

STOCK-TAKING REPORTS

Developments in Algorithmic  
Management from an IR-perspective

# Germany

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## Contents

Introduction.....	3
Section I – Research and data sources in relation to the use of algorithms, artificial intelligence and algorithmic management.....	4
Section II – Main policy issues and challenges in relation to the use of algorithms and algorithmic management by companies: views from Social Partners and the government.....	8
Section III – The governance of algorithmic management; the role of collective bargaining.....	12
References.....	15

## Introduction

In November 2018, the German federal government adopted the artificial intelligence strategy, setting a framework for a holistic political design of the further development and application of artificial intelligence in Germany. One of the measures of the AI-strategy includes evaluating the use of AI in Germany at regular intervals. The study of AI use in Germany in 2019 provides an overview of the current status of the use of AI in companies in Germany. Using statistical indicators, it shows in which sectors of the German economy AI was used in 2019, to what extent and for what purpose.

In the survey, AI was defined as "information processing technology for the independent solving of problems by computers". In 2019, 5.8% of the companies in the innovation survey used artificial intelligence methods in their company (BMW 2020). Another survey on behalf of the Federal Association of the Digital Economy (BVDW 2021) reports even higher shares of AI usage. According to this survey, AI use has more than doubled between 2019 and 2021. In 2019, around 10 percent of the companies surveyed said they were using AI. A year later it was almost 13 percent. From 2020 to 2021, the proportion of companies using AI rose to more than 21 percent.

In the ICT sector, the proportion of companies using AI was significantly higher at 17.8%. None of the other industry groups achieve this value (BMW 2020). A widespread use of AI is also found in financial services (12.2% of companies) and in business-related services (including tax and business consulting, engineering offices, advertising) with a good 11%. In the industrial sectors, electrical and mechanical engineering have the highest proportion of companies using AI at 6.8%.

The most widespread AI technique is machine learning and machine reasoning (55% of companies using AI). Processes of image or sound recognition as well as knowledge-based systems are used by almost every second company that uses AI, while speech or text comprehension is used by less than a third. The main areas of application for AI are products and services as well as the automation of processes.

Half of the companies that use AI also use personal data for AI applications. This proportion is highest in financial services, where around three quarters of the companies that use AI also process personal data. The smallest proportion of companies that use personal data as part of AI solutions can be found in electrical engineering and mechanical engineering (17%) and in vehicle construction (24%). (BMW 2020).

However, when interpreting these numbers, we should keep in mind that the percentage of companies using AI does not tell us anything about the distribution of AI and different usages among workers.

Regarding the use and regulation of AI and AM, the German case can be characterized on the one hand by an overall lack of formalized regulations (at legal, sector, and company level) with an explicit focus on AI and AM issues, on the other hand by a relative large number of established legal regulations, sectoral and company agreements, and union and works council activities that are indirectly governing the field of AI and AM application by addressing issues of data protection, platform work, co-determination, or discrimination.

However, in many respects the existing national regulations do not cover specific issues that arise in the course of AI and AM.

Challenges for industrial relations, policy makers, and the regulation of AI and AM arise in the following three areas of the German workplace: (1) Transparency issues. Employers often do not provide sufficient information on the methods used in AI applications. This refers also to barriers at the side of developers of AI-based systems who are often not actively providing both employees and their works councils with adequate information about the functioning of the systems. (2) Control issues: According to the existing data protection regulations employer may collect and process individual data when this information is used to fulfill the specific work purpose. Since this regulation leaves room for interpretation, misuse by companies occurs as demonstrated by examples of platform-based passenger transportation or food-delivery services. (3) Co-determination issues: The rights and competencies of works councils and workers to be informed and involved in the planning phase of AI systems needs to be strengthened at the legal and collective bargaining level. Since the rights of co-determination are reduced as soon as systems are introduced, it is important that employees, works councils and human resource management have the appropriate skills and information to draw the right conclusions, including possible long-term effects and unintended developments. Processual forms of co-determination gain importance, since governance and monitoring of AI and AM are becoming permanent tasks.

Moreover, specific challenges arise in terms of sectoral differences. Industrial manufacturing and food delivery services represent two contrasting fields regarding management strategies, employee representation, and needs and pathways of AI regulation. Compared to platform-based work in the food-delivery sector, where control and transparency issues are salient and co-determination is constrained, introduction of AM and AI in the manufacturing sector takes place in a more favorable environment. It is characterized by profound rights and a widespread culture and acceptance of co-determination by works councils and unions, which are actively using the given opportunities provided by law. The focus is rather on the optimization and flexibilization of work processes and work flows than on issues of individual performance control. However, the functioning and consequences of AM and AI applications often remain a black box. Unforeseeable and unintended effects in terms of control, standardization and work intensification might occur in the long run pointing towards new and often hidden demands for regulation, even in a favorable setting. Research is needed to further explore these issues.

## Section I – Research and data sources in relation to the use of algorithms, artificial intelligence and algorithmic management

A recent **representative employee survey** (DiWaBe-Survey) by the German Institute for Employment Research (IAB) and the Federal Institute for Occupational Safety and Health (BAuA) provides a good overview on AI usage by workers (see for the following Tisch et al. 2021). The survey evidences that digital trend technologies are gaining in importance at the German workplace. Almost a third of the employees reported that they use big data (at least rarely); about a quarter used artificial intelligence (AI). About 12% of the employees worked primarily on stationary machines and systems (including stationary robotic systems), about 10% used mobile devices and tools and 14% worked with measuring and diagnostic devices; less than 1% worked with mobile robots.

Moreover, the study evidences clear differences between skill levels: In unskilled or semi-skilled jobs only 14% of the workers report to use AI. Among workers who perform skilled tasks (23%), complex specialized work (27%) or highly complex tasks (30%) the share of AI users is considerably higher. Regarding sectors, workers in IT and Scientific Services (39%), Trade (35%), Manufacturing (30%), or Business-Related Services (30%) report the highest shares of AI users. Workers in Food and Gastronomy (13%) or Transportation and Logistic (14%) report considerably lower shares (13%). However, case numbers regarding the latter two sectors are rather small in the survey. Specific subgroups, like workers in Food Delivery Services are not well represented.

Due to the cross-cutting design of the study it is not possible to investigate AI effects in a causal way. By looking at associations of variables, we find evidence for a differentiated pattern (Tisch et al. 2021). Employees reported a higher work intensity when their information and communication media are digitized or smart interacting: More than half of the workers often experienced deadlines or pressure to perform, and almost four out of five employees often mastered several tasks at the same time (multitasking). The users of digitized and smart interacting tools, machines, devices and systems also reported multitasking somewhat more frequently than those who work without interacting devices. At the same time, employees who work with computer-aided and smart interacting information and communication technologies had slightly more control over their individual pace of work than employees work is not computer-based at all. Likewise, more employees reporting smart interacting work equipment to be able to organize their work themselves. (Tisch et al. 2021)

In 2019, the German service sector union 'Vereinigte Dienstleistungsgewerkschaft ver.di' conducted a survey on AI use in the service sector: the 'ver.di Innovation Barometer 2019 – Artificial Intelligence' (see for the following Müller, 2021). It is based on information provided by works councils, staff councils, and employee representatives on supervisory boards. The study provides evidence that AI systems have so far only made a minor contribution to improving the quality of work, while the risk of job losses, greater work intensity and control is increasing.

The results of the survey evidence clear problems in the use of AI systems. Two third of the interviewed representatives fear that that the number of jobs will decrease as a result of the use of AI, only three percent expect an increase. Moreover, half of the respondents (52%) report an increase in work intensity (11% report a decrease); 42 percent summarized more frequent disruptions to work processes (11% less disruptions). Half of the interviewed representatives (50%) recognize an increase in the transparency of the work and performance behavior of employees (13% a decrease). More than a half (60%) report a reduction in work autonomy and decision-making through AI (4% report an increase).

The survey identifies the given lack of information and co-determination as the main reason for the negative impact of AI on work conditions in the service sector. Almost one third of the surveyed employee representatives, works and staff councils report that they do not even know whether AI is used in their company. The majority (57%) is not involved in the planning and implementation of AI projects. (Müller 2021)

**Qualitative research** has explored the functioning and impact of algorithmic management more deeply by using firm-level case studies. Prominent fields of research are (location-based forms of) platform work such as food delivery or other driving services (see the overview by Lücking 2019), logistics (Butollo et al. 2018; Staab & Geschke 2019), manufacturing (Evers et al. 2020) or HR work (Spiekamp & Gießler 2020).

While food and meal delivery services are usually regarded as an example of strong algorithm-based control and standardization of low-skilled work, case-studies in the manufacturing or logistic sector draw a more ambiguous picture. Regarding the industrial work place, algorithmic-based steering of the labor process in terms of assistance systems, smart wearables, or manufacturing execution systems are increasingly used as

an element of Industrie-4.0. The most criticized aspect of algorithmic-based work governance is their potential to gather data on worker productivity and their ability to closely monitor activities (Falkenberg, 2018). Particularly, in assembly work and logistics algorithmic-based assistance systems are applied to guide workers throughout the assembly process or in the selection of parts. While the business and engineering literature tends to emphasize the positive effects of assistance systems on productivity – increased worker speed and fewer errors (Reif & Günthner, 2009; Tang et al., 2004) – other studies do not find an increase in productivity after assistance systems are implemented (Klippert et al., 2018). Productivity goals are often reflected in the design of systems, which usually provide workers with rather restrictive work instructions to reduce independent decisions or intuitive deviations from the predetermined work process (Niehaus, 2017). The fixation on a predefined workflow found in most systems for low skilled work limits workers' control over the process and can be problematic if unexpected situations arise (Müller et al., 2019). A lack of flexibility could cancel out productivity gains from the process standardization described above and reduce workers' ability to optimize their workflow (Gergana et al. 2019; Mark et al. 2020; Wotschack et al. 2021).

Other studies show that these systems can go along with very different concepts of work: on the one hand, algorithmic-based assistance systems or MES-system can provide very flexible, situational information to the employees and can be used to improve the transparency of work processes, optimize individual work performance and work organization, and upgrade work contents and skills (Klippert 2020). On the other hand, they permanently record data on performance and execution of work and can be an instrument of standardization and control (Evers et al. 2019).

Approaches that focus on standardization and control of work are dominant in logistics. In production, the goals of greater flexibility in the performance of tasks are dominant. Several studies evidence the importance of co-determination regarding both, the introduction of the new technology and issues of performance regulation to recognize aspects of a human-oriented design of assistance systems and wearables. A notable result is the relatively high acceptance of digital assistance systems, even in highly standardized processes. There are few conflicts, also due to the strong role of the works councils in securing data protection criteria and preventing performance and behaviour controls. Moreover, there is evidence that the acceptance of algorithmic-based assistance systems (such as smart wearables) by the workers relates to issues of transparency and co-determination. Employees are willing to have their performance, physical conditions and emotions measured if they retain control over the data and data usage and if this has a clear benefit for their work - especially in terms of relieving and facilitating the workload (Evers et al. 2019).

In the German food delivery sector AI and AM often occurs in form of 'app-based management' (Ivanova et al. 2018, p. 12) and relates to a high degree of external control of the work process in the sense of Kellogg et al. (2020). The smartphone is the focal point of algorithmic management in location-based platform work. It not only ensures the mobility of the platform workers, but also enables the extensive collection of data that can be evaluated - in particular movement data via GPS - due to the many sensors that a smartphone has.

The study by Ivanova et al. (2018) provided evidence that the tracking of movement data generates an enormous amount of data, which enables a comprehensive control of the work processes. The automatic evaluation of this data serves to optimize the processes and to monitor the work performance of the 'riders'. The assignment of work orders is based on the data evaluation. Automated decision-making occurs through the algorithms, which often creates the impression of technical rationality and objectivity. The app can also be used to generate additional incentives for motivation and performance improvement through push messages. By offering minor choices the app can foster the impression of autonomy and set incentives to increase individual productivity gains ('digital nudging') (Lücking 2019).

Data on the work performance is sometimes used to initiate a competition among workers but is also used for hierarchical purposes by dividing the couriers in different groups. Lucrative working shifts or orders are only displayed to ‘best performers’. A central element of the algorithmic control by the app is the information asymmetry: the drivers remain unaware of the exact extent and purpose of the service. They neither know how the summary metrics, used to compare their performance, are calculated, nor how they enter decisions on the working shifts or orders offered to them. (Schreyer & Schrape 2018)

Regarding the **regulation of AM and AI systems** at the work place, Germany is characterized by a lack of formalized regulations with an explicit focus on AM issues at organizational and sectoral level, but a large number of established legal regulations, sectoral agreements, or union and works council activities that are indirectly related to issues of AI and AM. Important statutory regulations are the (European) General Data Protection Regulation (GDPR) (‘Datenschutz Grundverordnung’), the (German) Federal Data Protection Act (‘Bundesdatenschutzgesetz’), the Works Constitution Act (‘Betriebsverfassungsgesetz’), Co-determination Law (‘Mitbestimmungsgesetz’), General Equality Law (‘Allgemeines Gleichbehandlungsgesetz’) (often called Anti-Discrimination; Antidiskriminierungsgesetz), or Labour law.

Many issues of AM in human resources are already addressed by regulations on data protection. Data protection in Germany is rooted in the new Federal Data Protection Act from 2018. The law is a supplement to the European General Data Protection Regulation and specifies it. Any personal data processing must be justified by certain facts in these data protection regulations. This also applies to the use of algorithms to decide on the allocation of tasks and promotions. Personal permanent monitoring of employees is only permitted if voluntary.

However, there remain issues regarding surveillance measures in the workplace. In principle, it is possible to carry out such measures in compliance with given data protection regulations, when they are necessary to fulfill the work. Since the employer may collect and process the data that is necessary to fulfill the specific work purpose, the regulation leaves room for interpretation.

Prominent examples are platform-based passenger transportation (like Uber) or food-delivery services (like Lieferando). In both cases, companies need to show that driver apps comply with applicable data protection regulations and that the data collected (such as times and locations) are essential for the delivery service to function properly. Traceability is to a certain extent necessary for the operational process. However, according to many experts it is not in line with GDPR anymore, when the data of the drivers is processed on a massive scale, transmitted to third parties, or when the data collected is used to monitor the performance of the employees (Schewior 2021).

Moreover, the company has to conform to transparency requirements according to (Art. 13) of the GDPR. Employees must therefore be informed about how their personal data is processed. This includes, for example, the possible transfer of data to third parties. In addition, a data protection impact assessment can be requested (in accordance with Art. 35 (1) GDPR) in order to evaluate the scope of the data processing.

The German Works Constitution Act (‘Betriebsverfassungsgesetz’) plays a major role in the regulation of AM and AI in Germany. It provides extensive information and advisory rights as well as effective co-determination rights to works councils that also apply to the use of AI systems and algorithms. They are derived from the general right to information (Section 80 & 90 BetrVG). This broadly defined right applies without restriction to the automation of personnel management using AI systems. Employers are obliged to inform the works council in advance and comprehensively about the relevant planning. The same applies with regard to the introduction of technical systems in work processes.



Particularly important for AI and AM usage is Section 87 ((1) No. 6) of the Works Constitution Act giving works councils broad rights for co-determination. It refers to technical equipment with which the behavior or performance of employees can be monitored. Even if companies involve third parties for the implementation of AI systems and do not even have access to the recorded data, the right of co-determination applies, obliging companies to involve their works councils and to ask for their agreement. However, if only anonymous data is collected or if only the performance of an entire department or group is evaluated, the works council generally has no say - although group monitoring does have an impact on individual workers. The co-determination right does not only apply to the use but also to collection of data. Examples are cyber-physical systems using RFID chips or fingerprint scanner systems.

The right of co-determination also applies when work schedules in terms of the start and end of daily working hours are changed or when working days are shifted within the week. Works councils also have to be involved by the employer in the case of a temporary change in regular working hours (Section 87 (1) No. 3 BetrVG). This might be the case when AI or AM systems intervene in shift planning and work schedules.

Recently the Works Councils Modernization Act ('Betriebsrätemodernisierungsgesetz') (6/2021) came into effect, aiming at a stronger involvement of works councils when AI-based systems are introduced (see section III). When it comes to AI applications processing individual data, works councils can generally have a say.

Regarding collective agreements, there are no detailed specifications for AI or AM. Recently, so-called future-oriented collective agreements ('Zukunftstarifverträge') and digitation-oriented collective agreements ('Digitalisierungstarifverträge') have been introduced that could also play a role in the regulation of AI-based systems (see section III).

The unions are recently active at the legal level and have published a number of position papers addressing general requirements regarding the regulation of AI and AM at the work place, the planned EU regulation (AI act) on harmonized rules for Artificial Intelligence, or the use of AM in platform work (see section III). A partial success was the Works Councils Modernization Act (see above), which strengthens the rights of works councils regarding the introducing and use of AI and AM.

## Section II – Main policy issues and challenges in relation to the use of algorithms and algorithmic management by companies: views from Social Partners and the government

In a package of measures by the **federal government** to overcome the effects of the corona pandemic from June 2020, the financial support for AI in Germany was increased from three to five billion euros by 2025. The federal government has also further developed its AI strategy from 2018 and published an update in December 2020. Their focus is on the five areas of (1) AI specialists, (2) research structures, (3) transfer and application, (4) development of a suitable regulatory framework and (5) social networking. With the help of the strategy, national efforts should be focused on those five areas. In addition to this national strategy, the federal states are also making efforts to promote KI.

The **Enquete Commision** ‘Artificial intelligence – social responsibility and economic, social and ecological potential’ was established in 2018 at the request of the parliamentary groups to analyze the opportunities and potential of AI and developing recommendations for action based on this. In the final report, presented in October 2020, the Enquete Commission concludes that the need for action concerning AI regulation has even increased. Important needs for action that have been identified are that an interdisciplinary dialogue is necessary to leverage the potential of AI. Furthermore, standards must be established, and experimental spaces created. The infrastructure is also seen as an important factor in the deployment. The Commission also called for coordination at European level.

On the side of the **employers**, a recent report on behalf of the German Association of the Digital Economy (BVDW 2021) - the central body for the representation of interests of companies that operate digital business models and whose value creation is based on the implementation of digital technologies - sees a lack of transparency and regulation regarding the use of AI and welcomes regulations at the national and European level. To foster the overall positive development of AI, a good balance between freedom for innovations and fixed requirements for legal certainty needs to be achieved. Trust-building effects in both, economy and society, are required to fully unfold the potential of AI, making Germany and the entire European Union the leading region for trustworthy AI.

While a uniform European regulatory approach is welcomed, freedom for innovation, should not be hindered by strict framework conditions, ‘hasty regulation’ or a broad definition of so-called high-risk AI systems. When it comes to new regulatory measures, politicians should rather close demonstrable gaps in the existing regulation and focus on the applications of an AI technology and not restrict the technology itself. (BVDW 2021)

Concrete policy recommendations relate to (1) transparency, (2) ethic labels, (3) certification for high-risk systems, and (4) involvement of the civil society.

(1) Improving the transparency of AI. According to the report, AI model should be explainable and enable a target person to understand the functioning and outcome of an AI model. The least explainable AI models include black box models. However, the use of black box models will be intensified in the future, which means that there is a need to catch up in research.

(2) Establishing ethics labels for AI systems: The report states that voluntary ethics labels for AI systems could contribute to greater acceptance in society. In addition, voluntary commitments by companies should create trust in AI. The German Institute for Standardization (DIN) and the German Commission for Electrical, Electronic & Information Technologies (DKE) developed the standardization roadmap KI on behalf of the Federal Ministry of Economic Affairs (BMWi). Similar to the regulatory proposal of the European Commission it recommends a risk assessment of AI applications.

(3) Introducing certification for high-risk AI systems: In line with the regulatory proposal of the European Commission, suggesting certifications for high-risk AI applications, the report suggests to design certifications for AI applications quickly and practically and to start their implementation. For this purpose, assessment standards must first be defined. An important first step can therefore be to identify suitable security-critical use cases for certain AI systems in order to derive technical guidelines based on them and then develop standards.

(4) Involving civil society in the debate on AI. The report suggests involving actors of the civil society to accompany and promote the development of AI together with actors from business and science. Potential project partners from civil society, educational institutions, science, administration, SMEs, AI developers and

start-ups can network and share their knowledge, experience and needs exchange information with each other. Such a platform should be developed, implemented and evaluated in the new federal government legislature.

In 2018, the **union of the service workers** ('Vereinigte Dienstleistungsgewerkschaft ver.di') – the second largest union in Germany - has outlined the following requirements and guidelines for the use of AI and AM: (1) Development of a social vision as a guiding principle for the use of AI in Germany, (2) linking AI development to democratic processes and social dialogues, (3) clear ethical rules and criteria for good work and banning autonomous weapon systems, (4) creation of a responsible body and rules, taking care of strict purpose limitation, impact assessment according to the EU-GDPR, and defining intervention mechanisms, (5) accountability: transparency of the functional mechanisms and decision-making parameters ('white box models'), (6) expansion of AI safety and work research and technology assessment, testing of AI applications, (7) mandatory labeling for chatbots when they are used for AI-generated media content, (8) disclosure and redistribution of efficiency gains through AI in areas of social need such as health, care, education and mobility, (9) earliest possible participation of co-determination representatives and employees: strengthening and expanding co-determination (including simplifying the establishment of works councils) and AI advice for co-determination actors, (10) safeguarding personal rights and human dignity (Müller 2021; see also [www.innovation-gute-arbeit.verdi.de](http://www.innovation-gute-arbeit.verdi.de))

Moreover, the union suggested to design AI systems in such a way that the scope for action and design of the workforce is expanded. Instead of devaluing activities, they should be upgraded through targeted qualification. This can be flanked by collective agreements. AI systems that are based on the processing of large amounts of data should not endanger personal rights, and the purpose of the data must be ensured. In addition, responsibilities and liability must not be transferred to technology. Humans remain responsible. In the foreground is the "good work by design" approach and the "privacy-by-design" principle. This can best be guaranteed by involving employees and their interest groups in the design and implementation process at an early stage. Eventually, it is emphasized that the central mean remains the organization of the employees in order to achieve more participation and co-determination, more autonomy and influence at the collective bargaining level. The union has introduced a digitization-oriented collective agreement ('Digitalisierungstarifvertrag') (see section III).

In line with these suggestions, the **German Trade Union Confederation** has developed a '10-point plan for a legal framework for reliable AI use' (DGB 2020), proposing the following the measures: (1) Certification procedures and development of independent testing and complaints bodies for democratically legitimized supervision and control, (2) strengthening of employees' participation rights, (3) competence development of works and staff councils for the operational use of AI, (4) explicit employee data protection law for the processing of personal data, (5) prohibition of the use of factual presentations and the use of evidence for illegally obtained employee data and their use, (6) Expansion of the General Equal Treatment Act ('Allgemeines Gleichstellungsgesetz') to protect employees against algorithm-based discrimination, (7) Binding processes for impact assessment and evaluation of AI applications (cf. data impact assessment according to GDPR), (8) risk assessment of mental health for AI systems, (9) expansion of labor research and critical datafication research, (10), ethical guidelines for training and formulation of a 'Hippocratic Oath' for AI development. (DGB 2020: Künstliche Intelligenz (KI) für Gute Arbeit [Konzeptpapier]). <https://www.dgb.de/downloadcenter/++co++18197bd6-9f2d-11ea-80f0-525400e5a74a>

A partial success for the unions was the Works Councils Modernization Act (since 6/2021), which strengthens the rights of works councils when introducing and using AI. At the level of collective bargaining, so called

'Future Collective Agreements' are discussed as a new instrument that could also play a role in the use of algorithms (see section III).

The topic of AI and regulation has also gained high importance for the unions in the manufacturing sector. The largest union in Germany – the metal workers' union IG Metall - is currently involved in the political and social discourse on artificial intelligence, both at federal and European level, through statements and participation in consultations and stakeholder discussions of the European Commission (Albrecht & Görlitz 2021; Gerst 2021). The scale and variety of AI applications is challenging given regulations in the industrial sector. Since AI is moving into decision-making areas that were previously reserved for humans, human autonomy, discrimination, and behavioral control have become major issues for the union. Since AI systems can continuously evolve, they also see a growing need to constantly reassess AI.

Nevertheless, AI is not primarily seen as a threat. Basically, the union strives for using the advantages of digitization without losing sight of the risks and emphasizes the need to actively shape digitization. Possible risks for employees are identified regarding the automation of activities, the processing of personal data, discrimination through people analytics, loss of freedom of action, changing job profiles and growing pressure to perform. A need for action is identified in the following fields: (a) Tackling the lack of co-determination and employee representation regarding the development and implementation of AI and AM systems. (b) Since digitization projects are often planned decentrally, works councils often lack information on the entire process (c) Digitization requires cross-topic representation of interests, for which works councils often do not have the appropriate body. (d) Digitization requires rapid responsiveness and resources, while works councils are often not agile enough in this respect (e) Management is increasingly involving employees in digitization projects and thus competing with established structures of employee representation. (f) Since groups of workers are affected differently by digitization, it is becoming increasingly difficult to establish solidarity.

Eventually, scholars have pointed at a number of risks and challenges that arise from the use of AI and AM system due to a lack of given regulations (Spielkamp et al 2021; Wedde 2020).

Spielkamp et al. (2021) raise concerns regarding on the one hand barriers to transparency and the legal right of information, on the other hand the risk of unforeseeable and unintended long-term effects of AI-based systems depending on their ability to change autonomously. They expect that in many cases employers will not be able to provide the employees and their representation groups with the information required by law because the AI-providers do not release this information. Although the current legal situation demands that employers need to provide works councils with extensive information right from the beginning of the planning process of AI-based systems, they will in many cases not possess this information since the software provider companies do not disclose it (Wedde 2020).

According to Spielkamp et al. (2021) The federal government should therefore clarify by law that that employers must ensure transparency about the methods used even if the software manufacturers do not want to provide any information. Moreover, according to the authors, the manufacturers of AI and AM systems should actively develop and offer opportunities to provide both employees and their works councils with appropriate information about the functioning of AI-based systems. Since the practical effectiveness and enforceability of the co-determination right will be reduced as soon as systems are in place, companies and works councils should ensure that employees and HR management have the appropriate competence to draw the right conclusions from this information, also regarding long-term effects (Spielkamp et a. 2021).

The transparency of AI-based systems is also jeopardized by a fundamental dilemma of the providers of these systems. In order to analyze and predict how individuals or teams work or whether they will achieve their goals, statistical methods of pattern recognition and probability calculation are used, such as machine learning

or ‘deep neural networks’. The providers usually deny the access to information on the underlying models, assumptions and data that were used to structure and train the system. They argue on the one hand with the risk of imitators, on the other hand that employees could manipulate the system. (Wedde 2020).

Peter Wedde (2020) summarizes the current situation in his report “Automation in personnel management – aspects of labor law and employee data protection”. According to given data protection regulations at the legal level, employees must individually and voluntarily agree that their personal data will be processed (e.g. using people analytics procedures), unless this processing is legitimized by relevant company agreements under data protection law. Problems arise when there is neither individual consent nor works councils willing to conclude appropriate company agreements. Consequently, it can be expected that companies using these systems are at least in a legal gray area; often the use of the systems will even be illegal. (Wedde 2020).

## Section III – The governance of algorithmic management; the role of collective bargaining

Recently the Works Councils Modernization Act (‘Betriebsrätemodernisierungsgesetz’) (6/2021) came into effect giving particular importance to procedural co-determination rights (Albrecht & Görnitz 2021). The law aims at a stronger involvement of works councils in AI usage by strengthening their rights regarding the introduction and application of AI. According to the law, works council can now call in an expert to evaluate AI or AM. Moreover, the rights of the works council in planning work processes and workflows applies even if these guidelines are drawn up exclusively or with the support of AI or AM. The same applies to the establishment of guidelines on personnel selection, if these guidelines are drawn up exclusively or with the support of AI or AM.

At the level of collective agreements, digitization-oriented (‘Digitalisierungstarifverträge’) and future-oriented forms of collective agreements (‘Zukunftstarifverträge’) have been introduced in Germany, recently.

In June 2021, the federal government and trade unions (‘Vereinigte Dienstleistungsgewerkschaft ver.di’) agreed on a digitization-oriented collective agreement (‘Digitalisierungstarifvertrag’) with the aim to strengthen the interests of the employees in the public sector. The agreement applies when digitization measures lead to a significant change in work processes, job requirements or other working conditions. It mainly focuses on economic security, employment protection and qualification measures for the employees. Issues of AI or AM systems are not explicitly touched.

In 2021, future-oriented collective agreements (‘Zukunftstarifverträge’) have been introduced in the metal and electrical industry sector (in North Rhine-Westphalia). They initiate negotiations regarding investments in the location, in sustainable products and in improvements of work processes and technology. They give works councils the opportunity to start negotiations with the employer about future demands in terms of production targets, personnel requirements, or skill requirements independently from an acute crisis. Though this new type of collective agreement is not focused on AI or AM issues, it might provide some guidance also for these areas.

It remains an open question (also within the union’s debates), however, if collective agreements are the right level for detailed regulation. Given the huge level of variation at the company level regarding the type and use of AI and AM systems, it might be more useful to apply collective agreements to oblige companies to develop

company agreements that cover critical issues of AI usage in terms of transparency, surveillance, data-use or co-determination.

**Recent developments in the food-delivery sector:** In spring 2021, the data protection officer of the state of Baden-Württemberg raised some concerns regarding the ‘Scoober’ app, an algorithmic-based app used by large food-delivery companies like ‘Lieferando’ (see for the following the report by the German news channel ‘Tagesschau’ from 21 May 2021): The data that the app collects and stores about riders is documented by several data reports showing that it is possible to track down to the second when a driver is assigned an order, picks it up and delivers it. The data is personalized, i.e. it can be assigned to individual employees. Baden-Württemberg’s data protection officer concluded that it ‘is a very close-meshed monitoring of the employment relationship that takes place there.’ The exact location of the riders is passed on at intervals of 15 to 20 seconds. According to the data protection officer, this leads to so-called tracking, i.e. ‘permanent monitoring of work performance’, which he believes is ‘clearly illegal’. The app also sends personal data to third parties, such as Google. The food delivery company denied the allegation and argues that the driver app would comply with the applicable data protection regulations, since the data on times and locations are essential for the delivery service to function properly. The company also stated that the data collected would not be used for unauthorized performance or behavior control and that the drivers were informed on how and for what purpose the data were used.

Since the company is a subsidiary of the group ‘Just Eat Takeaway’ based in Amsterdam, the case was handed over to the Dutch data protection authority, who is responsible for punishing any violations. The European General Data Protection Regulation provides for fines of up to four percent of the total worldwide annual turnover of the previous financial year. The process is still ongoing. It demonstrates the difficulties and possible limitations when legal regulations regarding data protection are applied. Moreover, it raises the question how unions and works councils can intervene here, by using their information and co-determination rights, and where additional regulations and support is necessary.

**Recent developments in the industry sector:** Currently, the German Trade unions are claiming a better regulation of AI at the legal level and have published a number of position papers regarding the planned EU regulation (AI Act).

Union representatives and experts from IG Metall pointed at legal systematic gaps in the AI-regulation draft (see Gerst 2021): (1) Since the new regulation is basically aimed at developers and providers of AI, who often do not know enough about the concrete application and user context, it is suggested to oblige users to adequately protect personal rights and prevent discrimination. (2) The concrete purpose of the system needs to be determined by the users to prevent risks for employees, e.g. by analyzing employee data according to activity, qualification, costs, etc. (3) In contrast to a logic of self-compliance by companies there should be testing of AI systems by independent testing bodies. (4) The risk classification of AI systems should be tightened when the system generates and processes personal data in order to prevent the risk of discrimination through profiling. (5) Liability issues should be spelled out. So far, the planned AI-regulation neglects the work context and should be specified according to the respective work context (6) The thresholds for banning AI systems (due to possible physical or psychological damage) should be lowered to prevent misuse more efficiently. (7) The planned regulation should address the requirements regarding the development of an appropriate infrastructure (test centers) and qualified staff to evaluate AI-applications. Moreover, bottlenecks regarding the work-force when testing the systems need to be avoided.

In addition, the topic of standardization of AI systems is tackled by the unions. So far, standardization of AM is largely carried out by business representatives, while union influence is rather low. Measure to strengthen

the operational level of unions' and works councils' action are discussed. There is also an extensive educational program for work councils and workers with a focus on digitization and artificial intelligence, geared to operational needs. Finally, sensitization, activation and training of employee representatives is fostered, e.g. by setting up the 'transformation atlas' ('Transformationsatlas'). The Transformation Atlas is an inventory of digitization and ecological change based on data from almost 2,000 companies with around 1.7 million employees. The information provided by the works councils and shop stewards, who processed the extensive catalog of questions, gives a picture of the status of digitization, strategy and corporate development, the employment structure, personnel development and qualification as well as co-determination and the involvement of employees. The atlas provides an important data basis for IG Metall's strategy for shaping the transformation.

## References

- Albrecht, T., and Görlitz, J. (2021): *Künstliche Intelligenz als Handlungsfeld für Gewerkschaften*. Denk-doch-Mal.de. <https://wap.igmetall.de/denk-doch-mal-22517.htm>
- Bundesministerium für Wirtschaft und Energie (BDW) (2020). *Einsatz von Künstlicher Intelligenz in der Deutschen Wirtschaft. Stand der KI-Nutzung im Jahr 2019*. Bundesministerium für Wirtschaft und Energie (BMWi)
- Bundesverband Digitale Wirtschaft (BVDW) (2021). *KI-Monitor 2021. Status quo der Künstlichen Intelligenz in Deutschland*. Gutachten des Deutschen Instituts für Wirtschaftsforschung. Bundesverband Digitale Wirtschaft (BVDW)
- Butollo, F., Engel, T., Füchtenkötter, M., Koepf, R., and Ottaiano, M. (2018). Wie stabil ist der digitale Taylorismus? Störungsbehebung, Prozessverbesserungen und Beschäftigungssystem bei einem Unternehmen des Online-Versandhandels. *AIS-Studien*, 11(2), pp. 143-159.
- Detlef, G. (2021). *Fragestellungen für eine Studienanfrage zum KI-Verordnungsentwurf der Europäischen Kommission*. IG-Metall.
- Evers, M., Krzywdzinski, M., and Pfeiffer, S. (2019). Wearable Computing im Betrieb gestalten. Rolle und Perspektiven der Lösungsentwickler im Prozess der Arbeitsgestaltung. *Arbeit*, (1), 3-27.
- Falkenberg, J. (2018). Mobile Kontrolleure. Eine arbeitssoziologische Analyse digitaler Assistenzsysteme in der Logistik 4.0. In Karačić, A., & Hirsch-Kreinsen, H. *Logistikarbeit in der digitalen Wertschöpfung Perspektiven und Herausforderungen für Arbeit durch technologische Erneuerungen. Tagungsband zur gleichnamigen Veranstaltung am 5. Oktober 2017* (pp. 37–56). FGW – Forschungsinstitut für gesellschaftliche Weiterentwicklung e.V.
- IG-Metall Vorstand. (2019). *Transformationsatlas - wesentliche Ergebnisse*. Pressekonferenz der IG Metall. IG-Metall. [https://www.igmetall.de/download/20190605\\_20190605\\_Transformationsatlas\\_Pressekonferenz\\_f2c85bcecc886a59301dbebab85f136f36061cced.pdf](https://www.igmetall.de/download/20190605_20190605_Transformationsatlas_Pressekonferenz_f2c85bcecc886a59301dbebab85f136f36061cced.pdf)
- Ivanova, M., Bronowicka, J., Kocher, E., and Degner, A. (2018). *Foodora and Deliveroo: The App as a Boss? Control and autonomy in app-based management - the case of food delivery riders? Forschungsförderung Working Paper 107*. Hans-Böckler-Stiftung
- Kellogg, K.C., Valentine, M.A., and Christin A. (2020): Algorithms at work: The new contested terrain of control. *Academy of Management Annals*, 14(1), pp. 366-410
- Klippert, J. (2020). *Gute Arbeit mit MES. Mensch-Organisation-Technik bei Manufacturing Execution Systems*. Ressort Zukunft der Arbeit der IG-Metall. IG Metall.
- Krzywdzinski, M. (2021). Die Vermessung der Arbeitswelt. Der Einsatz von Wearables in Industrie und Logistik. *WZB-Mitteilungen*, 171, Online-Supplement.
- Lücking, S. (2019). *Arbeiten in der Plattformökonomie. Über digitale Tagelöhner, algorithmisches Management und die Folgen für die Arbeitswelt*. Forschungsförderung, Report Nr. 5/2019. Hans-Böckler-Stiftung.



- Mark, B. G., Rauch, E., and Matt, D. T. (2020). Study of the impact of projection-based assistance systems for improving the learning curve in assembly processes. *Procedia CIRP*, 88, 98–103. <https://doi.org/10.1016/j.procir.2020.05.018>
- Müller, N. (2021): *Künstliche Intelligenz als Handlungsfeld für Gewerkschaften*. Denk-doch-Mal.de. <https://wap.igmetall.de/denk-doch-mal-22517.htm>
- Müller, R., Hörauf, L., Speicher, C., and Bashir, A. (2019). Situational cognitive assistance system in rework area. *Procedia Manufacturing*, 38, 884–891. <https://doi.org/10.1016/j.promfg.2020.01.170>
- Niehaus, J. (2017). *Mobile Assistenzsysteme für Industrie 4.0. Gestaltungsoptionen zwischen Autonomie und Kontrolle*. Forschungsinstitut für gesellschaftliche Weiterentwicklung e.V. (FGW). <https://www.ssoar.info/ssoar/handle/document/68013>
- Reif, R., and Günthner, W. A. (2009). Pick-by-vision: Augmented reality supported order picking. *The Visual Computer*, 25(5–7), 461–467. <https://doi.org/10.1007/s00371-009-0348-y>
- Schewior, C. (2021, 21 March). *Lieferando: Wenn das GPS-Tracking zum Problem wird*. Dr. Datenschutz internate consulting (21.5.2021). <https://www.dr-datenschutz.de/lieferando-wenn-das-gps-tracking-zum-problem-wird/>
- Schreyer, J., and Schrape, J.F. (2018). *Plattformökonomie und Erwerbsarbeit. Auswirkungen algorithmischer Arbeitskoordination – das Beispiel Foodora*. Forschungsförderung Working Paper 87. Hans-Böckler-Stiftung.
- Spielkamp, M., and Gießler, S. (2020). *Automatisiertes Personalmanagement und Mitbestimmung. KI-basierte Systeme für das Personalmanagement – was ist fair, was ist erlaubt?*, Working Paper Forschungsförderung 191. Hans-Böckler-Stiftung.
- Staab, P., and Geschke, S.C. (2019). *Ratings als arbeitspolitisches Konfliktfeld. Das Beispiel Zalando*. Hans-Böckler-Stiftung.
- Tang, A., Owen, C., Biocca, F., and Mou, W. (2004). Performance Evaluation of Augmented Reality for Directed Assembly. In S. K. Ong & A. Y. C. Nee (Eds.), *Virtual and Augmented Reality Applications in Manufacturing* (pp. 311–331). Springer London. [https://doi.org/10.1007/978-1-4471-3873-0\\_16](https://doi.org/10.1007/978-1-4471-3873-0_16)
- Tisch, A., Backhaus, N., Hartwig, M., Meyer, S., and Wischniewski, S. (2021). Digitalisierung der Arbeit. In: Statistisches Bundesamt (Destatis)/Wissenschaftszentrum Berlin für Sozialforschung, Bundesinstitut für Bevölkerungsforschung (BiB), (in Zusammenarbeit mit dem Sozio-ökonomischen Panel (SOEP) am Deutschen Institut für Wirtschaftsforschung) (Hg.). *Datenreport 2021. Ein Sozialbericht für die Bundesrepublik Deutschland*. Bundeszentrale für politische Bildung.
- Vladova, G., Wotschack, P., de Paiva Lareiro, P., Gronau, N., and Thim, C. (2020). Lernen mit Assistenzsystemen. Vor lauter Aufgaben den Prozess nicht sehen? *Industrie 4.0 Management*, 36, 3, 16-20.
- Wedde, P. (2020). *Automatisierung im Personalmanagement – arbeitsrechtliche Aspekte und Beschäftigtendatenschutz*. AlgorithmWatch, 50 Seiten. <https://algorithmwatch.org/project/autor/gutachten-arbeitsrecht-datenschutz-wedde/>, zuletzt abgerufen am 02.03.2020, Berlin.
- Wotschack, P., de Paiva Lareiro, P., Vladova, G., and Thim, C. (2021): "Lernen mit Assistenzsystemen. Zusätzliches Prozesswissen macht einen Unterschied". *WZB-Mitteilungen*, 171, 48-52.