.413*** | -0.216*** | -0.675*** | -0.106*** | -0.207*** | -0.105*** |
| Not platformised | (Base) | (Base) | (Base) | (Base) | (Base) | (Base) | (Base) | (Base) | (Base) | (Base) |
| Partly platformised | 0.03 | 0.039* | -0.080*** | -0.047** | -0.095*** | -0.069*** | 0.02 | -0.001 | 0.014 | -0.009 |
| Informational platformised | -0.055† | -0.026 | -0.083*** | -0.031 | -0.152*** | -0.103*** | 0.099** | 0.039 | 0.035 | -0.001 |
| Physical platformised | 0.118*** | 0.082** | -0.143*** | -0.106** | -0.214*** | -0.110*** | -0.277*** | 0.02 | -0.057† | -0.009 |
| Fully platformised | 0.229*** | 0.179*** | -0.318*** | -0.304*** | -0.314*** | -0.167*** | -0.496*** | 0.005 | -0.147** | -0.045 |
| R-squared | 0.003 | 0.041 | 0.004 | 0.034 | 0.011 | 0.072 | 0.036 | 0.439 | 0.003 | 0.353 |

Note: Only value coefficients for platformisation categories are shown, while controls are not.

Source: authors' elaboration using AIM-WORK weighted data.

In all cases the model without controls has very limited explanatory power (the differences in outcomes are small, as we already observed), and in all cases the explanatory power increases significantly with additional controls. However, except for labour income and tenure, the explanatory power of even the full models is quite limited for the observed outcome variables: this means that, although these outcomes are systematically related to structural differences in the workplace, most of their variation takes place within the same categories of workers.

It is important to assess whether the apparent correlations observed with the simple bivariate analysis (shown in the columns labelled “Model 1”) remain consistent with controls. For stress and flexible time schedules, the negative correlation previously observed for full and physical platformisation remains, although it is slightly weakened by the controls. In the case of autonomy, the penalty for fully platformised workers remains very strong. In other words, this econometric exploratory analysis suggests that the most important negative effect of platformisation is with respect to autonomy at work, although it is also significant for stress and flexibility of working times. As we already hinted, the differences associated with informational platformisation for these outcome variables are not significant, with the small exception of flexible time schedules (informational platformisation is related with a significantly lower level of flexibility in this respect, although only moderate).

However, the apparently strong association between platformisation and the variables of labour income and tenure completely disappears when the controls are introduced. This concerns both the negative association with full and physical platformisation, and the positive association with informational platformisation. All of the apparent association observed previously in figure 33 was the result of the composition of platformised workers in terms of the other variables included as controls, and not an effect of the platformisation of work.

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# Discussion and conclusions

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# 9 Discussion and conclusions

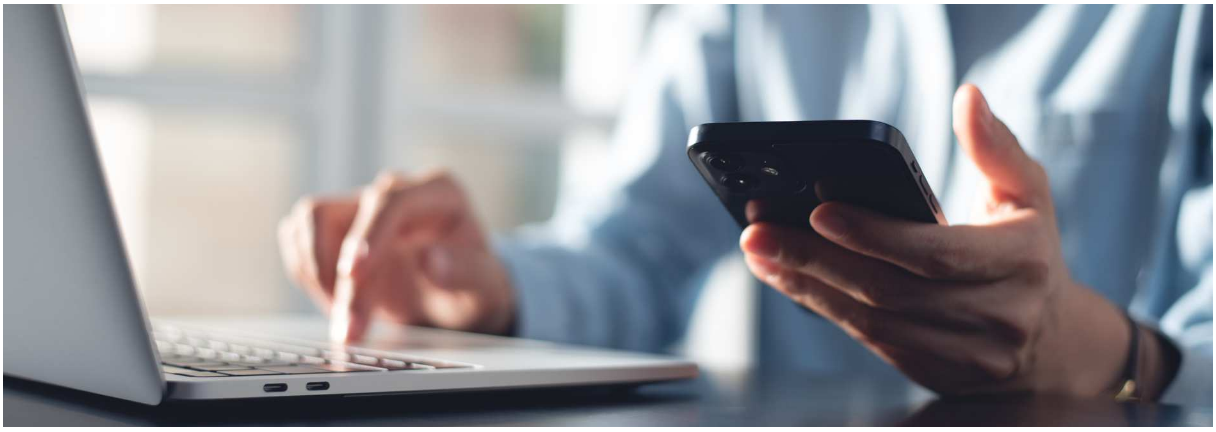
Although certain forms of automated managerial functions predate the current era, it was the rapid expansion of work mediated through digital labour platforms in the late 2010s that brought the dynamics of algorithmic control to the forefront of policy and academic debate. There is an interesting paradox here. On the one hand, platform work did not increase to the levels initially forecast, stabilising as a marginal and increasingly regulated form of work in Europe. But on the other hand, some of its most paradigmatic features - digital monitoring and algorithmic management based on data-driven technologies – seem to be seeping into more traditional workplaces across various types of economic activities.

Preliminary evidence from qualitative studies suggests that this nascent platformisation of regular work is already having an impact on work organisation and working conditions. Digital monitoring and algorithmic management are often implemented as control tools that can simplify and streamline work processes, standardise procedures and lead to efficiency and productivity gains. However, significant evidence points towards risks that these practices pose in terms of working conditions and job quality, particularly with respect to heightened stress, reduced autonomy and enhanced worker surveillance.

The AIM-WORK survey has been carried out against this backdrop, aiming to complement existing research and, especially, fill the major data gaps that hamper a proper understanding of the prevalence and impacts of the phenomenon. The new data presented in this report represents in our view a major step forward in the understanding of the reality of the platformisation of work in the EU. For the first time representative and comprehensive data on the main three pillars of this phenomenon (digital device usage, digital monitoring and algorithmic management) are available for all EU Member States, together with novel data on AI in the workplace.

The picture that emerges from the new AIM-WORK data is a heterogeneous one, but it does show that the platformisation of work is a significant phenomenon which is already reshaping work and workplaces in the 21st century. The vast majority of EU workers use digital tools when performing their jobs, mostly computers and mobile devices but including also a significant prevalence of use of AI tools, particularly AI chatbots powered by LLMs, that were not even available until recently. AIM-WORK data also complements previous studies with new data on the use advanced digital industrial tools at work. The widespread prevalence of digital device usage across Europe is compatible with some cross-country and cross-occupational differences, but overall confirms that the material base for the platformisation of work, the use of digital devices at work, is now firmly established across the EU.

Against this backdrop, it is not surprising that the two key platformisation practices of digital monitoring and algorithmic management are already quite prevalent across European workplaces. The digital monitoring of working times, and the automated allocation of shifts and tasks, are common features in workplaces across most Member States, already affecting 1 in 3 and



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1 in 4 workers respectively. The other forms of digital monitoring and algorithmic management analysed in this report are less prevalent but also quite significant and very relevant for specific sectors, countries and occupations. The analysis of the AIM-WORK data allows the identification of three main types of digital monitoring (physical, activity and time) and two main types of algorithmic management (automated direction and evaluation). Building on these concepts and metrics, it is possible to construct a relatively comprehensive picture of the platformisation of work in the EU. The new classification of workers that is proposed in this study based on the new data leads to two main conclusions.

First, the platformisation of work is by now a well-defined phenomenon with a clear set of identifiable characteristics. AIM-WORK data shows that the three-pronged concept proposed in previous research based on digital device usage, digital monitoring and algorithmic management (Fernández-Macias, et al., 2023) is a useful way to classify workers with consistently different conditions. It is only when the extent of a phenomenon is known that it becomes possible to understand its implications. Platformisation of work however is a multifaceted reality: the new data shows that its implications are highly diverse across countries, occupations and sectors, and therefore, the context-specific realities deserve close attention.

Second, this study allows the identification of the most consequential and potentially negative forms of platformisation of work in terms of their impact on working conditions, even though, as we have indicated, the EU-level analysis presented in the report can mask strong country variability that will be essential to analyse in detail in future studies. Our evidence suggests that partial forms of platformisation as well as what we called “informational platformisation” (typical of office work) do not have significantly negative consequences for workers, at least to the extent covered in the AIM-WORK questionnaire. On the other hand, the categories of full and physical platformisation (typical of manual work activities and combining physical monitoring and algorithmic direction) are associated with increased stress and diminished autonomy and flexibility.

Of course, the association between full and physical platformisation and negative working conditions is far from inevitable. The impact of platformisation can and should be shaped by labour market institutions, and a human-centric approach to technology deployment and usage in the workplace can help mitigate or eliminate negative impacts. An important step is to identify the forms of work organisation that may have negative implications for job quality, and the categories of full and physical platformisation are the ones requiring closest attention from policy makers according to our analysis.

Rather than a final output, this report is the starting point of a new, forward-looking research agenda on the platformisation of work in the EU and the impact of AI at work in the European context. The analysis presented here represents a step forward in the evidence base in the European context, but it is clearly insufficient, and it will be essential to go beyond EU averages in future research to gain a deeper and more nuanced understanding of country and sector-specific realities.

The JRC will, in collaboration with other institutions and researchers, conduct further research and analysis to fully leverage on the potential of this dataset to provide policy-relevant evidence. This will include a more detailed analysis of the impact of platformisation on working conditions across occupations, sectors and countries, looking at the factors that may mitigate potentially negative impacts. A more detailed analysis of digital monitoring, algorithmic management and platformisation by sector, countries, regions, firm size, etc is also warranted, as well as further analysis on the socio-economic profile of workers subject to digital monitoring, algorithmic management and platformisation, the relationship between different digital tools usage and the platformisation of work, and further research to understand the key drivers behind platformisation (e.g. employment legislation, subcontracting, digitalisation of businesses, industrial relations framework, etc). The impact of AI at work will also require closer attention in the near future, including to obtain new evidence on its impact on productivity, its sector, country and region-specific dynamics and its broader effects on work organisation and working conditions.

> Full and physical platformisation correlate with increased stress and diminished autonomy and flexibility.

# 10

# References

# 10 References

Abendroth Dias, K., Arias Cabarcos, P., Bacco, F.M., Bassani, E., Bertoletti, A. et al., Generative AI Outlook Report - Exploring the Intersection of Technology, Society and Policy, Navajas Canwood, E., Vespe, M., Kotsev, A. and van Bavel, R. (editors), Publications Office of the European Union, Luxembourg, 2025, data.europa.eu/doi/10.2760/1109679, JRC142598.

Adams-Prassl, Jeremias, Abraha, Halefom, Kelly-Lyth, Aislynn, Silberman, Michael 'Six', and Rakshita, Sangh. 2023. Regulating algorithmic management: A blueprint. European Labour Law Journal, 14(2): 124-151, doi.org/10.1177/20319525231167299

Adler-Bell, Sam, and Miller, Michelle. 2018. The datafication of employment. Report. The Century Foundation. tcf.org/content/report/datafication-employment-surveillance-capitalism-shaping-workers-futures-without-knowledge/?agreed=1

Aloisi, Antonio and Gramano, Elena. 2019. Artificial Intelligence Is Watching You at Work. Digital Surveillance, Employee Monitoring, and Regulatory Issues in the EU Context (June 10, 2019). Special Issue of Comparative Labor Law & Policy Journal, Automation, Artificial Intelligence and Labour Protection, 41(1): 95-121, ssrn.com/abstract=3399548

Bailey, Diane E. 2022. 'Emerging technologies at work: Policy ideas to address negative consequences for work, workers and society', ILR Review, 75(3): 527-551.

Baiocco, Sara, Enrique Fernández-Macías, Uma Rani, and Annarosa Pesole. 2022. The algorithmic management of work and its implications in different contexts. JRC Working Papers Series on Labour, Education and Technology, Seville: European Commission. publications.jrc.ec.europa.eu/repository/handle/JRC129749

Ball, Kirstie. 2010. 'Workplace surveillance: an overview.' Labor History, 51 (1): 87–106. DOI: 10.1080/00236561003654776

Ball, Kirstie. 2021. Electronic Monitoring and Surveillance in the Workplace. Literature review and Policy Recommendations. JRC125716, Luxembourg: Publication Office of the European Union. DOI: 10.2760/5137

Becker, Joel, Rush, Nate, Barnes, Elizabeth, Rein, David. Measuring the impact of early'2025 AI on experienced open source developer productivity. doi.org/10.48550/arXiv.2507.09089

Bernhardt, Annette, Kresge, Lisa and Suleiman, Reem. 2023. The Data-Driven Workplace and the Case for Worker Technology Rights. ILR Review, 76(1): 3-29. doi.org/10.1177/00197939221131558

Bick, A., Blandin, A., & Deming, D. J. 2024. The rapid adoption of Generative AI (PDF). National Bureau of Economic Research.

Bisello Martina; Peruffo, Eleonora; Fernández-Macías, Enrique; Rinaldi, Riccardo. 2019. How computerisation is transforming jobs: Evidence from Eurofound's European Working Conditions Survey, Seville: European Commission, 2019, JRC117167.

Bonney, Kathryn, Cory Breaux, Cathy Buffington, Emin Dinlersoz, Lucia S. Foster, Nathan Goldschlag, John C. Haltiwanger, Zachary Kroff, Keith Savage. 2024. Tracking Firm Use of AI in Real Time: A Snapshot from the Business Trends and Outlook Survey. NBER Working Paper 32319. DOI 10.3386/w32319

Brynjolfsson, Erik, and McAfee, Andrew. 2014. The second machine age: Work, progress, and prosperity in a time of brilliant technologies. W. W. Norton & Company.

1 2 3 4 5 6 7 8 9 10

Brynjolfsson, Erik, and McAfee, Andrew. 2017. The business of artificial intelligence. Harvard Business Review. hbr.org/2017/07/the-business-of-artificial-intelligence

Brynjolfsson, Erik and Mitchell, Tom. 2017. What can machine learning do? Workforce implications. Science 358(6370): 1530–1534. www.science.org/doi/10.1126/science.aap8062

Brynjolfsson, Erik, Danielle Li & Lindsey R. Raymond. 2025. "Generative AI at Work", The Quarterly Journal of Economics, Volume 140, Issue 2, May 2025, Pages 889–942

Buarque, Bernardo S.; Davies, Ronald B.; Kogler, Dieter F.; Hynes, Ryan M. (2019) : OK Computer: The creation and integration of AI in Europe, UCD Centre for Economic Research Working Paper Series, No. WP19/11, University College Dublin, UCD School of Economics, Dublin

Bucher, Taina. 2018. If...Then: Algorithmic Power and Politics, Oxford Studies in Digital Politics (New York, 2018; online edn, Oxford Academic, 19 July 2018), doi.org/10.1093/oso/9780190493028.001.0001

Cappelli, Peter. 2020. The consequences of AI-based technologies for jobs. R&I paper series working paper 2020/04. Luxembourg: Publications Office of the European Union, 2020. www.ospi.es/export/sites/ospi/documents/documentos/Tecnologias-habilitantes/EC_The-consequences-of-AI-based-technologies-for-jobs.pdf

Cirillo, Valeria, Rinaldini, Matteo, E. Virgillito, Maria, Divella, Marialuisa, Manicardi, Caterina, Massimo, Franscesco Sabato, Cetrulo, Armanda, Costantini, Eleonora, Moro, Angelos, and Staccioli, Jacopo. 2022. Case studies of Automation in Services. JRC129691, Luxembourg: Publications Office of the European Union.

Conference Board. 2024. Majority of US workers are already using Generative AI tools — But company policies trail behind. [Report]. The Conference Board.

Cox, Theo and Oosterwijk, Gerard R. 2024. Algorithmic management in traditional workplaces. Case studies on the impact of algorithmic technologies in seven sectors in the Nordics. Policy Study. The Foundation for European Progressive Studies (FEPS). 11 October 2024. feps-europe-eu/publication/algorithmic-management-in-traditional-workplaces/

Crane, L., Green, M., & Soto, P. 2025, February 5. Measuring AI uptake in the workplace. FEDS Notes. Board of Governors of the Federal Reserve System. doi.org/10.17016/2380-7172.3724

Daepp, Madeleine I. G. and Counts, Scott. 2025. The emerging Generative Artificial Intelligence Divide in the United States. arxiv.org/abs/2404.11988

De Cuyper, K., Gysen, S., Vinciguerra, M.C and Wright, S. Methodology of the AIM-WORK survey (JRC Survey on Artificial Intelligence and Algorithmic Management in the Workplace), JRC Working Papers on Labour, Education and Technology 2025

De Stefano, Valerio and Taes, Simon. 2023. Algorithmic management and collective bargaining, Transfer, 29(1): 21-36. doi.org/10.1177/10242589221141055.

Doellgast, Virginia, Wagner, Ines and O'Brady, Sean. (2024). Negotiating limits on algorithmic management in digitalised services: cases from German and Norway. Transfer: European Review of Labour and Research, 29(1): 105-120. doi.org/10.1177/102425892211430

Doellgast, Virginia and Kämpf, Tobias. Co-determination meets the digital economy: works councils in the German ICT services industry. Enterprises et histoire. 2023/24 (No. 113) : 32-43. shs.cairn.info/journal-entreprises-et-histoire-2023-4-page-32?lang=en

European Union. 2024. Artificial Intelligence and the Future of Work. Eurobarometer Report. Special Eurobarometer 554. DOI: 10.2767/8591026 europa.eu/eurobarometer/surveys/detail/3222?etrans=uk

1 2 3 4 5 6 7 8 9 10

European Commission: Directorate-General for Employment, Social Affairs and Inclusion, Visionary Analytics, Paliokaitė, A., Christenko, A., Aloisi, A. et al., Study exploring the context, challenges, opportunities, and trends in algorithmic management in the workplace – Final report, Publications Office of the European Union, 2025, data.europa.eu/doi/10.2767/5629841

European Foundation for Working and Living Conditions (Eurofound). 2015. European Working Conditions Survey 2015. www.eurofound.europa.eu/en/surveys/european-working-conditions-surveys/sixth-european-working-conditions-survey-2015

European Agency for Safety and Health at Work (EU-OSHA). 2025. First findings of the Fourth European Survey of Enterprises on New and Emerging Risks (ESENER 2024). 7 February 2025. Bilbao: Publication Office of the European Union. osha.europa.eu/sites/default/files/documents/ESENER-first-findings-2024_EN.pdf

European Parliament and the Council. 2024. Directive (EU) 2024/2831 of the European Parliament and of the Council of 23 October 2024 on improving working conditions in platform work. Official Journal of the European Union. 11 November 2024. European Available at: eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=OJ:L_202402831 (last accessed 13 May 2025).

Eurostat. 2024. Artificial Intelligence by size class of enterprise. doi.org/10.2908/ISOC_EB_AI

Eurostat. 2025. 3D printing and robotics by size class of enterprise. ec.europa.eu/eurostat/databrowser/product/page/ISOC_EB_P3D

Felten, Edward W., Raj, Manav, and Seamans, Robert. 2021. Occupational, industry, and geographic exposure to artificial intelligence: A novel dataset and its potential uses. Strategic Management Journal, 42: 2195-2217.

Felten, Edward, W., Raj, Manav, Seamans, Robert. 2023. Occupational Heterogeneity in Exposure to Generative AI. April 10, 2023. SSRN: ssrn.com/abstract=4414065 or dx.doi.org/10.2139/ssrn.4414065

Fernández-Macías, Enrique 2018. Automation, digitalisation and platforms: implications for work and employment, Eurofound Working Paper. Luxembourg: Publications Office of the European Union

Fernandez Macias, E., Klenert, D. and Antón, J., Not so disruptive yet Characteristics, distribution and determinants of robots in Europe, JRC124720.

Fernández-Macías, Enrique, Bisello, Martina, Peruffo, Eleonora, and Rinaldi, Riccardo. 2022. Routinization of work processes, de-routinization of job structures. Socio-Economic Review, 21(3):1773-1794. doi.org/10.1093/ser/mwac044

Fernández-Macías, Enrique., Urzì Brancati, Maria Cesira., Wright, Sally, and Pesole, Annarosa. 2023. The platformisation of work. Evidence from the JRC Algorithmic Management and Platform Work survey (AMPWork), Publications Office of the European Union, Luxembourg. doi:10.2760/801282, JRC133016.

Fernández-Macias, Enrique: Gonzalez-Vazquez, Ignacio; Torrejon-Perez, Sergio; Nurski, Laura. 2025. Work in the Digital Era: How Technology is Transforming Work and Occupations. JRC141451.

Fornasier, Mateus De Oliveira and Gustavo, Silveira Borges. 2022. The current influence of social media on democratic debate, political parties and electioneering. Journal of Constitutional Review, 9(1): 73-102. doi.org/10.5380/rinc.v9i1.83460

Franke, Milena and Pulignano, Valeria. 2021. Connecting at the edge: Cycles of commodification and labour control within food delivery platform work in Belgium. New Technology, Work and Employment, 38(2):371-390. doi.org/10.1111/ntwe.12218

Franke, Milena and Pulignano, Valeria, 2022. Labour Control and Commodification Strategies Within a Food Delivery Platform in Belgium. In: E. Armano, M. Briziarelli, and E. Risi (eds). Digital Platforms and Algorithmic Subjectivities. London: Westminster University Press. DOI:10.16997/book54.k

Freeman, C. and Louçã, F. 2001. As time goes by: From the industrial revolutions to the information revolution, Oxford University Press, UK.

Gandini, Alessandro. 2019. Labour process theory and the gig economy. Human Relations, 72(6), 1039–1056. doi.org/10.1177/0018726718790002

Gillespie, N., Lockey, S., Ward, T., Macdade, A., & Hassed, G. 2025. Trust, attitudes and use of artificial intelligence: A global study 2025. The University of Melbourne and KPMG. DOI 10.26188/28822919

González-Vázquez, Ignacio, Curtarelli, Maurizio, Anyfantis, Ioannis, Brun, Emmanuelle and Starren, Annick. 2024 Digitisation and worker wellbeing: The impact of digital technologies on work-related psychosocial risks. 2014. Seville: European Commission. JRC138992. publications.jrc.ec.europa.eu/repository/handle/JRC138992

Hampole, Menaka; Papanikolaou, Dimitris; Schmidt, Lawrence DW; Seegmiller, Brian. 2025. Artificial Intelligence and the Labour Market. NBER Working paper 33509. DOI 10.3386/w33509

Handa, Kunal, Alex Tamkin, Miles McCain, Saffron Huang, Esin Durmus, Sarah Heck, Jared Mueller, Jerry Hong, Stuart Ritchie, Tim Belonax, Kevin K. Troy, Dario Amodei, Jared Kaplan, Jack Clark, Deep Ganguli. 2025. Which Economic Tasks are Performed with AI? Evidence from Millions of Claude Conversations

Hartley, Jonathan S.; Jolevski, Filip; Melo, Vitor; Moore, Brendan. 2025. The Labor Market Effects of Generative Artificial Intelligence. dx.doi.org/10.2139/ssrn.5136877

He, M. 2024. State of Workers 2024 report. Morning Consult. pro.morningconsult.com/analyst-reports/state-of-workers-2024

Humlum, Anders; Vestergaard, Emilie. 2025. Large Language Models, Small Labour Market Effects. NBER Working paper 33777. DOI 10.3386/w33777

Jarrahi, Mohammad Hossein, Newlands, Gemma, Kyng Lee, Min, Kyung, Lee, Wold, Christine T., Kinder, Eliscia, and Sutherland, Will. 2021. Algorithmic management in a work context. Big Data & Society, 8(2). doi.org/10.1177/20539517211020332

Kellogg, Katherine C., Valentine, Melissa A. and Christin, Angèle. 2020. Algorithms at work: The new contested terrain of control. Academy of Management Annals, 14(1): 366–410. doi.org/10.5465/annals.2018.0174

Lane, Marguerita, Williams, Morgan and Broecke, Stijn. 2023. The impact of AI on the workplace: Main findings from the OECD AI surveys of employers and workers. OECD Social, Employment and Migration Working Papers 288. Paris: OECD Publishing. doi.org/10.1787/ea0a0fe1-en

Lee, Min Kyung, Evan Metsky, Laura Dabbish, and Daniel Kusbit. 2015. “Working with Machines: The Impact of Algorithmic and Data-Driven Management on Human Workers.” 33rd Annual ACMSIGCHI Conference on Human Factors in Computing Systems. Seoul, South Korea: New York: ACM Press. 1603-1612.

Lyon, David. 2001. Surveillance, Power and Everyday Life. In. Phillip Kalantzis-Cope and Karim Gherab-Martin. Emerging Digital Spaces in Contemporary Society: Properties of Technology. Basingstoke: Palgrave Macmillan. DOI: 10.1057/9780230299047

Mateescu, Alexandra and Nguyen, Aiha. 2019. Explainer: Algorithmic management in the workplace, Data & Society Research Institute, February 2019, pp. 1-15. datasociety.net/wp-content/uploads/2019/02/DS_Algorithmic_Management_Explainer.pdf

McClain, C. 2024, March 26. Americans' use of ChatGPT is ticking up, but few trust its election information. Pew Research Center.

Milanez, Anna, Lemmens, Annikka and Ruggiu, Carla. 2025. Algorithmic management in the workplace: New evidence from an OECD employer survey. OECD Artificial Intelligence Papers No. 31. February 2025. www.oecd.org/en/publications/algorithmic-management-in-the-workplace_287c13c4-en.html

Newlands, G., 2021. Algorithmic surveillance in the gig economy: The organization of work through Lefebvrian conceived space. Organization Studies, 42(5), pp.719-737.

Nilsson, K.H., Matilla-Santander, N., Lee, M.K., Brulin, E., Bodin, T. and Håkansta, C., 2025. Algorithmic management and occupational health: A comparative case study of organizational practices in logistics. Safety Science, 187, p.106863.

OECD. 2024. Using AI in the Workplace: Opportunities, Risks and Policy Responses. OECD Artificial Intelligence Papers. March 2024. No. 11. Paris: OECD. www.oecd.org/en/publications/using-ai-in-the-workplace_73d417f9-en.html

OECD/BCG/INSEAD. 2025. The Adoption of Artificial Intelligence in Firms: New Evidence for Policymaking. Paris: OECD Publishing. doi.org/10.1787/f9ef33c3-en

O'Neill, Cathy. 2016. Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy. New York, NY: Crown Publishers.

Parent-Rocheleau, Xavier and Parker, Sharon. K. 2021. Algorithms as work designers: how algorithmic management influences the design of jobs, Human Resource Management Review, 32(3): 1053. DOI: 10.1016/j.hrmr.2021.100838.

Pérez, C. 2003. Technological revolutions and financial capital: The dynamics of bubbles and golden ages, Edward Elgar Publishing, Cheltenham, UK.

Perry, Neil, Srivastava, Megha, Kumar, Deepak, Boneh, Dan. Do users write more insecure code with AI assistants?.CCS '23: Proceedings of the 2023 ACM SIGSAC Conference on Computer and Communications Security, November 2023, Pages 2785-2799. doi.org/10.1145/3576915.3623157

Pesole, Annarosa., Urzì Brancati, Maria Cesira, Fernández-Macías, Enrique, Biagi, Federico, and González Vázquez, Ignacio. 2018. Platform Workers in Europe. Evidence from the COLLEEM Survey. JRC112157, Luxembourg: Publications Office of the European Union. doi:10.2760/742789.

Popovac Maša, Fine Philip A., and Hicken Sally-Anne. 2023. The Harms and Benefits of Social Media. In: Allan, House and Cathy Brennan eds. Social Media and Mental Health. Cambridge: Cambridge University Press; 2023:67-80.

Rahwan, Iyad, Cebrian, Manuel, Obradovich, Nick, Bongard, Josh, Bonnefon, Jean Francxois, Breazeal, Cynthia, and Crandall, Jacob. 2019. Machine Behaviour. Nature, 568(7753): 477-86. doi.org/10.1038/s41586-019-1138-y

Rammer, Christian, Czarnitzki, Dir and G. Fernández, Gastón. 2021. Artificial Intelligence and Industrial Innovation: Evidence from Firm-Level Data. Research Policy, 51(7): DOI: 10.1016/j.respol.2022.104555

Rani, Uma, Pesole, Annarosa, Gonzalez Vazquez, Ignacio. 2024. Algorithmic Management practices in regular workplaces : case studies in logistics and healthcare, Publications Office of the European Union, Luxembourg, 2024. data.europa.eu/doi/10.2760/712475, JRC136063.

Srnicek, Nick. 2017. Platform Capitalism. Cambridge, UK: Polity Press.

1 2 3 4 5 6 7 8 9 10

Spatharioti, Sofia Eleni, David M. Rothschild, Daniel G. Goldstein, Jake M. Hofman. 2023."Comparing Traditional and LLM-based Search for Consumer Choice: A Randomized Experiment", Working Paper

Todolí-Signes, Adrian. 2021. Making algorithms safe for workers: occupational risks associated with work managed by artificial intelligence, Transfer: European Review of Labour and Research, 27 (4): 433-451.

Tolan, Songül, Pesole, Annarosa, Martínez-Plumed, Fernando, Fernández-Macías, Enrique, Hernández-Orallo, José and Gómez, Emilia. 2021. Measuring the Occupational Impact of AI: Tasks, Cognitive Abilities and AI Benchmarks. Journal of Artificial Intelligence Research, 71: 191-236. DOI: doi.org/10.1613/jair.1.12647

Urzì Brancati, Maria Cesira, Pesole, Annarosa, and Fernández-Macías, Enrique. 2020. New evidence on platform workers in Europe. Results from the second COLLEEM survey. JRC118570, Luxembourg: Publications Office of the European Union. doi:10.2760/459278.

Urzì Brancati, Maria Cesira, and Curtarelli, Maurizio. 2021. Digital tools for worker management and psychosocial risks in the workplace: evidence from the ESENER survey. JRC125714, Seville: European Commission.

Urzi- Brancati, Maria Cesira. 2024. Digital technologies at work and psychosocial risks: evidence and implications for occupational safety and health. EU-OSHA. Luxembourg: Publications Office of the European Union. doi:10.2802/0488296 osha.europa.eu/sites/default/files/documents/Digitalisation-and-PSR_EN.pdf

Vallas, Steven P. 2019. Platform capitalism: what's at stake for workers? New Labor Forum, 28(1): 48–59. doi.org/10.1177/1095796018817059

Weber, M. 2015, originally 1922. "Bureaucracy", in Waters, T. and Waters D. (eds.), Weber's Rationalism and Modern Society: New Translations on Politics, Bureaucracy, and Social Stratification, Palgrave MacMillan.

Wells, Georgia, Horwitz, Jeff, and Seetharaman, Deepa. 2021. Facebook knows Instagram is toxic for teen girls, company documents show. Wall Street Journal. 14 September 2021. wsj.com/articles/facebook-knows-instagramis-toxic-for-teen-girls-companydocuments-show-11631620739.

Wiles, Emma and John J. Horton. 2024. "More, but Worse: The Impact of AI Writing Assistance on the Supply and Quality of Job Posts", Working Paper

Wood, Alex J. 2021. Algorithmic Management: Consequences for Work Organisation and Working Conditions. JRC124874, Seville: European Commission.

Wood, Alex J., Graham, Mark, Lehdonvirta, Vili, and Hjorth, Isis. 2019. Networked but commodified: the (dis) embeddedness of digital labour in the gig economy. Sociology, 53(5): 931–950. doi. org/10.1177/0038038519828906

Wotschack, Philip, Butollo, Florian and Hellbach, Leon. 2024. Algorithmic management and democracy at work in Germany. Policy Brief. WZB Berlin Social Science Center. ddd.uab.cat/pub/infpro/2024/290691/INCODING_Policy_Brief_Germany_def.pdf

Zuboff, Shoshana. 2015. Big Other: Surveillance Capitalism and the Prospects of an Information Civilization (April 4, 2015). Journal of Information Technology, 30, 75–89. doi: 10.1057/jit.2015.5, Available at SSRN: ssrn.com/abstract=2594754

Zuboff, Shoshana. 2019. The age of surveillance capitalism: The fight for our human future at the new frontier of power. New York: Public Affairs.

Zysman, J. and Newman, A., 2006. How revolutionary was the digital revolution?: national responses, market transitions, and global technology. Stanford University Press.

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# Annex 1

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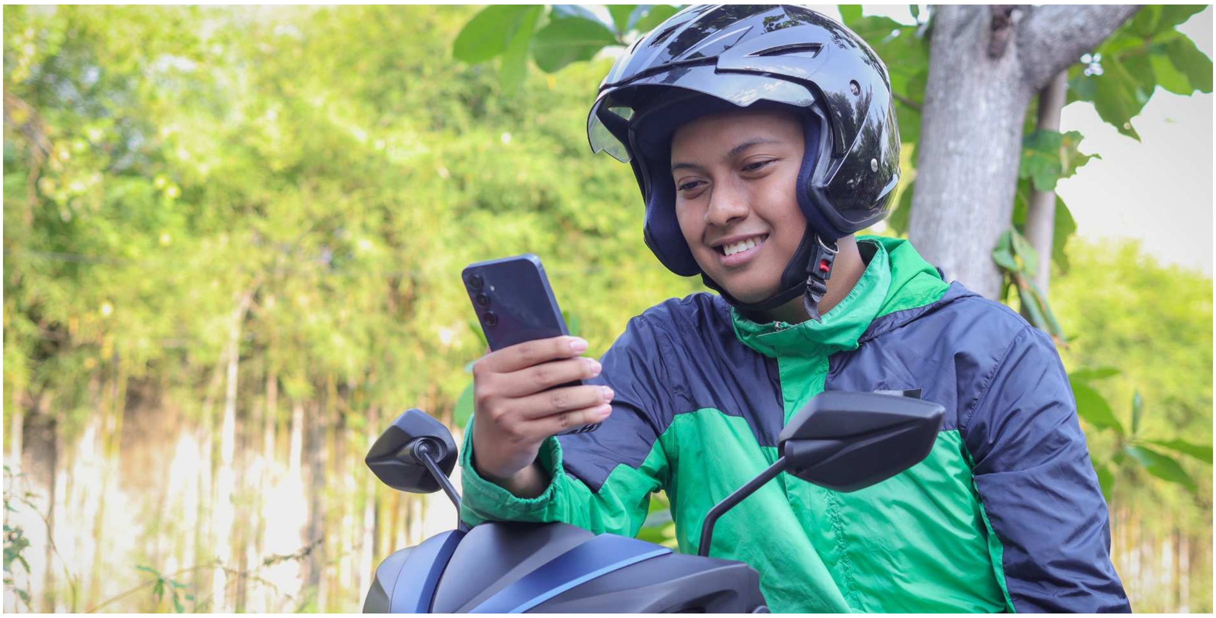
# Annex 1: Platform workers in AIM-WORK

The Joint Research Centre has been at the forefront of measuring the prevalence and nature of platform work in Europe for nearly a decade, beginning with the pioneering COLLEEM surveys (Pesole et al. 2018; Urzi Brancati et al 2020). These early exploratory studies provided crucial initial insights but also highlighted the limitations of non-probabilistic online panels, which tended to overestimate the extent of marginal or sporadic platform work. This led to the development of the statistically representative AMPWork survey for Germany and Spain, which offered a more reliable picture of the phenomenon (Fernández-Macías et al. 2023). In the years since, the landscape of platform work has continued to mature; the initial phase of rapid, unregulated growth has given way to a period of consolidation and regulatory scrutiny, with numerous court rulings and legislative proposals clarifying the employment status of platform workers. Evidence from the AMPWork survey suggested that platform work has stabilised into a small but significant form of employment, with a growing professionalisation of the workforce for whom it represents a main source of income. Building on this legacy, this annex provides a concise update on the prevalence and characteristics of platform work using the new, comprehensive AIM-WORK survey. By extending the analysis to all 27 EU Member States, these new data allow for an updated and more complete snapshot of the state of platform work across the Union, nearly a decade after its emergence as a major policy concern.

Table A1 shows the prevalence of platform-mediated work in Europe. Overall, only 2.9% of workers have received in the twelve months prior the interview any income from platforms. This share is higher in Italy, Netherlands and Finland (all three above 4%) and lower in Slovenia, Greece and Belgium. The table also shows that for most platform workers, their platform-related activity is not the main working activity, i.e. it can be considered a side job. [26] Among platform workers, only about 20% in the whole Europe do it as main working activity. This share is higher in some Eastern European countries (Slovakia, Slovenia and Romania) and lower in Finland, Latvia and Denmark. The AIM-WORK results confirm what we already observed in AMP-Work, namely that in Europe platform work has stabilised into a marginal but still significant form of work.



[26] Platform mediated work is considered the main job when at least one of the following conditions are met: 1) interviewed works for platforms at least once a month and receives more than 50% of her income from platforms; 2) interviewed works for platforms at least twenty hours per week and receives at least 25% of her total income from platforms.

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Table A1. Share of platform workers as share of total employment and share of platform workers who consider working for a platform their main job (as share of platform workers). Results by country.

| | Share of platform workers | ...of which platform work is the main job |
|---|---|---|
| Belgium | 1.4% | 16.6% |
| Bulgaria | 3.2% | 27.9% |
| Czechia | 1.8% | 37.6% |
| Denmark | 3.1% | 13.8% |
| Germany | 3.2% | 16.9% |
| Estonia | 2.9% | 31.8% |
| Ireland | 1.6% | 28.4% |
| Greece | 1.2% | 20.0% |
| Spain | 3.0% | 26.6% |
| France | 2.0% | 14.8% |
| Croatia | 2.6% | 33.0% |
| Italy | 4.7% | 19.5% |
| Cyprus | 2.5% | 19.8% |
| Latvia | 1.6% | 12.8% |
| Lithuania | 3.0% | 21.2% |
| Hungary | 2.5% | 14.2% |
| Malta | 1.4% | 30.5% |
| Netherlands | 4.3% | 18.6% |
| Austria | 3.4% | 18.9% |
| Poland | 2.1% | 25.2% |
| Portugal | 3.7% | 18.4% |
| Romania | 1.6% | 33.1% |
| Slovenia | 0.8% | 36.4% |
| Slovakia | 2.5% | 37.7% |
| Finland | 4.1% | 9.3% |
| Sweden | 1.8% | 23.3% |
| Total | 2.9% | 20.4% |

Note: Luxembourg is excluded due to too few observations.
Source: authors' elaboration based on AIM-WORK weighted data

Although the definitions of platform workers (people who provide labour services via digital labour platforms) and platformised workers (regular workers who are subject to digital monitoring and algorithmic management) are obviously related, they are operationally distinct and in fact they have a very limited overlap in empirical terms. Of the 3% of the working age population that can be broadly classified as platform workers, the vast majority (9 out of 10) either have a different regular job or they have no regular job altogether (for instance, people who are primarily students or retired, but do some platform work activity on the side). This means that only 1 out of 10 people classified as platform workers responded to the main AIM-WORK questionnaire, and could be therefore classified by the level of platformisation of their main job. Indeed, just a very small minority (2.7%) of "platformised" workers can be classified as platform workers in the standard definition. In other words, platform work and the platformisation of regular work are two distinct and non-overlapping phenomena, even if they have very similar features in terms of work organisation and even some key aspects of working conditions (such as autonomy or stress).

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# Annex 2

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# Annex 2: Unpaid Production of Digital Content for Online Platforms in AIM-WORK

The main objective of the AIM-WORK survey is to map the pervasiveness of digital monitoring, algorithmic management and platformisation of work in Europe. However, section E of the survey explores a slightly different topic, that is the unpaid production of digital content. User-generated content platforms (such as Facebook, YouTube, Reddit, Wikipedia …) are among the most prominent features of the digital economy. These platforms provide spaces for users to exchange content (mostly) freely, often supported by advertising. These platforms now play a central role in cultural production, leisure, and social interaction globally.

What distinguishes user-generated content platforms is that their value derives from content created voluntarily by users. The very existence of these content sharing platforms is possible thanks to the time spent by users in producing online content. This content is used to attract and retain other users, generating revenue primarily through advertising or the monetisation of user data. In some cases, it also feeds machine learning systems that produce further economic value. Although creating this content requires time and effort (which can be considered a form of labour as it generates value that is appropriated by private firms) it is almost always unpaid. Users are typically motivated by non-monetary incentives such as communication, recognition, self-promotion, or learning, making this a unique form of value creation in the digital economy.

Following on the initial exploration of this phenomenon in the AMPWork survey (Fernández-Macías et al. 2023), the AIM-WORK survey asked respondents whether they had produced the following types of content for sharing in online websites over the last twelve months: written posts for social networks aimed at people outside family and close friends; produced photos, videos or audios to be shared online with people outside family and close friends; written blogs; participated in online forums; written public customer reviews online; written for collaborative online projects like Wikipedia; or participated in voluntary online development projects.

It is important to note that the content must have been shared within the past 12 months and must have been shared beyond family and close friends. The second condition is crucial, as it ensures that our main measure does not capture strictly private communications, such as sharing photos with family. Instead, the focus is on content created for an audience beyond one's private circle. It should also be noted that we inquired exclusively about content creation, excluding the use of social media that involves a passive use (such as reading, watching videos etc.). This aspect is important as it makes possible to map who actively feeds social platforms via the inputs that are essential for the very existence of social media.

About 72% of the AIM-WORK respondents produced some content to be shared online outside family and close friends. Table A2 below shows the distribution of sharing platforms used by country. The first aspect that emerges is that posts on social networks, media sharing and reviews are the most common types of content sharing in Europe. Forums and blogs engage a lower share of European citizens, respectively 11 and 16% on average. As to country differences, Spain emerges as the country where there is the highest involvement across all categories of media, followed by Portugal and Sweden. On the other end of the distribution we find Malta, Romania and Croatia.

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Table A2. Type of platform used. Share by country.

| | Social networks | Media sharing | blog | forums | reviews | wiki | volunteer |
|---|---|---|---|---|---|---|---|
| Belgium | 0.38 | 0.32 | 0.18 | 0.13 | 0.29 | 0.12 | 0.1 |
| Bulgaria | 0.36 | 0.33 | 0.08 | 0.17 | 0.24 | 0.05 | 0.0 |
| Czechia | 0.35 | 0.27 | 0.07 | 0.15 | 0.30 | 0.07 | 0.0 |
| Denmark | 0.37 | 0.29 | 0.10 | 0.20 | 0.31 | 0.10 | 0.1 |
| Germany | 0.26 | 0.32 | 0.12 | 0.14 | 0.37 | 0.06 | 0.0 |
| Estonia | 0.33 | 0.34 | 0.09 | 0.16 | 0.24 | 0.04 | 0.0 |
| Ireland | 0.32 | 0.39 | 0.15 | 0.16 | 0.31 | 0.13 | 0.1 |
| Greece | 0.30 | 0.31 | 0.08 | 0.13 | 0.22 | 0.04 | 0.0 |
| Spain | 0.46 | 0.44 | 0.22 | 0.19 | 0.55 | 0.26 | 0.1 |
| France | 0.43 | 0.32 | 0.13 | 0.22 | 0.29 | 0.05 | 0.1 |
| Croatia | 0.26 | 0.25 | 0.06 | 0.14 | 0.19 | 0.04 | 0.0 |
| Italy | 0.39 | 0.45 | 0.13 | 0.10 | 0.38 | 0.04 | 0.0 |
| Cyprus | 0.27 | 0.27 | 0.10 | 0.09 | 0.24 | 0.04 | 0.0 |
| Latvia | 0.33 | 0.39 | 0.06 | 0.15 | 0.20 | 0.03 | 0.0 |
| Lithuania | 0.36 | 0.20 | 0.08 | 0.16 | 0.25 | 0.08 | 0.0 |
| Luxembourg | 0.41 | 0.33 | 0.18 | 0.13 | 0.24 | 0.09 | 0.1 |
| Hungary | 0.37 | 0.31 | 0.13 | 0.21 | 0.41 | 0.09 | 0.1 |
| Malta | 0.22 | 0.19 | 0.04 | 0.08 | 0.16 | 0.04 | 0.0 |
| Netherlands | 0.38 | 0.28 | 0.13 | 0.20 | 0.38 | 0.15 | 0.1 |
| Austria | 0.26 | 0.32 | 0.11 | 0.17 | 0.31 | 0.03 | 0.0 |
| Poland | 0.34 | 0.22 | 0.07 | 0.17 | 0.21 | 0.05 | 0.0 |
| Portugal | 0.41 | 0.47 | 0.13 | 0.18 | 0.45 | 0.13 | 0.1 |
| Romania | 0.20 | 0.20 | 0.04 | 0.08 | 0.17 | 0.04 | 0.0 |
| Slovenia | 0.30 | 0.25 | 0.06 | 0.13 | 0.29 | 0.07 | 0.1 |
| Slovakia | 0.28 | 0.23 | 0.06 | 0.15 | 0.25 | 0.04 | 0.0 |
| Finland | 0.47 | 0.36 | 0.12 | 0.22 | 0.32 | 0.04 | 0.1 |
| Sweden | 0.50 | 0.35 | 0.12 | 0.25 | 0.30 | 0.08 | 0.1 |
| EU Average | 0.34 | 0.31 | 0.11 | 0.16 | 0.29 | 0.07 | 0.1 |

Source: authors' elaboration based on AIM-WORK weighted data.

The survey also explored the motivations for creating online content to distinguish between intrinsic and instrumental drivers. As detailed in Table A3, the findings show that ‘fun’ is the dominant motivation, cited by two-thirds of those who share content. This is followed by other non-transactional reasons such as peer recognition, altruism, and the desire to gain experience, all reported by about half of respondents. In stark contrast, commercially-oriented motivations remain secondary; while one-third engage in content creation for ‘barter’, only 20% do so with the expectation of future income, and just 10% for gifts.

While motivations are broadly consistent across demographic groups, younger males are notably more likely to cite the expectation of future income. This suggests a generational view of online platforms as a potential space for monetisation. Furthermore, these instrumental motivations—publicity, gifts, and future income—are significantly more prevalent among the most active users who share content across multiple platforms, whereas intrinsic drivers like 'fun' are more evenly distributed across all user types.

Table A3. Motivations for using content sharing platforms

| Age and sex | recognition | publicity | fun | altruism | experience | gifts | barter | future income |
|---|---|---|---|---|---|---|---|---|
| 15-29 Male | 0.57 | 0.25 | 0.72 | 0.56 | 0.51 | 0.10 | 0.32 | 0.23 |
| 30-44 Male | 0.56 | 0.25 | 0.68 | 0.58 | 0.50 | 0.10 | 0.33 | 0.22 |
| 45-64 Male | 0.56 | 0.25 | 0.68 | 0.56 | 0.49 | 0.10 | 0.34 | 0.18 |
| 15-29 Female | 0.58 | 0.26 | 0.70 | 0.57 | 0.48 | 0.10 | 0.31 | 0.21 |
| 30-44 Female | 0.57 | 0.25 | 0.68 | 0.58 | 0.49 | 0.09 | 0.32 | 0.20 |
| 45-64 Female | 0.57 | 0.24 | 0.68 | 0.57 | 0.49 | 0.09 | 0.32 | 0.19 |

Source: authors' elaboration based on AIM-WORK weighted data.

# Annex 3

# Annex 3: Questionnaire. Analysis on Impacts of Artificial Intelligence and Algorithmic Management in the Workplace (AIM-WORK)

## SECTION A: SOCIO-DEMOGRAPHICS

[TIMER_SECTION A: start]

**A1. How old are you?**

Number of years:

999 Refusal

**A2. And would you describe yourself as:**

01 A man

02 A woman

03 Non-binary

99 Refusal

**A3. Do you live in [country of calling]?**

01 Yes

02 No

99 Refusal

ASK A4 IF A3 = 2 or 99

**A4. In which country do you live?**

97 Other (Living in a non-EU country)

99 Refusal

1 2 3 4 5 6 7 8 9 10

**D3. In which region do you live?**

| | | |
|---|---|---|
| 1 | Austria | IIS standard screener - ATREGION3 |
| 2 | Belgium | IIS standard screener - BEregion2 |
| 3 | Bulgaria | See excel Region |
| 4 | Croatia | IIS standard screener - HRREGION1 (quota on 4 regions see excel) |
| 5 | Cyprus | See excel Region |
| 6 | Czechia | IIS standard screener - CZREGION1 |
| 7 | Denmark | IIS standard screener - DKREGION1 |
| 8 | Estonia | See excel Region |
| 9 | Finland | IIS standard screener - FIREGION1 |
| 10 | France | IIS standard screener - FRREGION5 |
| 11 | Germany | IIS standard screener - GERREGION1 |
| 12 | Greece | IIS standard screener - GRREGION1 |
| 13 | Hungary | IIS standard screener - HU02REGION1 |
| 14 | Ireland | See excel Region |
| 15 | Italy | IIS standard screener – ITSTDREGION |
| 16 | Latvia | IIS standard screener - NUTS3 from LVCOMM |
| 17 | Lithuania | See excel Region |
| 18 | Luxembourg | See excel Region |
| 19 | Malta | See excel Region |
| 20 | Netherlands | IIS standard screener – NLPROVINCIE |
| 21 | Poland | IIS standard screener - PLREGION1 |
| 22 | Portugal | IIS standard screener - PTREGION1 |
| 23 | Romania | IIS standard screener - ROREGION2 |
| 24 | Slovakia | See excel Region |
| 25 | Slovenia | See excel Region |
| 26 | Spain | IIS standard screener - ESREGION2 |
| 27 | Sweden | IIS standard screener - SEREGION2 |

999. Prefer not to say

1 2 3 4 5 6 7 8 9 10

**A5. What is the highest level of education or training that you have successfully completed?**

01 Early childhood education (ISCED 0)

02 Primary education (ISCED 1)

03 Lower secondary education (ISCED 2)

04 Upper secondary education (ISCED 3)

05 Post-secondary non-tertiary education (ISCED 4)

06 Short-cycle tertiary education (ISCED 5)

07 Bachelor or equivalent (ISCED 6)

08 Master or equivalent (ISCED 7)

09 Doctorate or equivalent (ISCED 8)

10 Not elsewhere classified

98 Don’t know

99 Refusal

**A6. Please tell me which of these categories describes your current situation best? Are you ….**

1 Working full time or part time as an employee or self-employed

2 Assisting with a relative’s family farm or business

3 Unemployed

4 Unable to work due to long-term illness or disability

5 Employed or self-employed but currently on maternity, child-care leave or other leave

6 Retired

7 A full-time homemaker/ looking after the home

8 In full-time education (at school, university, etc.)/student

9 Other

99 Refusal [End survey]

ASK A7 IF A6 = 3, 4, 6, 7, 8 OR 9

**A7. Were you working as an employee or self-employed at any time during the last 12 months?**

01 Yes

02 No

98 Don’t know

99 Refusal

PROGRAMMING INSTRUCTIONS: RECODE A6 AND A7 INTO WORKER

WORKER = 1 IF A6 = 1, 2 OR 5 OR IF A7 = 1

WORKER = 0 IF A6 = 3, 4, 6, 7, 8 OR 9 OR IF A7 = 2, 98 OR 99

ASK A8 IF A7 = 1

**A8. When did you stop doing your last paid job?**

01 Less than 1 month ago

02 More than 1 month but less than 6 months ago

03 More than 6 months but less than 1 year ago

98 Don’t know

99 Refusal

ASK A3bis IF WORKER = 1

[S] **A3bis.**

IF A6=01, 02, OR 05: **And do you work in [country of calling]?**

IF A7=1: **And did you work in [country of calling]?**

01 Yes

02 No

99 Refusal

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

ASK A4bis IF A3bis = 2 or 99

**A4bis.**

IF A6=01, 02, OR 05: **In which country do you work?**

IF A7=1: **In which country did you work?**

PROGRAMMING INSTRUCTION: Pull down list of EU countries, plus Other – Non-EU country.

97 Other - Non-EU country

99 Refusal

**A9**

ASK A9 IF WORKER = 1

[S] **A9.**

IF A6=01, 02, OR 05: **And do you work part-time or full-time?**

IF A7=1: **And did you work part-time or full-time in your last paid job?**

01 Part time

02 Full time

03 Seasonal work

98 Don’t know

99 Refusal

ASK A10 IF WORKER = 1

**A10.**

IF A6=01, 02, OR 05: **How many paid jobs do you have at the moment?**

IF A7=1: **How many paid jobs did you have when you were last in paid employment?**

01 Only 1 paid job

02 2 paid jobs

03 3 or more paid jobs

98 Don’t know

99 Refusal

## SECTION B: CONDITIONS OF WORK

**B1**

ASK B1 IF WORKER = 1

[OPEN END] **B1.**

IF A6=01, 02, OR 05: **What is the title of your main paid job? Please be as specific as you can.**

IF A7=1: **What was the title of your last main paid job? Please be as specific as you can.**

OPEN END

98 Don't know

99 Refusal

**B2**

ASK B2 IF WORKER = 1

[OPEN END] **B2.**

IF A6=01, 02, OR 05: **What are your main responsibilities in your job?**

IF A7=1: **In your last job, what were your main responsibilities?**

OPEN END

98 Don't know

99 Refusal

**B3**

ASK B3 IF WORKER = 1

IF A6=01, 02, OR 05: **Are you working as an employee or are you self-employed in your main job?**

IF A7=1: **Were you working as an employee or were you self-employed in your main job?**

01 An employee

02 Self-employed

98 Don't know

99 Refusal

1 2 3 4 5 6 7 8 9 10

**B4**

ASK B4 IF B3=98 OR 99

**B4.**

IF A6=01, 02, OR 05: **Are you paid a salary or a wage by an employer?**

IF A7=1: **Were you paid a salary or a wage by an employer?**

01 Yes

02 No

98 Don't know

99 Refusal

**B5a and B5b**

ASK B5a IF B3=02 OR B4=02, 98 OR 99 (i.e. only for the self-employed)

[S] **B5a.**

IF A6=01, 02, OR 05: **Do you have employees working for you?**

IF A7=1: **Did you have employees working for you?**

01 Yes

02 No

98 Don't know

99 Refusal

**B5a and B5b**

ASK B5b IF B5a=02, 98 or 99

**B5b.**

IF A6=01, 02, OR 05: **Do you have more than one client or customer?**

IF A7=1: **Did you have more than one client or customer?**

01 Yes

02 No

98 Don't know

99 Refusal

**B6**

ASK B6 IF B3=01 OR B4=01 OR B5a=2, 98 OR 99

**B6**.

IF A6=01, 02, OR 05: **Which of the following best describes the kind of employment contract you have in your main job?**

IF A7=1: **Which of the following best describes the kind of employment contract you had in your last main job?**

01 A permanent contract (unlimited duration)

02 A short-term or fixed-term contract (limited duration)

03 A temporary employment agency contract

04 An apprenticeship or other training scheme

05 I do not have a contract

97 Other

98 Don't know

99 Refusal

**B7**

ASK B7 IF WORKER = 1

**B7**.

IF A6=01, 02, OR 05: **What is the MAIN activity of the company/organization you work for?**

IF A7=1: **What is the MAIN activity of the company/organization you worked for?**

OPEN END

98 Don't know

99 Refusal

**B8**

ASK B8 IF WORKER = 1

**B8**.

IF A6=01, 02, OR 05: **How many people in total, including yourself, work in the company or organisation where you perform most of your work?**

IF A7=1: **How many people in total, including yourself, worked in the company or organisation where you performed most of your work?**

01 1 (works alone)

02 2-4

03 5-9

04 10-49

05 50-249

06 250-499

07 500 or more

98 Don't know

99 Refusal

**B9**

ASK B9 IF WORKER = 1

**B9**.

IF A6=01, 02, OR 05: **How many years have you been working for this company or organisation?**

IF A7=1: **How many years did you work for this company or organisation?**

Number of years:

00 Less than 1 year

98 Don't know

99 Refusal

**B10a**

ASK B10a IF WORKER = 1

**B10a.**

IF A6=01, 02, OR 05: **Is there a trade union representing employees in your company or organisation?**

IF A7=1: **Was there a trade union representing employees in your company or organisation?**

01 Yes

02 No

98 Don't know

99 Refusal

ASK B10b IF B10a=1

**B10b.**

IF A6=01, 02, OR 05: **Is there a worker representative or staff committee or works council, or are regular staff meetings held, where employees can express their views about what is happening in the company or organisation?**

IF A7=1: **Was there a worker representative or staff committee or works council, or were regular staff meetings held, where employees could express their views about what is happening in the company or organisation?**

01 Yes

02 No

98 Don't know

99 Refusal

ASK B10d IF WORKER = 1

**B10d**.

IF A6=01, 02, OR 05: **Are there any social media groups or online chat forums where workers can express their views about what is happening in the company or organisation?**

IF A7=1: **Were there any social media groups or online chat forums where workers could express their views about what is happening in the company or organisation?**

01 Yes

02 No

98 Don't know

99 Refusal

SHOW IF WORKER = 1

IF A6=01, 02, OR 05: **In this section, all of the questions continue to be about your main job.**

IF A7=1: **In this section, all of the questions continue to be about the main job you had.**

**B11**

ASK B11 IF WORKER = 1

**B11**.

IF A6=01, 02, OR 05: **How many hours do you usually work per week in your main paid job? By the number of hours worked, we mean hours you usually work per week, not what is written in your employment contract.**

IF A7=1: **How many hours did you usually work per week in your last main paid job? By the number of hours worked, we mean hours you usually worked per week, not what was written in your employment contract.**

This excludes lunch break and excludes time spent travelling to and from work – if 30 minutes or more, round up to next hour

Number of hours per week: [enter number, 1-168]

998 Don't know

999 Refusal

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

**B12**

ASK B12 IF WORKER = 1

**B12**.

IF A6=01, 02, OR 05: **Can you please tell me how often you usually work in each of the following types of location during the last 12 months in your main paid job?**

IF A7=1: **Can you please tell me how often you usually worked in each of the following types of location during your last main paid job?**

| | Always | Often | Sometimes | Rarely | Never | DK | Refusal |
|---|---|---|---|---|---|---|---|
| 1. Your employer's or your business' premises such as an office, workshop, factory, shop, school, etc. | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 2. Your clients' premises | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 3. A car or another vehicle | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 4. An outside site such as a construction site, a field or a street | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 5. Your own home | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 6. Other locations such as a café, library or co-working space | 1 | 2 | 3 | 4 | 5 | 8 | 9 |

**B13:**

ASK B13 IF WORKER = 1

**B13.**

IF A6=01, 02, OR 05: **To what extent do you agree or disagree with the following statements about your main paid job?**

IF A7=1: **To what extent do you agree or disagree with the following statements about your last main paid job?**

| | Strongly agree | Tend to agree | Neither agree nor disagree | Tend to disagree | Strongly disagree | Not applicable | DK | Refusal |
|---|---|---|---|---|---|---|---|---|
| 1. IF A7=1: I could take a break when I wished<br>IF A6=01, 02, OR 05: I can take a break when I wish | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 |
| 2. IF A7=1: I could interact and communicate with my manager when I needed to<br>IF A6=01, 02, OR 05: I can interact and communicate with my manager when I need to | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 |
| 3. IF A7=1: I could interact and communicate with my peers when I needed to<br>IF A6=01, 02, OR 05: I can interact and communicate with my peers when I need to | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 |
| 4. IF A7=1: I experienced stress in my work<br>IF A6=01, 02, OR 05: I experience stress in my work | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 |

**B14**

ASK B14 IF WORKER = 1

**B14.**

IF A6=01, 02, OR 05: **To what extent do you agree or disagree with the following statements about your main paid job?**

IF A7=1: **To what extent do you agree or disagree with the following statements about your last main paid job?**

| | Strongly agree | Tend to agree | Neither agree nor disagree | Tend to disagree | Strongly disagree | Not applicable | DK | Refusal |
|---|---|---|---|---|---|---|---|---|
| 1. IF A7=1: I could decide the order in which I do things<br><br>IF A6=01, 02, OR 05: I can decide the order in which I do things | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 |
| 2. IF A7=1: I could decide the methods I used or ways I did my work<br><br>IF A6=01, 02, OR 05: I can decide the methods I use or ways I do my work | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 |
| 3. IF A7=1: I could decide the speed or pace of my work<br><br>IF A6=01, 02, OR 05: I can decide the speed or pace of my work | 1 | 2 | 3 | 4 | 5 | 7 | 8 | 9 |

**B15**

ASK B15 IF WORKER = 1

**B15.**

IF A6=01, 02, OR 05: **How are your working time arrangements usually set?**

IF A7=1: **How were your working time arrangements usually set?**

01

IF A6=01, 02, OR 05: They are set by the company / organisation with no possibility for changes

IF A7=1: They were set by the company / organisation with no possibility for changes

02

IF A6=01, 02, OR 05: I can choose between several fixed working schedules determined by the company /organisation

IF A7=1:: I could choose between several fixed working schedules determined by the company / organisation

03

IF A6=01, 02, OR 05,: I can adapt my working hours within certain limits (e.g. flextime)

IF A7=1: I could adapt my working hours within certain limits (e.g. flextime)

04

IF A6=01, 02, OR 05: My working hours are entirely determined by me

IF A7=1: SHOW: My working hours were entirely determined by me

98 Don’t know

99 Refusal

1 2 3 4 5 6 7 8 9 10

**B17**

ASK B17 IF WORKER = 1

**B17.**

IF A6=01, 02, OR 05: **In your current main paid job, how often do you...?**

IF A7=1: **In your last main paid job, how often did you...?**

| | Always | Often | Sometimes | Rarely | Never | DK | Refusal |
|---|---|---|---|---|---|---|---|
| 1. Work at night, for at least 2 hours between 10.00pm and 05.00am | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 2. Work on Sundays | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 3. Work on Saturdays | 1 | 2 | 3 | 4 | 5 | 8 | 9 |
| 4. Work more than 10 hours a day | 1 | 2 | 3 | 4 | 5 | 8 | 9 |

## DIGITAL DEVICE USAGE

SHOW IF WORKER = 1

If a6=01, 02, or 05: The next set of questions are about the types of digital devices, tools and equipment you use to do your job.

If a7=1: The next set of questions are about the types of digital devices, tools and equipment you used to do your job.

**B18**

ASK B18 IF WORKER = 1

**B18.**

IF A6=01, 02, OR 05: **Do you use any of the following digital devices in your current main work/job**

IF A7=1: **Did you use any of the following digital devices in your last main work/job?**

| | YES | NO | DK |
|---|---|---|---|
| 1. Computers or laptops | 1 | 2 | 8 |
| 2. Tablets, smartphones or other mobile computer devices that connect to the internet | 1 | 2 | 8 |
| 3. Wearable devices, such as fitness trackers, smartwatches, or body-worn cameras (For example, a device worn for security purposes) | 1 | 2 | 8 |
| 4. Proximity cards or smart cards (For example, a card used to access a work building or specific rooms) | 1 | 2 | 8 |
| 5. Other [Open end]<br>• INTERVIEW INSTRUCTION: DO NOT READ OUT THIS ANSWER OPTION, BUT TYPE IN IF RESPONDENT MENTIONS SERVICE OTHER THAN IN ITEM 1-4 | | | |

1 2 3 4 5 6 7 8 9 10

ASK B19 IF WORKER = 1 and IF B18=YES on at least one row

**B19.**

IF A6=01, 02, OR 05: **Do you use any of the following software tools in your current main work/job?**

IF A7=1: **Did you use any of the following software tools in your last main work/job?**

| | YES | NO | DK |
|---|---|---|---|
| 1. Document editing or writing tools (For example, Google Docs or Microsoft Office) | 1 | 2 | 8 |
| 2. Data analysis or spreadsheet software/ programs (For example, Excel, Google Sheets, R, Python, Stata, or SPSS) | 1 | 2 | 8 |
| 3. Communication or meeting platforms (For example, Slack, Microsoft Teams, Zoom, or GoogleMeet) | 1 | 2 | 8 |

## USE OF AI AT WORK

ASK B20 IF WORKER = 1

**B20.**

IF A6=01, 02, OR 05: **In the last 12 months, did you use an AI-powered tool when performing your main paid job?**

IF A7=1: **Did you use an AI-powered tool when performing your last main paid job?**

01 Yes

02 No

98 Don’t know

99 Refusal

1
2
3
4
5
6
7
8
9
10

ASK B21 IF B20 = 1

[S] **B21.**

IF A6=01, 02, OR 05: **In the last 12 months, on average, how frequently did you use an AI-powered tool or tools when performing your main paid job?**

IF A7=1: **On average, how frequently did you use an AI-powered tool or tools when performing your last main paid job?**

01 Several times a day

02 About once a day

03 Several times a week

04 About once a week

05 A few times a month

06 Less often

07 Never

98 Don't know

99 Refusal

ASK B22 IF B20 = 1

**B22.**

IF A6=01, 02, OR 05: **What is the name of the main AI-powered tool you use when performing your main job?**

IF A7=1: **What is the name of the main AI-powered tool you use when performing your last main job?**

[OPEN END]

1 2 3 4 5 6 7 8 9 10

SCRIPTER: show list with answer options below the open ended box [S]

1. ChatGPT /OpenAI
2. Deepl.com
3. Amazon Alexa (for business)
4. Character AI
5. Google Gemini /Bard
6. Mistral
7. MidJourney
8. Microsoft Copilot
9. Github Copilot
10. Grammarly
11. Otter.ai

ASK B23 IF B20 = 1

**B23.**

IF A6=01, 02, OR 05: **In the last 12 months, have you personally used an AI-powered tool in your job for ...**

IF A7=1: **In your last main paid job, did you personally use an AI-powered tool in your job for ...**

| | YES | NO | DK |
|---|---|---|---|
| 1. writing or synthesis of text? | 1 | 2 | 8 |
| 2. analysis of data and numbers? E.g. data analytics | 1 | 2 | 8 |
| 3. brainstorming or developing new ideas? | 1 | 2 | 8 |
| 4. planning and scheduling? | 1 | 2 | 8 |

1 2 3 4 5 6 7 8 9 10

ASK B24 IF B20 = 1

**B24.**

IF A6=01, 02 OR 05: **And during the last 12 months, have you personally used an AI-powered tool for any of the following specific work purposes…**

IF A7=1: **And in your last main paid job, did you personally use an AI-powered tool for any of the following specific work purposes…**

| | YES | NO | DK |
|---|---|---|---|
| 1. customer advice or support? | 1 | 2 | 8 |
| 2. transcription? (by transcription we mean converting spoken words, either from a live conversation or a recorded audio/video, into a written text) | 1 | 2 | 8 |
| 3. image generation or recognition? | 1 | 2 | 8 |
| 4. translation, interpretation or language processing? | 1 | 2 | 8 |
| 5. other | | | |

ASK B28 IF B20 = 1

**B28. In your opinion, has using AI-powered tools made your work tasks easier, or more difficult, or has it made no difference …. ?**

01 Easier

02 More difficult

03 No difference

98 Don’t know

99 Refusal

ASK B25 IF WORKER = 1

**B25**.

IF A7=1: **Did you personally work with or alongside robots to do your job?**

IF A6=01, 02 OR 05: **Do you personally work with or alongside robots to do your job?**

01 Yes

02 No

98 Don't know

99 Refusal

ASK B26 IF WORKER = 1

**B26**

IF A7=1: **Did you personally use technology for predictive purposes when doing your last main job? For example, to predict when machines should be serviced, inventories updated, or fruit should be picked?**

IF A6=01, 02 OR 05: **Do you personally use technology for predictive purposes when doing your main job? For example, to predict when machines should be serviced, inventories updated, or fruit should be picked?**

01 Yes

02 No

98 Don't know

99 Refusal

1 2 3 4 5 6 7 8 9 10

ASK B27 IF WORKER = 1

**B27.**

IF A7=1: **Did you personally work with or alongside autonomous vehicles when doing your last main job?**

IF A6=01, 02 OR 05: **Do you personally work with or alongside autonomous vehicles when doing your main job?**

Examples are autonomous vehicles that transport items from storage to packing stations in warehouses; autonomous floor-cleaning robots in all kinds of workplaces; autonomous drones conducting safety inspections or inventory management in warehouses.

01 Yes

02 No

98 Don't know

99 Refusal

## DIGITAL MONITORING AT WORK

SHOW IF (WORKER = 1 AND B3=1 (i.e. NOT SELF-EMPLOYED )) OR (B3=2 and B5a=2 (i.e. self-employed without any employees))

**B29a**

ASK B29 IF WORKER = 1 AND B3=1 (i.e. NOT SELF-EMPLOYED )

**B29a. To your knowledge:**

PROGRAMMING INSTRUCTIONS: RANDOMIZE ITEMS (DO NOT RANDOMIZE ITEM 10)

| | YES | NO | DK | Not applicable | Refusal |
|---|---|---|---|---|---|
| 1. IF A7=1: Did your employer use tools to automatically monitor how many hours you work?<br>IF A6=01, 02, OR 05: Does your employer use tools to automatically monitor how many hours you work? | 1 | 2 | 8 | 9 | 10 |
| 2. IF A7=1: Were your keystrokes, screen, or document usage monitored by your employer? | | | | | |
| IF A6=01, 02, OR 05: Are your keystrokes, screen, or document usage monitored by your employer? | 1 | 2 | 8 | 9 | 10 |
| 3. IF A7=1: Did your employer monitor your calls or emails?<br>IF A6=01, 02, OR 05: Does your employer monitor your calls or emails? | 1 | 2 | 8 | 9 | 10 |
| 4. IF A7=1: Did your employer monitor your internet usage during working hours (e.g. websites visited, social media use)? | | | | | |
| IF A6=01, 02, OR 05: Does your employer monitor your internet usage during working hours (like websites visited and social media use)? | 1 | 2 | 8 | 9 | 10 |
| 5. IF A7=1: Were cameras used in your workplace to monitor your activities?<br>IF A6=01, 02, OR 05: Are cameras used in your workplace to monitor your activities? | 1 | 2 | 8 | 9 | 10 |

| | YES | NO | DK | Not applicable | Refusal |
|---|---|---|---|---|---|
| 6. IF A7=1: Did your employer monitor your entry, exit and/or movement (e.g. swipe cards)? IF A6=01, 02, OR 05: Does your employer monitor your entry, exit and/or movement (for instance with swipe cards)? | 1 | 2 | 8 | 9 | 10 |
| 7. IF A7=1: When you were at your workplace in your last main job, were any sensors or other devices used to monitor your location? IF A6=01, 02, OR 05: When you are at your workplace, are any sensors or other devices used to monitor your location? | 1 | 2 | 8 | 9 | 10 |
| 8. IF A7=1: In your last main job, did your employer monitor your location when driving the vehicle you used for work purposes (like GPS device, smartphone, biometrics)? IF A6=01, 02, OR 05: In your main job, does your employer monitor your location when driving the vehicle you use for work purposes (like GPS device, smartphone, biometrics)? | 1 | 2 | 8 | 9 | 10 |
| 9. IF A7=1: Did your employer monitor your social media profiles or online public activities? IF A6=01, 02, OR 05: Does your employer monitor your social media profiles or online public activities? | 1 | 2 | 8 | 9 | 10 |
| 10. IF A7=1: Did your employer do any other type of digital monitoring of your work? IF A6=01, 02, OR 05: Does your employer do any other type of digital monitoring of your work? IF B29_10 = 1 add [open end] | 1 | 2 | 8 | 9 | 10 |

SHOW IF B3=2 and B5a=2 (i.e. self-employed without any employees)

**B29b. To your knowledge:**

| | YES | NO | DK | Not applicable | Refusal |
|---|---|---|---|---|---|
| 1. IF A7=1: When doing your last main job, were tools used to monitor how many hours you worked?<br>IF A6=01, 02, OR 05: When doing your main job, are tools used to monitor how many hours you work? | 1 | 2 | 8 | 9 | 10 |
| 2. IF A7=1: When doing your last main job, were your keystrokes, screen, or document usage monitored?<br>IF A6=01, 02, OR 05: When doing your main job, are your keystrokes, screen, or document usage monitored? | 1 | 2 | 8 | 9 | 10 |
| 3. IF A7=1: When doing your last main job, were your calls or emails monitored?<br>IF A6=01, 02, OR 05: When doing your main job, are your calls or emails monitored? | 1 | 2 | 8 | 9 | 10 |
| 4. IF A7=1: When doing your last main job, was your internet usage monitored during working hours (e.g. websites visited, social media use)?<br>IF A6=01, 02, OR 05: When doing your main job, is your internet usage monitored during working hours (e.g. websites visited, social media use)? | 1 | 2 | 8 | 9 | 10 |
| 5. IF A7=1: When doing your last main job, were cameras used in your workplace to monitor your activities?<br>IF A6=01, 02, OR 05: When doing your main job, are cameras used in your workplace to monitor your activities? | 1 | 2 | 8 | 9 | 10 |

| | YES | NO | DK | Not applicable | Refusal |
|---|---|---|---|---|---|
| 6. IF A7=1: When doing your last main job, was your entry, exit and/or movement monitored (e.g. with swipe cards)? IF A6=01, 02, OR 05: When doing your main job, is your entry, exit and/or movement monitored (e.g. with swipe cards)? | 1 | 2 | 8 | 9 | 10 |
| 7. IF A7=1: When you were at your workplace in your last main job, were there any sensors or were other devices used to monitor your location? IF A6=01, 02, OR 05: When you are at your workplace, are there any sensors or are other devices used to monitor your location? | 1 | 2 | 8 | 9 | 10 |
| 8. IF A7=1: In your last main job, was your location monitored when driving the vehicle you used for work purposes (like GPS device, smartphone, biometrics)? IF A6=01, 02, OR 05: In your main job, was your location monitored when driving the vehicle you use for work purposes (like GPS device, smartphone, biometrics)? | 1 | 2 | 8 | 9 | 10 |
| 9. IF A7=1: When doing your last main job, were your social media profiles or online public activities monitored? IF A6=01, 02, OR 05: When doing your main job, are your social media profiles or online public activities monitored? | 1 | 2 | 8 | 9 | 10 |
| 10. IF A7=1: When doing your last main job, was any other type of digital monitoring of your work done? IF A6=01, 02, OR 05: When doing your main job, is any other type of digital monitoring of your work done? IF B29_10 = 1 add [open end] | 1 | 2 | 8 | 9 | 10 |

1 2 3 4 5 6 7 8 9 10

ASK B30 IF ANY ITEM B29a_1 to B29a_10 = 1 OR if ANY ITEM B29b_1 to B29b_10=1

**B30.**

IF ANY ITEM B29a_1 to B29a_10 = 1, SHOW: **Did your employer/company/organisation inform you in some way that they were using these digital monitoring practices for work activities?**

IF ANY ITEM B29b_1 to B29b_10=1, SHOW: **Were you informed that digital monitoring practices for your work activities were being used?**

01 Yes

02 No

03 Not applicable (self-employed)

98 Don't know

99 Refusal

## ALGORITHMIC MANAGEMENT

SHOW IF WORKER = 1

IF A6 =01, 02, 05: **All of the questions continue to be about your main paid job.**

IF A7=1: **All of the questions continue to be about your last main paid job.**

**B31**

ASK B31 IF WORKER = 1

**B31.**

IF A6=01, 02, OR 05: **Are your rosters or shift hours automatically allocated to you via a device such as a computer, tablet, smartphone or app?**

IF A7=1: **Were your rosters or shift hours automatically allocated to you via a device such as a computer, tablet, smartphone or app in your last main job?**

01 Yes

02 No

97 Not applicable

98 Don't know

99 Refusal

1 2 3 4 5 6 7 8 9 10

**B32**

ASK B32 IF WORKER = 1

**B32.**

IF A6=01, 02, OR 05: **Are your work tasks automatically allocated to you via a device such as a computer, tablet, smartphone or app?**

IF A7=1: **Were your work tasks automatically allocated to you via a device such as a computer, tablet, smartphone or app in your last main job?**

01 Yes

02 No

97 Not applicable

98 Don't know

99 Refusal

**B33**

ASK B33 IF WORKER = 1

**B33.**

IF A6=01, 02, OR 05: **Is the speed or rate at which you have to complete tasks at work automatically determined by a device such as a computer, tablet, smartphone or app?**

IF A7=1: **Was the speed or rate at which you had to complete tasks at work automatically determined by a device such as a computer, tablet, smartphone or app in your last main job?**

01 Yes

02 No

97 Not applicable

98 Don't know

99 Refusal

**B34**

ASK B34 IF WORKER = 1

**B34**.

IF A6=01, 02, OR 05: **Do you have to follow automated instructions or directions from a device such as a computer, tablet, smartphone or app to complete your work?**

IF A7=1: **Did you have to follow automated instructions or directions from a device such as a computer, tablet, smartphone or app to complete your work in your last main job?**

01 Yes

02 No

97 Not applicable

98 Don’t know

99 Refusal

**B35**

ASK B35 IF WORKER = 1

**B35**.

IF A6=01, 02, OR 05: **Are you automatically ranked on a leaderboard or dashboard so that your work can be compared to the work of your colleagues?**

IF A7=1: **Were you automatically ranked on a leaderboard or dashboard so that your work could be compared to the work of your colleagues?**

01 Yes

02 No

97 Not applicable

98 Don’t know

99 Refusal

**B36**

ASK B36 IF WORKER = 1

**B36**.

IF A6=01, 02, OR 05: **Are you automatically awarded points, prizes, stars, or similar, for meeting targets or different levels of work performance?**

IF A7=1: **Were you automatically awarded points, prizes, stars, or similar, for meeting targets or different levels of work performance in your last main job?**

01 Yes

02 No

97 Not applicable

98 Don't know

99 Refusal

**B37**

ASK B37 IF WORKER = 1

**B37**.

IF A6=01, 02, OR 05: **Are online customer ratings used as a way to automatically allocate projects, tasks, work, or shifts to you?**

IF A7=1: **Were online customer ratings used as a way to automatically allocate projects, tasks, work, or shifts to you in your last main job?**

01 Yes

02 No

97 Not applicable

98 Don't know

99 Refusal

**B38**

ASK B38 IF WORKER = 1

**B38**.

IF A6=01, 02, OR 05: **Could your shifts be automatically cancelled or suspended if you do not maintain a minimum performance rating or score?**

IF A7=1: **Could your shifts be automatically cancelled or suspended if you did not maintain a minimum performance rating or score in your last main job?**

01 Yes

02 No

97 Not applicable

98 Don’t know

99 Refusal

[TIMER_SECTION B: stop]

[TIMER_SECTION C: start]

## SECTION C: PLATFORM-MEDIATED WORK

**C1**

ASK ALL

**C1. Have you earned income from any of the following during the past 12 months?**

| | Yes | No | Refusal |
|---|---|---|---|
| 1. I have earned income by selling products or your own possessions on online marketplaces like Etsy, eBay and others | 1 | 2 | 9 |
| 2. I have earned income by renting out accommodation on online platforms like Airbnb, Sharedesk, Nestpick and others | 1 | 2 | 9 |
| 3. I have earned income by leasing out goods on online platforms like Turo, PeerRenters and others | 1 | 2 | 9 |
| 4. I have earned income through crowdfunding or lending money on peer-to-peer lending platforms like Kickstarter, Indiegogo, Zopa, Prosper, Kiva and others | 1 | 2 | 9 |
| 5. I have earned income by providing services either online or in-person using online platforms or apps such as Upwork, Freelancer, Clickworker, PeoplePerHour Uber, Deliveroo, Handy, TaskRabbit and others | 1 | 2 | 9 |

1 2 3 4 5 6 7 8 9 10

## C2

ASK C2 IF C1_5 = 1

**C2. What type of services have you provided via online platforms during the past 12 months?**

Multiple answers are possible.

| | Yes | No | Refusal |
|---|---|---|---|
| 1. Taxi and people transportation services | 1 | 2 | 9 |
| 2. Food and other goods delivery services | 1 | 2 | 9 |
| 3. Online software development or technical services | 1 | 2 | 9 |
| 4. Online creative work | 1 | 2 | 9 |
| 5. Online marketing services | 1 | 2 | 9 |
| 6. Online clerical tasks or administration assistance services | 1 | 2 | 9 |
| 7. Online data entry tasks | 1 | 2 | 9 |
| 8. Online writing and/or translation work | 1 | 2 | 9 |
| 9. Online professional services such as legal or financial services | 1 | 2 | 9 |
| 10. Interactive online lessons | 1 | 2 | 9 |
| 11. Online content moderation | 1 | 2 | 9 |
| 12. In-person cleaning, gardening or care work in peoples' homes | 1 | 2 | 9 |
| 13. Other [open end] | 1 | 2 | 9 |

PLATFORM_WORKER = 1 IF AT LEAST ONE ITEM C2_1 to C2_13 = 1

PLATFORM_WORKER = 0 IF ALL ITEMS C2_1 to C2_13 = 2 OR 9

ASK C3 IF PLATFORM_WORKER = 1

**C3. How many platforms or apps have you used or worked through to provide services during the past 12 months?**

[enter number, valid range 1-13]

98 Don't know

99 Refusal

**C4**

ASK C4 IF PLATFORM_WORKER = 1

**C4. What is the name of the main platform or app that you have used or worked through to provide this service during the past 12 months?**

[OPEN END]

Interviewer: DO NOT READ OUT, only tick those that are applicable or type in verbatim as open end

1. UpWork
2. Uber/Bolt/Cabify
3. AirBnB
4. PeoplePerHour
5. Freelancer.com
6. Guru.com
7. TaskRabbit
8. Amazon Mechanical Turk

1 2 3 4 5 6 7 8 9 10

**C5**

ASK C5 IF WORKER = 1 AND PLATFORM_WORKER = 1

**C5. Is the provision of services via digital platforms or apps the "main job" you had in mind when you were answering my earlier questions about your usual hours of work etc. ?**

01 Yes

02 No

98 Don't know

99 Refusal

**C6**

ASK C6 IF PLATFORM_WORKER = 1

**C6. When you are providing services through online platforms, how are your tasks, jobs, or projects typically assigned to you? I will read out some options, and you can tell me which one best describes your situation.**

01 The platform automatically assigns me tasks when I'm logged in and available

02 I choose which tasks to accept when I'm logged in and available

03 Clients choose me for tasks after seeing my details online

04 I find tasks outside the platform but use it to book time slots or appointments

05 Clients contact me directly, like by phone or email, and I use the platform only for booking

06 Other, please specify [open end]

98 Don't know

99 Refusal

1 2 3 4 5 6 7 8 9 10

### C7

ASK C7 IF PLATFORM_WORKER = 1

**C7. Do you get paid for these services through the platform, or do you get paid directly by the client?**

- 01 I receive my payment through the platform
- 02 The client pays me directly, and not through the platform
- 03 A mix of both, that is receiving some payments through the platform as well as some clients paying me directly
- 98 Don’t know
- 99 Refusal

### C8

ASK C8 IF PLATFORM_WORKER = 1

**C8. How frequently have you worked via online platforms or apps providing the services indicated?**

- 01 Daily or almost daily
- 02 At least once weekly
- 03 At least once monthly
- 04 At least once during the past 6 months
- 05 At least once during the past 12 months
- 06 I provided the services more than a year ago, but not in the past 12 months
- 98 Don’t know
- 99 Refusal

**C9**

ASK C9 IF PLATFORM_WORKER = 1 and C8<>6/98/99

[numeric] **C9.**

IF C8= 1 to 3: **How many hours per week did you work, on average, via all online platforms or apps in the last month?**

IF C8=4 or 5: **How many hours per week did you work, on average, via all online platforms or apps in the last month or the last time you provided a service?**

[enter number, valid range 0-168]

98 Don't know

99 Refusal

**C10**

ASK C10 IF PLATFORM_WORKER = 1 and C9<>98 or 99

If C9=0 show "<1" as insert in C10

**C10. Does the** [infill C9] **hours include the time you spent searching for work, updating your online profile and/or promoting yourself online?**

01 Yes

02 No

98 Don't know

99 Refusal

**C11**

ASK C11 IF PLATFORM_WORKER = 1

**C11. What proportion of your total personal net earnings comes from providing work via platforms or apps?**

[enter 0-100] **%**

998 Don't know INTERVIEW INSTRUCTION: DO NOT READ OUT

999 Refusal INTERVIEW INSTRUCTION: DO NOT READ OUT

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

ASK C12 IF PLATFORM_WORKER = 1

**C12. Are there any trade unions or similar workers associations who represent people who do work via the same platform or app as you?**

01 Yes

02 No

98 Don’t know

99 Refusa

ASK C13 IF PLATFORM_WORKER = 1

**C13. Are you aware of any informal channels where workers can express their views about what is happening with their platform or app work? For example, social media groups, online chat rooms, common meeting places/hubs**

01 Yes

02 No

98 Don’t know

99 Refusal

ASK C14 IF C13 = 1

**C14. Have you ever participated in any of these informal channels?**

01 Yes

02 No

98 Don’t know

99 Refusal

[TIMER_SECTION C: stop]

## SECTION E: UNPAID DIGITAL LABOUR

[TIMER_SECTION E: start]

SHOW TO ALL

IF WORKER = 1: **THE NEXT QUESTIONS ARE ABOUT YOUR ONLINE ACTIVITIES OUTSIDE WORK.**

IF WORKER = 0: **THE NEXT QUESTIONS ARE ABOUT YOUR ONLINE ACTIVITIES.**

**E1**

ASK ALL

**E1. In the past 12 months, have you ever ….**

MULTIPLE ANSWERS ARE POSSIBLE

| | Yes | No | DK | Refusal |
|---|---|---|---|---|
| 1. **Written posts for social networks** (such as Facebook, Twitter, etc) aimed at people outside your family or close friends | 1 | 2 | 8 | 9 |
| Produced photos, videos or audios to be shared online with people outside your family and close friends (like posting videos on Googlephotos, YouTube, Instagram, TikTok) | 1 | 2 | 8 | 9 |
| 2. Written blogs or other long pieces of text/articles to be shared online | 1 | 2 | 8 | 9 |
| 3. **Participated in online forums** (like Reddit or technical forums) | 1 | 2 | 8 | 9 |
| 4. **Written public consumer reviews for websites and/or apps** (like Google, Booking.com, Tripadvisor, Trustpilot, IMDB, Goodreads) | 1 | 2 | 8 | 9 |
| 5. Written text or other content for collaborative information websites (like Wikipedia) | 1 | 2 | 8 | 9 |
| 6. Collaborated in voluntary projects coordinated from a website or an app, such as free software development (like Mozilla, R) | 1 | 2 | 8 | 9 |

DIGITAL_WORKER = 1 IF AT LEAST ONE ITEM E1_1 to E1_7 = 1

DIGITAL_WORKER = 0 IF AT ALL ITEMS E1_1 to E1_7 = 2, 8 OR 9

1 2 3 4 5 6 7 8 9 10

**E2**

ASK E2 IF DIGITAL_WORKER = 1

**E2. During the past 12 months, how often did you do this?**

01 Daily or almost daily

02 At least once weekly

03 At least once monthly

04 At least once every 6 months

05 At least once during the past 12 months

06 I provided services more than a year ago, but not in the past 12 months

98 Don’t know

99 Refusal

**E3**

ASK E3 IF DIGITAL_WORKER = 1

**E3. On average, how much time each week did you spend doing this?**

[enter number, valid range 0-59] minutes (if less than 60 minutes) or

[enter number, valid range 1 -168] hours

98 Don’t know [Exclusive]

99 Refusal Exclusive]

**E4**

ASK E4 IF DIGITAL_WORKER = 1

**E4. What is/are the name/s of the websites or apps (platforms)?**

[OPEN END]

1
2
3
4
5
6
7
8
9
10

**E5**

ASK E5 IF DIGITAL_WORKER = 1

**E5. What motivates you to do this?**

| | Yes | No | DK | Refusal |
|---|---|---|---|---|
| 1. Peer recognition/social interaction/communication | 1 | 2 | 8 | 9 |
| 2. Self-promotion (publicity for myself, my services, or my products/art) | 1 | 2 | 8 | 9 |
| 3. Fun | 1 | 2 | 8 | 9 |
| 4. General benefit to society/ help others | 1 | 2 | 8 | 9 |
| 5. To gain experience | 1 | 2 | 8 | 9 |
| 6. Chance to win gifts/lottery | 1 | 2 | 8 | 9 |
| 7. Mutual exchange, barter | 1 | 2 | 8 | 9 |
| 8. Unpaid work experience in order to get future income | 1 | 2 | 8 | 9 |
| 9. Other, please specify [open end] | 1 | 2 | 8 | 9 |

**E6**

ASK E6 IF DIGITAL_WORKER = 1

**E6. Can I just check whether you received any kind of monetary or non-monetary reward (free products, commissions, royalties, money, etc) for this online activity?**

01 Yes

02 No

98 Don't know

99 Refusal

**E7**

ASK E7 IF DIGITAL_WORKER = 1 AND IF E6 IS NOT 2 'No'

[M, with options 5, 8 and 9 as exclusive answers] **E7. Did you ….**

01 Receive free products

02 Receive commission or money from in-site advertising

03 Receive royalties or commission based on the number of views/followers

04 Other, please specify [open end]

05 I have not received any of the above

98 Don't know

99 Refusal

[TIMER_SECTION E: stop]

## SECTION D: SOCIO-DEMOGRAPHICS II

[TIMER_SECTION D: start]

SHOW TO ALL

**D1**

ASK ALL

**D1. Including yourself, can you please tell me how many people live in your household?**

Number of people living in household: [enter number, valid range 1-15]

99 Refusal

**D2**

ASK ALL

[GRID, numeric] **D2. Including yourself, how many of them are … ?**

PROGRAMMING INSTRUCTION: ACCEPT NUMBER D1 (total number of people in household). SUM D2_1, D2_2, D2_3 SHOULD BE D1

IF D1=99, valid range= 1-15

01 Aged between 16 and 65? [enter number]

02 Aged less than 15 years old? [enter number]

03 Aged older than 65? [enter number]

99 Refusal

ASK ALL

**D3a. Were you born in** [COUNTRY that is called]**?**

01 Yes

02 No

98 Don’t know

99 Refusal

ASK D3b IF D3a = 2

**D3b. In which country were you born?**

97 Other (Born in a non-EU country)

98 Don’t know

99 Refusal

1 2 3 4 5 6 7 8 9 10

ASK D4 IF D3a = 2

**D4. How many years have you been living in** [COUNTRY that is called]**?**

[enter number, valid range 00-A1 (Age)] years

00 If less than 1 year

98 Don’t know

99 Refusal

ASK ALL

**D4a. Have you received income from a paid job in the last 12 months?**

01 Yes

02 No

98 Don’t know

99 Refusal

D5

ASK IF D4a=1

**D5**.

**Please can you provide the approximate range for your personal NET earnings from your main paid job? You can provide this on a weekly, monthly or annual basis.**

IF A7 = 1 OR A6 = 6: **Please can you provide the approximate range for your personal NET earnings from your last main paid job? You can provide this on a weekly, monthly or annual basis.**

| Code | weekly | monthly | annual |
|---|---|---|---|
| D | Less than 175€ | Less than 700 € | Less than 8400 € |
| B | 176 €- 225 € | 701 €- 900 € | 8401 €- 10800 € |
| I | 226 € - 275 € | 901 € - 1100 € | 10801 €- 13200 € |
| O | 276 € - 300 € | 1101 € - 1200 € | 13201 € - 14400 € |
| T | 301 €- 325 € | 1201 € - 1300 € | 14401 € - 15600 € |
| G | 326 € - 350 € | 1301 €- 1400 € | 15601 € - 16800 € |
| P | 351 €- € 400 € | 1401 €- 1600 € | 16801 € - 19200 € |
| A | 401 €- € 450 € | 1601 €- 1800 € | 19201 € - 21600 € |
| F | 451 €- € 500 € | 1801 €- 2000 € | 21601 € - 24000 € |
| E | 501 €- 600 € | 2001 € - 2400 € | 24001 € - 28800 € |
| Q | 601 € - 700 € | 2401 € - 2800 € | 28801 € - 33600 € |
| H | 701 € or more | 2801 € or more | 33601 € or more |
| 88888888 | DK | DK | DK |
| 99999999 | Refusal | Refusal | Refusal |

ASK ALL

**D6. Do you use more than one mobile phone?**

01 Yes

02 No

98 Don’t know

99 Refusal

ASK IF D6=1 (Yes)

**D7. How many mobile phones do you use with a sim card from an EU country?**

[enter number, valid range 1-5]

98 Don't know

99 Refusal

[TIMER_SECTION D: stop]

[TIMER_SECTION F: start]

**rB1.**

ASK rB1 IF WORKER = 1 and B1 is NOT 98 or 99

You now have the opportunity to edit typo's and further correct what you have written on these questions:

IF A6=01, 02, OR 05: **What is the title of your main paid job? Please be as specific as you can.**

IF A7=1: **What was the title of your last main paid job? Please be as specific as you can.**

Answer option 1: I don't want to make changes to the job title, all is clean and clear

Answer option 2: open end box 1000 characters

**rB2**.

ASK rB2 IF WORKER = 1 and B2 is NOT 98 or 99

You now have the opportunity to edit typo's and further correct what you have written on these questions:

IF A6=01, 02, OR 05: **What are your main responsibilities in your job?**

IF A7=1: **In your last job, what were your main responsibilities?**

Scripter: insert answer <B2>

Answer option 1: I don't want to make changes to the job role/function, all is clean and clear

Answer option 2: open end box 1000 characters

**rB7.**

ASK rB7 IF WORKER = 1 and B7 is NOT 98 or 99

You now have the opportunity to edit typo's and further correct what you have written on these questions:

IF A6=01, 02, OR 05: **What is the MAIN activity of the company/organization you work for?**

IF A7=1: **What is the activity of the company/organization you worked for?**

Scripter: insert answer <B7>

Answer option 1: I don't want to make changes to the sector, all is clean and clear

Answer option 2: open end box 1000 characters

[TIMER_SECTION F: stop]

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