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Disruptive, yet inclusive AI: solution and boundaries from a labour law perspective.

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Abstract

The contribution focuses on the pursuit of inclusive AI application that not only outweigh the risks AI poses but actively commit to workers' well-being and to fundamental rights, such as the right not to be discriminated against, also thanks to the involvement of all stakeholders from the outset. To this end and from a labour law perspective, the essay offers a conceptualization for the notion of inclusive AI at work and provides some examples, in order to assess their legal status in the risk pyramid within the recent Regulation (EU) 2024/1689. Secondly, it analyses regulatory techniques that can be mobilized within the European legal landscape to enforce this inclusive prerogative, since they impose an active duty on the employer to prevent and remove discrimination, thereby ensuring inclusion.

Keywords: AI; Inclusion; Non-discrimination; Assistive technologies; Algorithmic management.

1. Introduction: Industry 5.0 and the human-centricity in the technological progress.

Like previous technological revolutions, the profound transformation driven by digital, data-centric and interconnected tools, ushered in the so-called fourth industrial revolution, also known as "Industry 4.0",[1] has had a disruptive impact on nearly every aspect of daily lives, especially in the work context. In this revolution, the development and accessibility of Artificial Intelligence (AI), alongside the exponential growth of digital technologies have

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[1] A notion adopted for the first time in Germany in 2011, at the Hannover Fair. *See* https://www.ingenieur.de/technik/fachbereiche/produktion/industrie-40-mit-internet-dinge-weg-4-industriellen-revolution/, accessed 21 May 2025.

paved the way for new automated production models, thanks to a technological mix of robotics, sensors, connection and programming. Nonetheless, the primary drivers of these innovations remain rooted in the logic of profit-maximization and cost-efficiency, within a pro-capitalist paradigm, where employers, by virtue of owning the technologies, retain the freedom to deploy them according to their own interests.[2]

Indeed, as much as Industry 4.0 has increased productivity, spurred innovation and lowered operational costs, it has also reshaped the nature of work, altered skill demands, and influenced organizational power dynamics, raising concerns about privilege, exploitation and inequality.

In response to the afore-mentioned environmental and societal costs of Industry 4.0, a new paradigm has emerged lately, which seeks to go beyond the sole goals of efficiency and productivity, while reinforcing the social value of industry. Referred to as "Industry 5.0"[3] by academics and officially endorsed by the EU Commission since 2021, this model is built around three core elements: human-centricity, sustainability and resilience.[4]

In the attempt to follow this vision, scholars are increasingly emphasizing the neutrality of technology and are investing their research on potential AI applications that not only outweigh the risks it poses but actively commit to workers' well-being and to fundamental rights, such as the right not to be discriminated against, also thanks to the involvement of all stakeholders from the outset.[5]

In this context, the pursuit of inclusive AI applications is not merely a technical challenge, it is also a legal one, since it demands, firstly, to elaborate a legal framework for such technologies and, secondly, to assess the legal strategies that can be leveraged to foster the shift towards Industry 5.0.

The aim of this contribution is to answer these questions, from a labour law perspective. It starts in Section 2 by offering a conceptualization for the notion of inclusive AI at work and describing some examples, in order to assess their legal status in the risk pyramid within the recent Regulation (EU) 2024/1689 (henceforth, AI Act).

Section 3 analyses regulatory techniques that can be mobilized within the European legal landscape to enforce this inclusive paradigm. They impose an active duty on the employer to prevent and remove discrimination, thereby ensuring inclusion.

To this end, two categories of legal measures are scrutinized.

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[2] *See* Albin E., *Channelling Technologies to Benefit Employees via Labour Law*, in Bueno N., ter Haar B., Zekić N. (eds.), *Labour Law Utopias: Post-Growth and Post-Productive Work Approaches*, Oxford University Press, Oxford, 2024, 177-200; ter Haar B., *Industry 4.0 + Industry 5.0 = Happy Marriage Between Humans and Technology*, in *Italian Labour Law e-Journal*, 2, 17, 2024, 189-213.

[3] *See* Paschek D., Mocan A., Draghici A., *Industry 5.0 – The Expected Impact Of Next Industrial Revolution*, Thriving on Future Education, Industry, Business and Society; Proceedings of the MakeLearn and TIIM International Conference, 2019; Nahavandi S., *Industry 5.0 – A Human-Centric Solution DG R&I (2020) Unlocking the potential of industrial human–robot collaboration*, in *Sustainability*, 11, 16, 2019, 4371 ff.

[4] European Commission, *Industry 5.0. Towards a sustainable, human-centric and resilient European industry*, Publications Office of the European Union, Luxembourg, 2021, 13.

[5] *See* for example, Marinaci T., Russo C., Savarese G., Stornaiuolo G., Faiella F., Carpinelli L., Navarra M., Marsico G., Mollo M., *An Inclusive Workplace Approach to Disability through Assistive Technologies: A Systematic Review and Thematic Analysis of the Literature*, in *Societies*, 13, 2023, 231; Lucchese A., Panagou S., Sgarbossa F., *Investigating the impact of cognitive assistive technologies on human performance and well-being: an experimental study in assembly and picking tasks*, in *International Journal of Production Research*, 63, 6, 2025, 2038-2057.

In sub-sections 3.1 and 3.2., primary consideration is given to activation measures within anti-discrimination law, and most particularly to the legal obligation placed on the employer to provide reasonable accommodation for people with disabilities, but also to the potential broadening of this duty beyond disability, in application of the principle of substantive equality. Consequently, sub-section 3.3 reflects on the parallelism between accommodation duties and prevention duties placed on the employer under Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (henceforth, Framework OSH Directive).

Lastly, Section 4 provides for some conclusive remarks.

2. The marriage between AI and Inclusion: conceptualization and examples of inclusive AI at work.

In order to identify the requirements AI must meet to be classified as inclusive, it is necessary to provide a clarification for the notion of "AI" as well as for the adjective "Inclusive" that enriches it in meaning, for the purpose of this essay.

According to the AI Act, AI is "a machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments".[6]

When considering this definition in conjunction with Recital 12, it appears that the prerequisite to fall under the definition of "AI" and, as a consequence, under the scope of the Regulation is the "inferential capability". This capability refers to the system's ability to deduce results, such as recommendations or opinions, or to derive models and algorithms, by processing and analysing data and information used to train the AI system, a capability that belongs also to less complex systems, such as logic or knowledge-based ones.[7]

A relevant aspect to be taken into consideration is that in the labour context, the adoption of AI has developed along two main trajectories.

Firstly, at a software level, through the so-called "algorithmic management," which consists of the use of AI-based monitoring or decision-making systems in human resource functions. Its applications range from recruitment and selection, performance appraisal, training, to work organization and work planning, where workers are most likely the recipients of the decisions taken by AI.[8]

[6] *See* Art. 3, par. 1, n. 1, AI Act.

[7] *See* for an analysis on the AI Act, among others, Scagliarini S., Senatori I. (eds.), *Lavoro, Impresa e Nuove Tecnologie dopo l'AI Act*, Quaderni della Fondazione Marco Biagi, Fondazione Marco Biagi, 2024; Biasi M., *Problema e sistema nella regolazione lavoristica dell'intelligenza artificiale: note preliminari*, in *Federalismi.it, Focus Lavoro, Persona, Tecnologia*, 18 December 2024, as well as all the contributions published in *Rivista Giuridica del Lavoro e della Previdenza Sociale*, 4, 2024.

[8] The terminology used to define this technological development varies, encompassing terms such as "Talent Analytics", "Workforce Analytics", "HR Analytics", and, more recently, "AI-based worker management" in EU-OSHA, *Worker management through AI. From technology development to the impacts on workers and their safety and*

Secondly, at a more hardware and tool-based level, such as robotics, automation, pick-by-technologies, wearables, Augmented Reality (AR) and Virtual Reality (VR). These instruments entail the redefinition of tasks performed by workers through the use of new work devices that support, augment or, in some cases, replace human performance.[9]

As regards the notion of "Inclusion", it is important to note that, despite the increasing attention being given to the issue in regulatory approaches and at a policy level,[10] there is currently no legal definition of it.

As scholars suggest, the core aspects of this concept can be identified through the interaction of formal and substantive equality.[11] This means that it involves both the idea of equal treatment, disregarding differences in sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation,[12] as well as the aim of equal opportunity, by acknowledging the existence of social or historical obstacles and proactively putting forward social engineering interventions to remove them.

Therefore, the concept of inclusion, from a legal standpoint, is deeply intertwined with anti-discrimination law, since the subjects to be included correspond to subjects who suffer marginalization and whose vulnerability is worth taking according to the European anti-discrimination framework. Indeed, as it is well-known, the European anti-discrimination law favours a prescriptive model in identifying grounds of discrimination, although the latter are constantly updated to reflect the historically contingent nature of inequalities.

As a consequence, for an AI system to be considered inclusive, it must: avoid, prevent and remove direct and indirect discriminations;[13] ensure equal access disrespectful of differences related to any ground of discrimination; and actively discard physical, structural or organisational obstacles that hamper the equal enjoyment of rights, including not only fundamental rights and freedoms, considered in a purely individual dimension, such as the

health, 2024a, available at: https://osha.europa.eu/en/publications/worker-management-through-ai-technology-development-impacts-workers-and-their-safety-and-health, accessed 21 May 2025. *See* also among others and with different scope of meaning, which at times do not include the entire range of activities mentioned: Ponce Del Castillo A., Naranjo D., *Regulating algorithmic management*, in *ETUI Policy Brief-European Economic, Employment and Social Policy*, 2022; Wood A.J., *Algorithmic management consequences for work organisation and working conditions*, in *JRC Working Papers Series on Labour, Education and Technology*, No. 2021/07, European Commission, Joint Research Centre (JRC), Seville, 2021.

[9] *See* Faioli M., *Artificial Intelligence: The Third Element of the Labour Relations*, in Perulli A., Treu T. (eds.), *The Future of Work. Labour Law and Labour Market Regulation in the Digital Era*, Wolters Kluwer, Alphen aan den Rijn, 2021; *Id.*, *Robot Labor Law. Linee di ricerca per una nuova branca del diritto del lavoro e in vista della sessione sull'intelligenza artificiale del G7 del 2024*, in *Federalismi. Focus Lavoro, Persona, Tecnologia*, 3 April 2024.

[10] Some examples can be seen in the UN Agenda 2030 for Sustainable Development, that concerns inclusion in SDGs n. 5, 8, and 10; in the European Pillar of Social Rights, adopted in November 2017, at European level, as well as the Gender Equality Strategy 2020-2025; LGBTIQ Equality Strategy 2020-2025 or the Strategy for the rights of persons with disabilities 2021-2030.

[11] *See* Tardivo D., *L'inclusione lavorativa della persona con disabilità: tecniche e limiti*, Giappichelli, Turin, 2024, 42 ff.

[12] These are the grounds of discrimination identified at article 21, EU Charter of Fundamental Rights.

[13] In compliance with the EU anti-discrimination directives, such as the Directive 2000/43/EC (henceforth, Racial Equality Directive); Directive 2000/78/EC (Employment Equality Directive); Directive 2006/54/EC (Gender Recast Directive); Directive 2010/41/EU (Self-employment Equality Directive); and lastly, Directive 2023/970/EU (Pay Transparency Directive).

right to health, but also rights that inherently encompass a social dimension, i.e. the right to work.[14]

Furthermore, this inclusive paradigm should be endorsed throughout the entire lifecycle of the AI system, from the design stage to the impact assessment of its operations, also through the involvement of interested parties.

It must be noted that, by ensuring coherence, trustworthiness and human-centricity, the AI Act clearly shows – at least – the intention to drive future technological innovations towards ethical pathways.

Example of this commitment can be found already in the seven non-binding ethical principles identified in the "Guidelines for trustworthy AI" by the High Level Expert Groups appointed by the European Commission and published in April 2019, which have guided the recent legislative initiatives proposed by the Commission. Among the seven requirements, two deserve special attention for the development of inclusive AI: i) "*diversity, non-discrimination and fairness*", meaning that AI systems should be developed and used in a way that includes diverse actors and promotes equal access, gender equality and cultural diversity, while avoiding discriminatory impacts and unfair biases that are prohibited by Union or national law; ii) "*societal and environmental well-being*", indicating that AI systems should be developed and used in a sustainable and environmentally friendly manner as well as in a way to benefit all human beings, while monitoring and assessing the long-term impacts on the individual, society and democracy.[15]

Nonetheless, the inclusive paradigm is – or should be – materialized differently depending on the trajectory of AI adoption taken into consideration, as it will be investigated *infra*.

2.1. Inclusive AI at software level: the importance of bias mitigation in Algorithmic Management.

At the software level, Algorithmic management involves the use of Algorithmic Management Systems (henceforth, AMSs), which are automated or semi-automated computer processes, to manage relationships with personnel and support organizational decisions dealing with all the operations which once were prerogatives of the employers or of HR managers on behalf of the employer. In fact, the main characteristic of the employment relationship, namely the employers' hierarchical power over the employees, seems to be entrusted to algorithmic systems by: the power to direct tasks; the power to oversee the execution of tasks and its adherence to assigned orders; and, lastly, the power to discipline negligent or disobedient workers.

These systems are included in the Annex III of the AI Act, subsuming all the AI systems where the high risk is qualified by law, and therefore, presumed. Indeed, Item 4 of the Annex lists systems deployed in "Employment, workers' management and access to self-employment", for "recruitment or selection of natural persons, in particular to place targeted

[14] *See* Tardivo D., nt. (11), 32, who isolates three core of rights that are useful to interpret the material scope of inclusion. He includes also more recent rights, such as the right to sexuality or to sport.
[15] *See* https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai, accessed 21 May 2025.

job advertisements, to analyse and filter job applications, and to evaluate candidates;" but also to "make decisions affecting terms of work-related relationships, the promotion or termination of work-related contractual relationships, to allocate tasks based on individual behaviour or personal traits or characteristics or to monitor and evaluate the performance and behaviour of persons in such relationships".[16]

The classification of AMSs as high-risk systems under the AI Act leads to the imposition of various requirements primarily on providers of such systems, but also on deployers, who correspond to the employers. These obligations concern risk-management, the quality and relevance of data used, the technical documentation and record-keeping, the transparency and the provision of information to deployers, human oversight, and robustness, accuracy and cybersecurity,[17] in the attempt to introduce a uniform, horizontal legal framework to develop trustworthy AI from the outset.

In addition to the requirements set out by the AI Act, the outcomes of the AMSs – where the employer's decision is concealed – must also comply with antidiscrimination law, just like any other decision undertaken by the employers. Nonetheless, empirical evidence has highlighted that these systems, often depicted as impartial and objective, raise ethical concerns and even increase the risk of systemic and structural algorithmic discrimination, if not trained correctly. This is due to either managerial choices, facilitated by the opacity of algorithms, or structural characteristics which compromise the algorithm, linked to an algorithmic bias.[18]

To counterbalance the opacity of algorithms and the discrimination risks it entails, the expanding literature on algorithmic discrimination,[19] over the past few years, suggests exploiting the precision and calibration afforded by AI, incorporating "equality by design" in the development of AI systems, to elaborate non-discriminatory and inclusive systems, with the ultimate goal to address and correct for ongoing social patterns of inequality. [20]

The notion of "equality by design" has been advanced drawing from the example of "privacy by design". Nonetheless, while "privacy by design" recognizes that "embedding privacy as the default into the design, operation and management of [information and

[16] Annex III, Item 4, AI Act.
[17] Recital 66 and Chapter III, AI Act.
[18] *See* Bodie M.T., Cherry M.A., Mccormick M.L., Tang J., *The Law and Policy of People Analytics*, in *University of Colorado Law Review*, 2017, 88, 4, 1014.
[19] There is a wide body of literature on algorithmic discrimination, *see*, among others, Barocas S., Selbst A.D., *Big data's disparate impact*, in *California Law Review*, 104, 3, 2016, 671-732; Committee of experts on internet intermediaries (MSI-NET), *Algorithms and Human Rights. Study on the human rights dimensions of automated data processing techniques and possible regulatory implications*, 2018; Gerards J., Xenidis R., *Algorithmic discrimination in Europe: Challenges and opportunities for gender equality and non-discrimination law*, Publications Office of the European Union, Luxembourg, 2021; Kleinberg J., Ludwig J., Mullainathan S., Sunstein C.R., *Discrimination in the Age of Algorithms*, in *Journal of Legal Analysis*, 10, 2018, 113-174; Gaudio G., *Le discriminazioni algoritmiche*, in *Lavoro Diritti Europa*, 1, 2024, 1-26, available at: https://www.lavorodirittieuropa.it/dottrina/principi-e-fonti/1524-le-discriminazioni-algoritmiche, accessed 21 May 2025.
[20] Amid the supporters of this approach *see*: Amani B., *AI and Equality by Design*, in Martin-Bariteu F., Scassa T. (eds.), *Artificial Intelligence and the Law in Canada*, LexisNexis, Toronto, 2021; Lobel O., *The Equality Machine. Harnessing Digital Technology for a Brighter, More Inclusive Future*, Public Affairs, New York, 2022, 308; Renan Barzilay A., Ben-David A., *Platform inequality: gender in the gig economy*, in *Seton Hall Law Review*, 47, 393, 2017, 393-431; Soriano Arnanz A., *Creating non-discriminatory Artificial Intelligence systems: balancing the tensions between code granularity and the general nature of legal rules*, in *Revista de Internet, Derecho Y Política*, 38, 2023.

communication technologies] and systems, across the entire information life cycle, is necessary to fully protect privacy", as argued by the European Data Protection Supervisor,[21] "equality by design" seeks to provide the same recognition and design-oriented safeguards for protecting equality and inclusion as normative regulatory values integral to AI governance in general, and to predictive analytics and machine learning in particular, by mainstreaming positive actions and extending reasonable accommodations in the development and use of algorithmic applications.[22]

In this regard, the machine learning literature on fairness is quickly proliferating, with creative ideas to adjust and constrain algorithms to counteract unintentional bias. It is developing bias mitigation techniques that adopt the concept of fairness and, consequently, modify the training data, the learning algorithm, or the predictions in the design of the algorithm, namely during the pre-processing, in-processing, and post-processing stages. [23] These techniques, to some extent, recall forms of positive actions and for this reason have been defined "algorithmic positive action"[24]. However, the implementation of the above-mentioned techniques, within the framework of positive actions, encounters several limitations.[25] First of all, the use of this instrument is not mandatory but merely voluntary, hence, it depends on the employer's will. Secondly, the strict conditions established by the case law of the Court of Justice of the EU, which considerably limit their operation. For example, the need to prove the existence of a clear and lasting disadvantage, the exclusion of automatic mechanisms in the application of the measures, as well as strict compliance with the principle of proportionality.[26]

These limitations have been indirectly overcome by the AI Act, since it expressly recognises the significance of bias mitigation, as a corollary of the essentiality of data quality to root out sources of discriminations,[27] at article 10. This article, entitled "Data and data governance", sets out several requirements for the training, validation and test data of high-risk AI systems, as well as for individuals or organisations responsible for collecting and processing such data. More precisely, article 10, par. 2, lett. *f*, stipulates that the training, validation and testing of high-risks AI systems must be conducted "in view of possible biases that are likely to affect the health and safety of persons, have a negative impact on fundamental rights or lead to discrimination prohibited under Union law", while lett. *g*, requires the implementation of appropriate measures to detect, prevent and mitigate possible

[21] European Data Protection Supervisor, "Resolution on Privacy by Design" (Resolution delivered at the 32nd International Conference of Data Protection and Privacy Commissioners, Jerusalem, Israel, 27–29 October 2010), available at: https://globalprivacyassembly.org/wp-content/uploads/2015/02/32-Conference-Israel-resolution-on-Privacy-by-Design.pdf), accessed 21 May 2025.
[22] *See* Amani B., nt. (20), 4 and Xenidis R., *Algorithmic neutrality vs neutralising discriminatory algorithms: for a paradigm shift in EU anti-discrimination law*, in *Lavoro e Diritto*, 4, 2022, 765-771.
[23] *See* Bellamy R.K. *et al.*, *AI Fairness 360: An Extensible Toolkit for Detecting, Understanding, and Mitigating Unwanted Algorithmic Bias*, 2018, 1-20.
[24] *See* Barocas S., Selbst A.D., nt. (19), 705.
[25] As shown by Weerts H., Xenidis R., Tarissan F., Palmer Olsen H., Pechenizkiy M., *The Neutrality Fallacy: When Algorithmic Fairness Interventions are (not) Positive Actions*, 2024 ACM Conference on Fairness, Accountability, and Transparency (FAccT '24), 3-6 June, 2024, Rio de Janeiro, Brasil.
[26] CJEU – Case C-450/93, *Eckhard Kalanke v Freie Hansestadt Bremen* [1993] ECLI:EU:C:1995:322; CJEU – Case C-409/95, *Hellmut Marschall v Land Nordrhein-Westfalen*, [1995], ECLI:EU:C:1997:533
[27] *See* Recital 67, AI Act.

biases. To this end, the AI Act also allows an exception to the prohibition of processing of special categories of data, provided that appropriate safeguards are in place to protect the fundamental rights and freedoms of natural persons. The risks associated with the processing of such data are offset by a list of "procedural" conditions outlined in article 10, par. 5, from lett. *a* to *f*. These include, for instance, the requirement that this option be used only when no viable alternatives exist, the obligation to implement appropriate security measures and documentation, as well as the mandatory and immediate deletion of data once the bias has been corrected.

In light of the aforementioned considerations, it is possible to state that the data governance requirements set out in the AI Act move forward with the implementation of "equality by design" for the development of inclusive AMSs, providing a measure to detect and prevent algorithmic discriminations.[28] Nevertheless, this obligation primarily – and reasonably – falls to providers of AI systems.

However, incorporating "equality by design" in AMSs should not be limited to the *ex ante* implementation of technical tools by providers in such ways to avoid discrimination or bias. Rather, it should also encompass an active role for employers, as actual users of the AMSs. This role may include making adjustments and accommodations to meet the workers' needs, provided it remains economically viable, as well as ensuring ongoing monitoring and auditing of the decision-making process, also with the involvement of workers and their representatives, to reduce its potentially discriminatory effect.[29] For instance, in the context of work scheduling, there are initial evidence that participatory methods, taking into account workers' demands, could elicit worker well-being models, and that well-being models could assist scheduling managers to better account for worker well-being.[30]

While the afore-mentioned safeguards have been integrated into the Directive (EU) 2024/2831 of the European Parliament and of the Council of 23 October 2024 on improving working conditions in platform work (Platform Work Directive),[31] they remain absent from the AI act.

This gap, which is in part due to the "general" scope of this Regulation and its lack of specialization for social and labour matters, has prompted legal experts to call upon the European legislature to develop *ad hoc* regulatory instruments tailored to the unique characteristics and risks associated with the world of work.[32] While waiting for – and if – a

[28] Accordingly, *see*, Soriano Arnanz A., nt. (20).

[29] On the importance of auditing, *see* Kim P., *Auditing Algorithms for Discrimination*, in *University of Pennsylvania Law Review Online*, 166, 2017, 189-203. *See* also on the involvement of workers' representatives in the impact assessment: Mantelero A., Peruzzi M., *L'AI Act e la gestione del rischio nel sistema integrato delle fonti*, in *Rivista Giuridica del Lavoro e della Previdenza Sociale*, 4, 2024, 517-536.

[30] *See* Lee M.K., Ishan N., Zhang A., Afriyie J., Zhizen Q., Sicun G., *Participatory Algorithmic Management: Elicitation Methods for WorkerWell-Being Models*, AIES '21, May 19–21, 2021.

[31] The reference is to the safeguards introduced by the Platform Work Directive for Algorithmic Management at Chapter III. *See*, for a comment on the comparison between the AI Act and the Platform Work Directive, Purificato I., *Dall'informazione al coinvolgimento delle parti sociali: la dimensione collettiva nel prisma dell'Intelligenza Artificiale*, in Scagliarini S., Senatori I. (eds.), *Lavoro, Impresa e Nuove Tecnologie dopo l'AI Act*, Quaderni della Fondazione Marco Biagi, Fondazione Marco Biagi, 2024, 74-90.

[32] *See*, for example, the open letter signed by some of the most prominent European legal scholars – such as J. Adams-Prassl, N. Countouris, M. Kullmann, and R. Xenidis – addressed to the European Commission and calling for the adoption of a general directive applicable to algorithmic management systems: AA. VV., *Open*

more specific regulatory response to labour discipline to be adopted, other regulatory techniques should be considered.

2.2. Inclusive AI at hardware level: from smart digital systems to assistive technologies.

AI technologies, at the hardware level, are comparable to work tools that can either augment, support, or replace human performance. It is possible to distinguish between three main categories:

i. Robotic devices, including both collaborative robots (commonly referred to as cobots), which are designed to work side by side with humans, without physical protective barriers, automating repetitive, dangerous or ergonomically burdensome tasks; autonomous mobile robots (AMR), capable of navigating autonomously and collaborating in integrated work teams; and humanoid robots.

ii. Wearable tools, including, for example, smart bracelets to monitor physiological parameters (i.e. heart rate, stress, movements); robotic exoskeletons, which assist in movements, reduce muscle load and prevent injuries; BCI (Brain-Computer Interface) technologies, capable of detecting neural signals to control devices or support cognitive work.

iii. Generative AI-based systems, including Large Language Models (LLM) (e.g. GPT), that assist in drafting reports, technical documentation or internal communications; XR technologies (Extended Reality: VR, AR, MR), which enable immersive simulations, hands-on training in safe environments, and remote collaboration in virtual contexts.

The legal status of each of these technologies within the AI Act varies according to the kind of technology used and the purposes it has been implemented for.

As regards the former, it is increasingly common that workers interact with LLM to perform creative or cognitive tasks.[33] Those systems are classified in the AI Act as general-purpose AI, due to their generality and their capability to competently perform a wide range of distinct tasks.[34] General-purpose AI models that do not involve systemic risks must meet limited requirements, such as transparency obligations, while those involving systemic risks must comply with more stringent rules. Those rules, however, do not equate to the requirements set out for providers of high-risk AI systems and further blur the boundaries of the employers' liability.

The purposes for which each of these technologies is adopted span from production-related objectives, such as with automation; to support in occupational health and safety

Letter: Algorithmic Management and the Future of Work in Europe, in *Social Europe*, 4 November 2024, https://www.socialeurope.eu/open-letter-algorithmic-management-and-the-future-of-work-in-europe, accessed 21 May 2025.

[33] *See* the recent report on the impact of generative AI on work by: Gmyrek P., Berg J., Kamiński K., Konopczyński F., Ładna A., Nafradi B., Rosłaniec K., Troszyński M., *Generative AI and Jobs: A Refined Global Index of Occupational Exposure*, ILO Working Paper 140, International Labour Office, Geneva, 2025.

[34] Chapter V, AI act.

through the adoption of the so-called "smart digital systems" that collect and analyse data in order to identify and assess risks, prevent and/or minimise damage and promote safety and health at work;[35] and, lastly, functions linked with assistive technologies, aimed at preserving or enhancing the functional abilities of individuals with disabilities through specialized devices or systems.

These purposes may interfere with the AI Act if they involve any of the prohibited practices, pursuant to article 5, AI Act, such as the use of AI systems to infer emotions of a natural person in the areas of workplace, unless is performed for medical or safety reasons. In this regard, it must be noted that, as clarified by the Commission in the draft Communication on "Guidelines on prohibited artificial intelligence practices established by Regulation (EU) 2024/1689 (AI Act)"[36], the term emotions or intentions do not include physical states, such as pain or fatigue.[37] The latter, however, are not excluded from the scope of the AI Act and are, indeed, classified as high-risks AI systems, under Annex III, Item 1, as their functioning inherently requires biometric identification systems.[38]

Furthermore, within the high-risk category are also included emotion recognition systems in the area explicitly permitted under the AI act, namely for safety or medical reasons. It is worth noting, however, that, accordingly to the AI Act, high-risk systems that are intended to improve the result of a previously completed human activity, are not considered to pose a significant risk of harm to the health, safety or fundamental rights of natural persons and, as a consequence, join the derogation established by article 6, par. 3.

The classification of these systems as high-risk entails compliance with the requirements described above at §2.1, also with regards to bias mitigation techniques, to ensure that providers consider the differentiated impact on vulnerable groups throughout the development process. However, without prejudice to the obligation to assess in advance – and by design – the risks posed by such systems,[39] the inclusive potential of hardware-based AI tools ultimately depends on the specific purpose for which they are used.

Indeed, rather than serving solely the interests of employers or the pursuit of cost-efficiency, these systems can genuinely be leveraged to enhance the functional capabilities of individuals. This is particularly true for persons with disabilities, whose needs have driven

[35] *See* EU-OSHA, *Smart digital monitoring systems for occupational safety and health: uses and challenges European*, Publications Office of the European Union, Luxembourg, 2022.

[36] These guidelines have been approved by the COM, but not formally adopted yet. *See Communication to the Commission; Approval of the content of the draft Communication from the Commission - Commission Guidelines on prohibited artificial intelligence practices established by Regulation (EU) 2024/1689 (AI Act),* C(2025) 884 final, Brussels, 4 February 2025.

[37] *Ivi*, par. 7.2.1. *See* also Recital 18, AI Act.

[38] Pursuant to Article 1, n. 34, AI Act, "biometric identification" means "the automated recognition of physical, physiological, behavioural, or psychological human features for the purpose of establishing the identity of a natural person by comparing biometric data of that individual to biometric data of individuals stored in a database".

[39] It must be noted that empirical evidence has highlighted that, although in some cases they originate from objectives of inclusion and safeguarding the health of workers, they determine the emergence of new challenges. The latter concern the reliability of AI systems, the possible reduction of human supervision, as well as new risks that are not only physical (e.g. cybersickness, musculoskeletal disorders, accidents caused by disorientation) but also psychosocial (e.g. mental fatigue, cognitive overload, technostress, isolation and social detachment). *See* EU-OSHA, nt. (35).

the development of a wide range of innovative devices designed to mitigate or compensate for physical and cognitive impairments.[40]

To give some examples, depending on the type of impairment, assistive speech-based technologies are increasingly being developed to offer efficient and cost-effective solutions that help employees with visual impairments or learning disabilities identify and process information. Furthermore, when the disability condition impacts the employees' ability to focus, manage time, and maintain concentration on essential functions of their job, there are several solutions to accommodate their needs, such as time tracking or time management applications, as well as AI-driven scheduling tools or virtual assistants that help employees set reminders, organize and prioritize tasks based on deadlines or other factors, and/or provide other executive functioning support. Lastly, with regard to disabilities affecting the musculoskeletal system — and also in light of the aging population — it is possible to make use of exoskeletons or AI-powered smart glasses. The latter are wearable assistive technologies, designed to support individuals who are blind or have low vision, and typically combine AI, computer vision, and NLP to enable functions such as text recognition, object detection, scene description, etc.[41]

The example of devices developed to reduce or compensate for physical or cognitive disabilities, also in order to serve the legal requirements of reasonable accommodations, clearly illustrates the neutral nature of technology and its potential to be harnessed at the service of humans.[42]

Additionally, the beneficial use of these emerging technologies is closely linked to enhanced workplace risk prevention and response to damages, enabled by AI systems. Examples include smart armbands that provide real-time health and safety data analysis or smart headbands designed to monitor fatigue-related risks. Indeed, AI and machine-learning monitoring solutions have proven their ability to pinpoint issues faster and with better accuracy than humans.[43] Although this purpose may not seem directly linked to the issue of "inclusive AI", as empirical evidence shows, these smart digital technologies also enable the inclusion of a diverse workforce in Occupational Health and Safety (OSH) processes, offering an opportunity to make health and safety procedures more inclusive and accessible to workers of different genders, body types, and migrant backgrounds.[44]

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[40] *See* DelPo Kulow M., Thomas S., *Assistive Technology and the Americans with Disabilities Act Endearing Employers to these Reasonable Accommodations*, in *Berkeley Journal of Employment & Labor Law*, 40, 2, 2019, 257-293; Kruse D., Shure L., Johnson-Marcus H.A., Di Lallo A., Gao W., Su H., *Assistive Technology's Potential to Improve Employment of People with Disabilities*, in *Journal of Occupational Rehabilitation*, 34, 2024, 299-315; Beaudoin K., Smith P.E., *AI's Potential Role in Reasonable Accommodation requests*, in *ArizonaAttorney*, January 2024, 35.

[41] *See* Beaudoin K., Smith P.E., *ibid*; Kruse D., Shure L., Johnson-Marcus H.A., Di Lallo A., Gao W., Su H., *ibidem*. *See* also Marinaci T., Russo C., Savarese G., Stornaiuolo G., Faiella F., Carpinelli L., Navarra M., Marsico G., Mollo M., nt. (5).

[42] *See* Albin E., nt. (2).

[43] *See* EU-OSHA, *Smart digital systems for improving worker safety and health: overview of research and practices*, Publications Office of the European Union, Luxembourg, 2024b.

[44] For example, in the case "Smart armband for real-time data analysis for health & safety" the system was designed based on the analysis of how workers move in the workplace, allowing developers to decide on the right placement of a wearable on the body, based on the perspectives of different workers. *See*, EU-OSHA, *ibid*, 23.

Despite the numerous benefits unveiled by these high technologies, their adoption comes across the employers' reluctance for organizational constraints. Indeed, from a management perspective, it is pivotal to assess whether the human-centric value of these assistive technologies justifies the financial and operational costs of their deployment. However, evaluating the economic impact of adopting these technologies should also entail weighing the upfront investment against the potential long-term savings associated with enhanced occupational health outcomes,[45] not to mention that the cost for the adoption of some of the above-mentioned tools has become increasingly more affordable, so much so that many are commonly used in everyday life.[46]

3. Legal strategies towards inclusive AI.

Having examined the technical feasibility of inclusive AI systems as well as their legal alignment under the AI Act, the following sections will explore the regulatory mechanisms within EU legislation that can be leveraged to enforce this inclusivity mandate and incorporate "equality by design" not only in the development of AI systems, but also in their actual use. The analysis, indeed, will focus on regulations that place a proactive obligation directly on employers to prevent and eliminate discrimination, thereby promoting meaningful inclusion.

This approach moves from the belief that the neutrality towards the workforce is inadequate to realise an inclusive paradigm, since it inadvertently leads to insensitivity towards differences.[47] Conversely, it allows to exhibit each difference and to take measures with the aim to remove pre-existing or structural discriminations in the labour market.

This transition towards a proactive approach in the removal of inequalities and realisation of equal opportunities is also consistent with other initiatives at international level. In this regard, the EU Parliament recently issued a Resolution concerning equal treatment in employment and occupation in light of the United Nations Conventions on the Rights of Persons with Disabilities (UNCRPD),[48] which encouraged MS to take active measures to safeguard equal treatment for all, including persons with disabilities, aimed at ensuring, in line with the UNCRPD, the accessibility of workplaces and providing reasonable accommodation for persons with disabilities at all stages of work, from recruitment through career advancement, for safe and healthy working conditions and employment rehabilitation.[49]

[45] Accordingly, *see* Lucchese A., Panagou S., Sgarbossa F., nt. (5).
[46] Accordingly, *see* DelPo Kulow M., Thomas S., nt. (40).
[47] *See* Barbera M., *Principio di Eguaglianza e divieti di discriminazione*, in Barbera M., Guariso A. (eds.), *La tutela antidiscriminatoria. Fonti, strumenti, interpreti*, Giappichelli, Turin, 2019, 6-83.
[48] European Parliament resolution of 10 March 2021 on the implementation of Council Directive 2000/78/EC establishing a general framework for equal treatment in employment and occupation in light of the UNCRPD (2020/2086(INI)), which will be now referred to as Resolution on rights for persons with disabilities. The UNCRPD was adopted by the UN General Assembly in December 2006 and entered into force in May 2008.
[49] *Ibidem*, paragraph 20.

Another example of this approach, at normative level, can be found in other legal sources, such as the Directive (EU) 2019/1158 of the European Parliament and of the Council of 20 June 2019 on work-life balance for parents and carers and repealing Council Directive 2010/18/EU (Work-life Balance Directive), where the adaptation of the workplace to workers' needs is considered a mainstream policy response to the aim of raising employment participation rates.[50] Indeed, pursuant to art. 9, when establishing the right to request flexible working arrangements for workers under certain conditions, the Work-life Balance Directive requires *de facto* employers to actively shape their work organisation at the personal needs and preferences of their employees.

In this context, the following subsection 3.1 focuses on the analysis of activation measures within antidiscrimination law, with particular attention to the dynamic duty of reasonable accommodation, which is explicitly intended for the benefit of individuals with disabilities. Subsection 3 also takes into account the potential extension of this duty beyond disability, in application of the principle of substantive equality.

Considering the subjective limitation of this duty, subsection 3.3 extends the analysis to explore the parallels and connections between antidiscrimination law and OSH regulations, particularly in relation to the prevention of psychosocial risks. These risks are, indeed, closely linked to potentially discriminatory work environments, practices, or organizational structures.

3.1. The dynamic duty of reasonable accommodation applied to AI systems.

The investigation of the legal instruments within the anti-discrimination framework at the European level, qualified by a preventive and proactive purpose of removing discrimination, can only begin with the consideration of the obligation of reasonable accommodation, as it represents an unequivocal example of the progressive abandonment of the principle of employer decision-making autonomy in favour of the needs of disabled workers.

Indeed, the obligation to provide reasonable accommodation represents one of the cornerstones of the "substantive model" of equality enshrined by the UNCRPD, and it can be found both in art. 5 Employment Equality Directive and in art. 2 of the UNCRPD.

Under EU legislation, reasonable accommodations are mandatory requirements that employers should undertake to adapt the workplace as to meet the needs of persons with disabilities, only, without imposing a disproportionate and undue burden, to ensure that they can enjoy or exercise all human rights on an equal basis with others. Hence, as evident from the definition of the concept, the most relevant difference between reasonable accommodation and positive action is the mandatory nature of the former.

Some examples of adjustments are also suggested by Recital 20 of the Directive, providing that they should consist of effective and practical measures, such as adapting premises and

[50] *See*, in this regard Bell M., *Adapting Work to the Worker: the Evolving EU Legal Framework on Accommodating Worker Diversity*, in *International Journal of Discrimination and the Law*, 18, 2-3, 2018, 124-143.

equipment, patterns of working time, the distribution of tasks or the provision of training or integration resources.

The denial of reasonable accommodation, according to the vast majority of academia, entails a form of discrimination whose nature has been debated in literature. Some academics classify this conduct as an indirect discrimination, considering that the latter requires an active behaviour to remove the unfair treatment, originated by treating equally dissimilar situations.[51] However, both the UNCRPD and the Proposal for a Council Directive on implementing the principle of equal treatment issued by the Commission in 2008[52] adopt a different approach, according to which the lack of adoption of a reasonable accommodation realises a *sui generis* form of discrimination and, consequently, shall not be considered a form of indirect discrimination. This theory argues that while the latter is typically assessed in terms of the effects on a group and should be generally tackled with positive actions, a claim of reasonable accommodation should be based on an individual assessment.[53]

As a matter of fact, the UNCRPD underlines that the obligation to provide reasonable accommodation is an individual measure, tailored to the specific needs of the disabled worker and entails an assessment of a given individual's working environment.

It can be claimed that, albeit both the avoidance of indirect discrimination and the adoption of reasonable accommodation require an active attitude of the employer, they encounter limits of different scope. The former can be overcome by the employer if the test of necessity and proportionality is met; the latter, instead, may be circumvented only in case of a disproportionate and undue burden on the employer.

This approach appears more adequate to the disability ground, as opposed to positive action which have a collective dimension, since each disability has its own peculiarities that cannot be operationalised as a single, binary variable because the category's nature and boundaries are not self-evident even among people who seem to fit within it.[54] Nonetheless, this seems to occur in algorithmic HRM, due to the necessary abstraction that AI and algorithms require, which ends up assessing disability status as a merely biomedical disfunction.[55]

Conversely, embracing the definition shared by the International Classification of Functioning, Disability and Health (ICF), disability should be conceived under a biopsychosocial model, i.e. a biological condition not abstracted by the social context, in that "disability and functioning are viewed as outcomes of health conditions (diseases, disorders

[51] *See* Barbera M., *Il nuovo diritto antidiscriminatorio. Il quadro comunitario e nazionale*, Giuffrè, Milan, 2007, 105-106; De Schutter O., *The Prohibition of Discrimination under European Human Rights Law. Relevance for EU Racial and Employment Equality Directives*, Office for Official Publications of the European Communities, Luxembourg, 2005, 35 ff.

[52] Proposal for a Council Directive on implementing the principle of equal treatment between persons irrespective of religion or belief, disability, age or sexual orientation, SEC(2008) 2180, 2 July 2008.

[53] *See* Bonardi O., *Eguaglianza e divieti di discriminazione nell'era del diritto del lavoro derogabile*, Ediesse, Rome, 2017; Spinelli C., *Inclusive Digital Workplaces for Persons with Disabilities*, in Menegatti E. (ed), *Law, Technology and Labour*, *Italian Labour Law e-Studies*, Bologna, 2023, 226.

[54] *See* Tilmes N., *Disability, fairness, and algorithmic bias in AI recruitment*, in *Ethics and Information Technology*, 24, 21, 2022, 6.

[55] *See* Tilmen N., *ibid.*

and injuries) and contextual factors".[56] Therefore, the requirement to adopt reasonable accommodations should include the modification of the social and contextual factors, also in organisational terms, and it should encompass all the stage of the HRM process, from recruitment to dismissal. For instance, these measures may include, but are not limited to: making existing facilities used by employees readily accessible to and usable by persons with a disability; job restructuring; modifying work schedules or reassignment to a vacant position; acquiring or modifying equipment or assistive devices, adjusting or modifying tests, training materials or policies; providing sign language interpreters or readers for individuals who are blind or have poor vision.[57]

Furthermore, an essential feature of the duty of reasonable accommodation is its participatory approach, where dialogue constitutes an integral aspect of compliance. This has been affirmed by the Committee on the Rights of Persons with Disabilities, which emphasizes that the duty bearer must engage in dialogue with the individual with a disability to identify and eliminate barriers that hinder the enjoyment of human rights.[58]

In regard of reasonable accommodations towards algorithmic discriminations on the ground of disability, some positive example can be seen in US, where the Equal Employment Opportunity Commission has issued a guidance to support employers in the implementation of reasonable accommodations and in the compliance with the American with Disabilities Act when AI is adopted to enable decision making in the recruitment stage.[59] This document sets a positive example to follow in the realm of algorithmic discriminations on the ground of disability in hiring. For instance, it suggests employers to clarify to applicant the steps of the evaluation to eventually request reasonable accommodations. Furthermore, it lists some examples of reasonable accommodations, such as providing an accessible version of the test, with extra time or other technological assistance, or consider providing a completely alternative test, although underling that the employer never has to lower production or performance standards or eliminate an essential job function as a reasonable accommodation. This document also specifies that employers should be held accountable even for AI-enabled tools provided by software vendors, as long as they have authorised these vendors to act on their own behalf.

To sum up, the obligation to adopt reasonable accommodation establishes a duty of care on the employer, that normally arises from the request of the worker/candidate, but, according to the Committee on the Rights of Persons with Disabilities, should apply also in situations where a potential duty bearer should have realized that the person in question had a disability that might require accommodations to address barriers to exercising rights.[60]

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[56] *See* WHO, *Towards a Common Language for Functioning, Disability and Health*, 2002, 10.
[57] *See* Spinelli C., nt. (53).
[58] Committee on the Rights of Persons with Disabilities, *General comment No. 6 (2018) on equality and non-discrimination*, par. D.
[59] *See* The ADA and AI: Applicants and Employees, ADA, 29 CFR Part 1630 & app. https://www.eeoc.gov/eeoc-disability-related-resources/artificial-intelligence-and-ada, accessed 21 May 2025.
[60] Committee on the Rights of Persons with Disabilities, General comment No. 6 2018, 6: "*The duty to provide reasonable accommodation is an individualized reactive duty that is applicable from the moment a request for accommodation is receive. Reasonable accommodation requires the duty bearer to enter into dialogue with the individual with a disability. It is important to note that the duty to provide reasonable accommodation is not limited to situations in which the person with a disability has asked for an accommodation or in which it could be proved that the alleged duty bearer was actually aware that the person in*

Therefore, by transposing this obligation into the context of the adoption of AI at the software level, and considering the specific nature of algorithmic discrimination that is to be prevented and addressed, it can be inferred that, when an automated or semi-automated system is used for algorithmic management, one of the measures an employer should adopt in accordance with the Directive is, at the very least, the obligation to assess the impact of each organizational decision mediated by the system on every individual with a disability who is affected by it.[61] Such an assessment is essential to ensure that persons with disabilities can access employment, perform their duties, or receive promotions, by mitigating or removing the barriers that hinder their full and equal participation in working life.

This would entail not only selecting responsibly the AI systems to implement, ensuring it excludes potentially discriminatory evaluation criteria against employees with disabilities, but also the adoption of technical and organizational measures, such as the customization of algorithms or the introduction of human oversight mechanisms, to ensure that the system does not produce adverse or exclusionary effects for them.[62]

As regards the AI adoption at the hardware level, as already noted, assistive technologies are inherently a form of reasonable accommodation, since they are developed precisely to compensate an individual impairment. To this end, the role of dialogue must be highlighted, since the needs and correspondent "accommodating technologies" may vary according to each individual. In this regard, a reference should be made to the recent legislative decree adopted in Italy, n. 63/2024, which has introduced the "Individual Life Project" for people with disabilities, placing the person and their needs at the centre and providing a multidimensional and personalized assessment process to identify the supports needed to improve the person's quality of life.

Even though the cost for the adoption of such technology may be one potential source of barrier and may come across the limit of the "undue burden" the increasing advancements in technology may also potentially expand the legal onus placed on the employer.[63]

Ultimately, it may be argued that the inclusive paradigm discussed above finds its legal basis in the fulfilment of the reasonable accommodation obligation, reinterpreted in the manner just described, albeit only with regard to workers with disabilities.

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question had a disability. It should also apply in situations where a potential duty bearer should have realized that the person in question had a disability that might require accommodations to address barriers to exercising rights".

[61] *See* Barocas S., Selbst A.D., nt. (19).

[62] Some scholars have been critical on the mere guarantee of human interventions, *see* Todolì Signes A., *Algoritmos Productivos y Extractivos. Cómo regular la digitalización para mejorar el empleo e incentivar la innovación*, Editorial Aranzadi, Portada, Cizur Menor, 2022. Accordingly, a ruling issued by Tribunal Superior de Justicia in A Coruña on thw 19th May 2023, STSJ GAL 3620/2023 - ECLI:ES:TSJGAL:2023:3620, required a company, which adopted a computer system of internal promotions ensuring also human intervention, to adequately prove the reasons for deviating from the algorithmic criteria. In this case, the company did not select for promotion a worker, who was also a union representative, despite he had received the highest score from the computer system. *See* Todolì Signes A., *Que un humano cambie el criterio del algoritmo para decidir un ascenso puede ser discriminatorio (STSJ de Galicia de 19/5/2023)*, in *Argumentos en Derecho Laboral*, 19 June 2025, https://adriantodoli.com/2025/06/19/que-un-humano-cambie-el-criterio-del-algoritmo-para-decidir-un-ascenso-puede-ser-discriminatorio-stsj-de-galicia-de-19-5-2023/, accessed 28 June 2025.

[63] Accordingly, *see*, Kruse D., Shure L., Johnson-Marcus H.A., DI Lallo A., Gao W., Su H., nt. (40).

3.2. The principle of substantive equality as a driver for the inclusive paradigm in AI systems.

The narrow subjective scope of the reasonable accommodation obligation, as well as its typically reactive nature – previously discussed – limit, to some extent, the potential of this instrument in fostering the marriage between AI and inclusion.

In order to overcome the subjective limitations of the accommodation obligation and to strengthen the preventive function of protection, some scholars have theorized the existence of a broader duty to seek accommodation measures.[64] This proposal draws on the progressive expansion of the prohibition of indirect discrimination as a safeguard against standardized and insufficiently inclusive organizational practices. The latter, indeed, is not confined solely to the justification test in judicial proceedings and is instead conceived as preventive and collective in nature.

According to this theory, the prohibition of indirect discrimination is framed as a suitable tool to protect and promote pluralism, grounded in respect for diversity as well as for cultural, ethnic, and religious traditions.[65]

Indeed, indirect discriminations are generated by structural and societal characteristics and are caused by apparently neutral behaviours, decisions, or treatments, that lead to discriminations.

To avoid claims of indirect discrimination, active measures should be undertaken by the employers, unless the justification of necessity and proportionality applies. Therefore, the ban of indirect discriminations suggests that employers may often have an active obligation – or duty of care – to remove any organisational obstacle, which, even in a neutral way, determines a disadvantage for a social group, departing sometimes from the pure market rationality and baring additional costs to ensure equality of opportunity amid members of protected class. As a matter of fact, some scholars have argued that while the ban of direct discriminations can be considered an expression of negative restriction, the concept of indirect discriminations requires active behaviours, in order to remove obstacles to equality.[66]

This reasoning follows the argument of the aforementioned inclusive paradigm, given its suitability to include other grounds for discrimination, beyond the boundaries of disability, and to establish a "substantially" equitable model.

Additionally, it should be noted that a broader approach to the interpretation of reasonable accommodation had already been advocated elsewhere in the European context,[67]

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[64] *See* Waddington L., *Reasonable Accommodation: Time to Extend the Duty to Accommodate Beyond Disability?*, in *NTM|NJCM-Bulletin*, 36, 1, 2011, 186-198; Howard E., *Indirect Discrimination 15 Years on*, in *E-Journal of International and Comparative Labour Studies*, 4, 3, 2015; Bell M., nt. (50). *See* also Bonardi O., nt. (53).

[65] Accordingly, *see*, Ast F., *European legal frameworks responding to diversity and the need for institutional change. Indirect discrimination as a means of protecting pluralism: challenges and limits*, in Council of Europe (ed.), *Institutional accommodation and the citizen: legal and political interaction in a pluralist society*, Council of Europe Publishing Editions, Strasbourg, 2009, 85-110.

[66] Accordingly, *see* Barbera M., nt. (47).

[67] CJEU – Case C-130/75, *Vivien Prais v. Council of the European Communities* [1975] ECLI:EU:C:1976:142. The case involved an appeal by a candidate in an open competition whose examination was scheduled on a Jewish holiday, the religion professed by the applicant, during which adherents are prohibited from traveling or writing, thereby preventing participation.

and also at national level. For instance, in Italian case law, the search for adjustments and alternative solutions within work organization has been examined in two rulings concerning discriminatory impacts of working schedules based on gender and parental care. These cases, adjudicated by female judges, underscore that work organisation often relies on standardised models of workers, which can inadvertently disadvantage individuals who deviate from these norms. In both decisions, the courts, while prohibiting indirect discrimination, required employers to explore alternative arrangements that were less discriminatory and more accommodating to the needs of working parents.[68]

These examples illustrate a growing trend toward expanding the scope of workers' rights, with the aim of adapting work environments and organisational structures to address the emerging and complex needs of the workforce.[69] This reasoning aligns with the Industry 5.0 approach and the anthropocentric evolution of law, which increasingly prioritizes human-centred approaches to social and labour challenges, of which the AI Act is an example.

Furthermore, the resulting interpretation, acting as a tool for the realization of a substantial model of equality, constitutes a corollary of the general principle of equality and non-discrimination. This principle, as is well known, has undergone a process of "constitutionalization"[70] in European law, thanks to the Charter of Fundamental Rights, the Treaty of Lisbon,[71] and the interpretation given to it by the CJEU. Indeed, the jurisprudence of the Luxembourg Court recognizes and legitimizes an autonomous and significant existence of the principle in question, with inter-private applicability that is independent of directives and of the implementing or omissive behaviours of the Member States.[72]

[68] The first ruling was issued by the Tribunal of Florence on 22nd October 2019 and confirmed the indirect discriminatory nature of two orders of the Florence Labour Inspectorate concerning disciplinary sanctions for the violations of working time. In this case, the judge held that «*it is common knowledge that parents (and, a fortiori, working mothers), especially if they have children of nursery, kindergarten or primary school age, frequently find themselves having to cope with pressing and unforeseeable needs connected with the care of their children, which may also entail the sudden need to delay their arrival at work or anticipate their departure, it is to be expected, on the basis of common sense and common experience that the set of provisions laid down in the two orders for service in respect of the organisation of working time may disadvantage the abovementioned typical groups of employees as compared with non-parental employees, in that it hinders, or in any event makes it difficult to reconcile work and family time and to make use of the legal institutions provided for that purpose, thereby also exposing parental employees to a greater risk of incurring disciplinary offences connected with delays in their work*» (translation of the author). For a comment on this ruling, *see* De Luca F., *Verso una dimensione antropocentrica del lavoro: la conciliazione come diritto soggettivo*, in *Diritto delle Relazioni Industriali*, 2, 2020, 519 ff. The second ruling was issued by Tribunal of Bologna issued on 31st December 2021 against the company Yoox Net-a-Porter Group S.p.A The case was brought against the judge by the regional Equality Body for gender discrimination, the "Consigliera di parità" when, after a tender succession for warehouse service, the company decided to reorganise the working hours and divide employees in two shifts (5.30 am – 13.30 pm and 14.30 pm – 22.30 pm), deleting the "central shift" (8.30 am – 17.30 am) for presumed health and safety anti-Covid measures. Accord to the judge, «*the objectively discriminatory impact of the rearrangement of the working schedule towards workers, and, in particular, female workers with underaged and not yet self-sufficient children was incontestable […] on the basis of common sense and common experience*» (translation of the author). For a comment on this ruling, *see* Peruzzi M., *Orario di lavoro e discriminazione per genitorialità: la soluzione giurisprudenziale prima della L. n. 162/2021*, in *Rivista Italiana di Diritto del Lavoro*, 2, 2022, 247-272.

[69] In agreement with this view, *see* Bell M., nt. (50).

[70] *See* Barbera M., nt. (47).

[71] The European Charter of Fundamental Rights recognizes equality among the fundamental principles of the European legal system; *see*, for example, articles 20, 21, 22, 23.

[72] The case law of the CJEU has recognized the direct and autonomous applicability of the principle of equality, beginning with the *Mangold* case, the first in which the Court was called upon to rule on the matter, *see* CJEU – Case C-144/04 *Werner Mangold v. Rüdiger Helm* [2005] ECLI:EU:C:2005:709. Since then, the rulings have been

Therefore, embracing the resulting theoretical framework, in which the prohibition of indirect discrimination constitutes an active, preventive obligation, is tantamount to mandating its adoption with consequent preventive effectiveness, particularly appropriate to tackle algorithmic discrimination, occurring in algorithmic management, which are, indeed, predominantly indirect.

In line with the above, scholars believe that to prevent these latter issues, the prohibition of discrimination should be understood as a positive obligation "to do no harm", rather than merely a prohibition "against causing harm", arguing that the former is more suitable for algorithmic decision-making due to the inherent high risks in automated systems and their far-from-neutral nature.[73]

It is important to add that these adjustments result in a wider interpretation of the reasonable accommodation duty compared to its application in the context of disability, which resembles, to some extent, positive actions, since it doesn't pertain to specific measures in individual cases, but rather to the treatment of groups, as a whole, as well as disadvantages that should be considered from the design stage onwards.

Moreover, unlike the obligation of reasonable accommodation, whose refusal can be legitimate when it imposes an excessively onerous economic burden on the employer, it is believed that justification in discrimination judgments does not easily admit arguments related to costs. [74]

In the context of algorithmic management, this translates into the precaution for employers for adopting automated systems that do not employ standardized variables or criteria in the organization of production activity, and, as it follows, into the obligation to design or implement the system in a less discriminatory way, weighing not only in advance, but also after and during its use the different impact of each criterion on risk factors and admitting, where possible, the search for flexible solutions.

In addition, accommodation needs could also be assessed through negotiation between the parties involved in order to seek the most efficient and feasible solution. In this regard, this process should contemplate the participation of labour unions and employee representatives to counterbalance the bargaining power of the employer.

The previous interpretation may appear to impose a significant burden on employers, but it is limited by the proportionality and necessity test, meaning that the implementation of such measures should be considered mandatory only when there are no alternative and less disadvantageous measures.

numerous and diverse, addressing, for example, various subjective or objective areas of application: CJEU – Case C-555/07 *Seda Kücükdeveci v. Swedex GmbH & Co. KG* [2010] ECLI:EU:C:2010:21; CJEU – Case C-83/14 *CHEZ Razpredelenie Bulgaria AD v. Komisia za zashtita ot diskriminatsia* [2015] ECLI:EU:C:2015:480, concerning race and ethnic origin; CJEU – Case C-414/16 *Vera Egenberger v. Evangelisches Werk für Diakonie und Entwicklung e.V.* [2018] ECLI:EU:C:2018:257; and CJEU – Case C-193/17 *Cresco Investigation GmbH v. Markus Achatzi* [2019] ECLI:EU:C:2019:43, concerning religion and personal beliefs.

[73] Consistently, *see* Weerts H., Xenidis R., Tarissan F., Palmer Olsen H., Pechenizkiy M., nt. (25).

[74] *See* Alidadi K., *Religion, Equality and Employment in Europe: The Case for Reasonable Accommodation,* Bloomsbury Publishing, Oxford, 2019, 95.

In support of this interpretation, the scope of application of reasonable accommodation has already been broadened in other jurisdiction, namely Canada and South Africa.[75] Indeed, both countries use reasonable accommodations as an antidiscrimination duty covering all protected grounds and adhere to a substantive vision of equality, which proactively remedies unnecessary exclusion of people who do not fit the *standard* and mainstream characteristics of society and attempts to respond to its actual complexity.[76] [77]

Nonetheless, this interpretation encounters application limitations with respect to hardware-level AI tools, the adoption of which would remain at the discretion of the employer.

3.3. Prevention duties in occupational health and safety regulations for the implementation of Inclusive AI.

The interplay between antidiscrimination obligations, inclusion and the protection of health – especially in safeguarding workers' well-being – is widely recognised, not only by leading legal scholars,[78] but also by international institutions.[79] This underscores a close connection between antidiscrimination law and OSH regulations, warranting further exploration to determine how this link can be leveraged to address and prevent discrimination, including those generated by algorithms, while fostering an inclusive model of AI in the world of work.

The connection between non-discrimination and OSH is further reflected in the very definition of health, as articulated in the preamble to the Constitution of the World Health Organization, which describes health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

[75] *See* Khaitan T., *A Theory of Discrimination Law*, Oxford University Press, Oxford, 2015, 77.

[76] In the words of Lepofsky M.D., *The Duty to Accommodate: a Purposive Approach*, in *Canadian Labour Law Journal*, 1, 1, 1992, 8: "It combats requirements of conformity by compelling creative efforts at protecting one's right to non-conformity". *See* also, Cartabia M., *The Many and The Few: Clash of Values or Reasonable Accommodation?*, in *American University International Law Review*, 33, 4, 2018, 675.

[77] In South Africa, it was first conceived as a type of positive action applied to designated groups, including black people, women, and people with disabilities, according to Section 1, Employment Equality Act no. 55 of 1998. Later, the Promotion of Equality and Prevention of Unfair Discrimination Act no. 4 of 2000, extended reasonable accommodation to the grounds of race, gender, disability, and age. On the contrary, Canada legislation didn't initially recognise reasonable accommodation explicitly and acknowledged it as the result of application the equality guarantee established in the Canadian Charter of Freedoms and Rights, at Section 15. Afterwards, it was formally enshrined by the 1986 amendment of the Ontario Human Rights Code. Later, the Canadian Human Rights Act was then amended to incorporate a reasonable accommodation duty in 1998, covering all grounds protected in this act, including race or ethnicity, sex, gender identity and expression, sexual orientation, age, marital or family status, and others.

[78] *See* among others: Ales E., *Il benessere del lavoratore: nuovo paradigma di regolazione del rapporto*, in *Diritti Lavori Mercati*, 1, 2021, 43-59.

[79] Communication of the Commission concerning the EU strategic framework on health and safety at work 2021-2027 "Occupational safety and health in a changing world of work", where it is argued that "recognising diversity, including gender differences and inequalities, and fighting discrimination in the workforce is vital in ensuring the safety and health of both women and men workers, including when assessing risk at work".

This evolving understanding of health has been acknowledged in EU case law,[80] and more recently, in other institutional documents, such as the European Parliament resolution of 10 March 2022 on a new EU strategic framework on health and safety at work post 2020. Consequently, the focus on mental and social well-being in the workplace has been linked by academics to the absence of discriminatory practices or behaviours.[81]

Furthermore, the sensitive approach towards diversities is also reflected in the Framework OSH Directive, which both at article 9 and article 15 requires the employers to take into consideration particularly sensitive risk groups to protect them from the dangers which specifically affect them. These "sensitive risk groups" aren't expressly identified in the Directive, but according to the "EU Guidance on risk assessment at work" [82] they correspond to: staff with disabilities; young and old workers; pregnant women and nursing mothers; untrained or inexperienced staff (e.g. new recruits, seasonal and temporary workers, etc.); as well as people working in confined or poorly ventilated spaces maintenance workers. These groups largely overlap with vulnerable categories protected under antidiscrimination law, that, as noted above, should be mainstreamed in the inclusive paradigm.

The overlap between sensitive risk groups and grounds of discriminations is not coincidental, as each group is identified based on increased exposure to risks that necessitate tailored measures – not only to avoid inherent risks, but also to prevent potential discrimination they may suffer due to social, structural, organisational or physical barriers.

Another pivotal aspect that underlines the connection between antidiscrimination obligations and the safeguard of workers' wellbeing relies on the centrality of a good work organisation to avoid violations of both the legislative instruments. Indeed, the work organisation is often the scene of structural and systemic discriminations arising from standardised and non-inclusive organisational models that are incapable of valuing the diversity of the workforce. At the same time, stress, as a risk factor to be prevented, has been considered a pathogenic symptom of an organisational dysfunctionality rather than a mere individual weakness. [83]

In this regard, the Framework OSH Directive, requires employers to take all the measures necessary for the safety and health protection of workers, including prevention of occupational risks and provision of information and training as well as provision of the necessary organisation and means, on the basis of the following general principles: (a) avoidance of the risk; (b) the evaluation of unavoidable risks (so-called risk assessment); (c) combating the risks at their source; (d) adaptation of the work to the individual; (e) adaptation to technical progress; (f) replacement of the dangerous with less or non-dangerous; (g) development of an encompassing prevention policy, covering technology, work organisation,

[80] CJEU – Case C-84/94 United Kingdom of Great Britain and Northern Ireland v. Council of the European Union [1996] ECLI:EU:C:1996:431.
[81] *See* in this sense Ales E., nt. (78).
[82] European Commission, *Guidance on risk assessment at work*, Office for Official Publications of the European Communities, Luxembourg, 1996. Available at: https://op.europa.eu/en/publication-detail/-/publication/1a3462b0-728c-4a2b-88f0-6c641b91a86f, accessed 21 May 2025.
[83] *See* EU-OSHA, *Ricerca sullo stress correlato al lavoro*, 2000.

working conditions, social relationships; (h) prevalence of collective measures; (i) provision of instructions to workers.[84]

The Framework OSH Directive further specifies such obligations by requiring employers to be in possession of an assessment of OSH risks, including those facing sensitive risk groups, by identifying the measures to be taken and the protective equipment to be used, and by ensuring a proper and balanced participation of workers and their representatives.

Several features set out in these requirements may be particularly important to integrate a vulnerable-oriented approach in the compliance with preventive duties, which are also useful to foster the adoption of inclusive AI systems.

Firstly, the principle of the adaptation of the work to the individual entails a necessary adjustment of the workplace, the work environment and most especially the work organisation to the workers' needs in order to prevent risks. These include physical, mental, psychosocial and social risks.[85] The latter are not only related to individual worker or to the conditions of work but are also linked to social and economic influences that are outside the workplace and relevant to psychosocial concerns at work, including the familial or private-life concerns or cultural elements, which can be associated to discrimination grounds.[86] An example of such external factors, relevant for psychosocial concerns, is work-life balance.[87]

Moreover, the adaption duty has also been integrated within European Pillar of Social Rights, which despite its non-binding legal nature, has become the central reference point for social policy projects at the EU level. In the objective no. 10, entitled "Healthy, safe and well-adapted work environment and data protection", it is established that "Workers have the right to a working environment adapted to their professional needs and which enables them to prolong their participation in the labour market".

Therefore, the onus to adapt the workplace to the individual obliges the employer to reflect in advance on the material and immaterial aspects of his organisation as well as of his HRM strategies heralds of any potential risk for workers' well-being.[88] The compliance with this imposition should be carried out involving, among others, workers' representatives who can play a decisive role in emphasising the collective dimension of well-being in the workplace.[89]

This duty of adaptation, which often faces resistance within corporate culture, shares certain similarities with the concept of reasonable accommodation. However, it is broader in scope, as it should not be constrained by economic considerations nor it is limited to workers with disabilities, unlike reasonable accommodation. Furthermore, differently from the reactive nature of reasonable accommodation, this duty is inherently anticipatory and is

[84] Art. 6, Framework OSH Directive.
[85] *See*, accordingly, Ales E., nt. (78).
[86] *See* ILO/WHO, *Psychosocial factor at work. Recognition and control*, Report of the Joint ILO/WHO Committee on Occupational Health Ninth Session Geneva, 18-24 September 1984.
[87] *See* Ales E., *Occupational Health and Safety: a European and Comparative Legal perspective*, WP CSDLE "Massimo D'Antona".INT – 1-2015, 2015, 6.
[88] *See* Fabbri T., Curzi Y. (eds.), *Lavoro e salute. Approcci e strumenti per la prevenzione dello stress e la promozione del benessere al lavoro*, Giappichelli, Turin, 2012.
[89] On the relevance of the involvement of workers' representatives, *see* Ales E., nt. (78).

directed toward a collective dimension rather than being tailored to the needs of an individual worker. [90]

The second feature which plays an important role concerns the specific consideration of sensitive groups in the risk assessment. Indeed, ensuring a more inclusive risk assessments, with a vulnerable oriented view in order to correctly assess peculiar risks, is not only necessary to comply with OSH regulations, but it is also functional to the identification of the most appropriate measures to avoid or reduce the identified risks.

However, while the importance of a gender sensitive approach in the compliance with OSH regulations is already endorsed at EU level, as several documents indicate,[91] this is not yet true for the other grounds of discriminations. Thus, the challenge lies in extending this awareness to the design and implementation of prevention duties in a manner that encompasses all grounds of discrimination, consistently with the requirements of the Framework OSH Directive.[92]

Indeed, the emphasis on the connections between antidiscrimination law and the right to health and safety highlights opportunities for "cross-fertilisation" [93] that integrate inclusion into the design of the company's organisation, suggesting the need for more flexible structures capable of adapting to the emerging needs of reception and inclusion.

In summary, the responsibility of employers who fail to account for vulnerable groups creates blurred boundaries between liability for discrimination and other OSH obligations. Thus, failures to adopt measures and actions to eliminate, reduce, or prevent risks for these groups may constitute violations of OSH regulations and could also give rise to claims of indirect discrimination, stemming from the insufficient consideration of significantly different health-related circumstances among workers.

Lastly, though certainly not of least significance, a specific attention should be posed to the principle of adaption to the technical progress, which pursuant to article 6, par. 2, lett. *e*., requires employers to take into account the degree of technical progress in the identification of prevention means and in the implementation of measures which assure an improvement in the level of protection afforded to workers.

Indeed, technological innovation, while being a harbinger of significant psychological and psychosocial pressures for employees,[94] could also in turn result in a broadening of the boundaries of the employer's safety obligation. As it has been noted above, several research

[90] *See* Bell M., nt. (50); Bonardi O., *L'accomodamento ragionevole: rimedio o nuova forma di discriminazione?*, in *Quaderni IEN*, 1, 2024, 5-41.

[91] Some examples are the EU-OSHA reports: EU-OSHA, *Mainstreaming Gender into Occupational Safety and Health Practice*, 2014; EU-OSHA, *Women and the Ageing Workforce. Implications for Occupational Safety and Health*, 2016.

[92] This is also supported by the EU-OSHA, in EU-OSHA, *Workforce Diversity and Risk Assessment: Ensuring everyone is covered*, 2009.

[93] This concept appears in Ferri D., *L'accomodamento ragionevole per le persone con disabilità in Europa: da Transatlantic Borrowing alla Cross-Fertilization*, in *Diritto Pubblico Comparato ed Europeo*, 2, 2017, 386, and Malzani F., *Benessere e sicurezza dei lavoratori: oltre la disabilità*, in *Variazione sui Temi di Diritto del Lavoro*, 4, 2020, 973.

[94] *See* Cefaliello A., Moore P.V., Donoghue R., *Making algorithmic management safe and healthy for workers: Addressing psychosocial risks in new legal provision*, in *European Labour Law Journal*, 14, 2023, 192-210; EU-OSHA, nt. (43); González Vázquez I., Curtarelli M., Anyfantis I., Brun E., Starren A., *Digitalisation and workers wellbeing: The impact of digital technologies on work-related psychosocial risks*, JRC Working Papers Series on Labour, Education and Technology 2024/03, European Commission, Seville, 2024; EU-OSHA, *OSH and the Future of Work: Benefits and Risks of Artificial Intelligence Tools in Workplaces*, 2019.

has been conducted with reference to smart digital systems and to assistive technologies that are precisely aimed at ensuring safety while also accommodating workers' needs. Hence, the reluctance of the employers to implement technically advanced, hardware-based AI systems, which are poised to augment workplace health and safety, is set to result in a progressively narrower scope in the near future.

As regards software-based AI systems, it seems implicit that workplace safety regulations require every employer to implement such systems with a responsible and precautionary approach, given the discriminatory potential stemming from the adoption of AMSs and the high proliferation of psychosocial hazards they may integrate if not oriented positively.

This means, for instance, both a meticulous assessment of the specific risks to which vulnerable groups are exposed, preventing and/or removing so-called "intentional" algorithmic discriminations (which are the result of managerial choices hidden within the algorithm), and the implementation of preventive measures. These measures can involve the use of AI itself, for example, through the application of bias mitigation techniques developed in the machine learning fairness literature.

Scholars, indeed, agree that to prevent and tackle the impact of AI systems on the health and safety of workers, employers should adopt a human-centred approach to carefully inform all the stages in designing, developing, integrating, using and assessing these systems, integrating an effective participatory model and collaboration between programmers, designers, developers of digital technologies, OSH experts, employers, and workers and their representatives, covering the entire workflow where these technologies are implemented.[95]

This approach reflects the aims of the inclusive AI paradigm, being adequate not only to prevent and tackle algorithmic discriminations in software-level AI systems, but also to increase employers' agency with regards to the implementation of hardware-based AI systems – provided that a thorough assessment and mitigation of the risks they may entail has been carried out. In addition, it would also ensure a more concrete and extensive implementation of the dynamic principle of adapting work to the individual, leveraging its expansive potential and responsiveness not only to vulnerabilities but also to the demands of digital and green transitions.

4. Final remarks.

As AI becomes increasingly ubiquitous in the world of work, the challenge is not just to contain its disruptive impacts, but to shape actively its design and deployment according to values of inclusion, equality, and human dignity. This contribution has argued that inclusive AI is not merely a question of technical assurances but also demands a legal framework that substantively guarantees equality, promotes reasonable accommodation, and includes vulnerable-oriented approaches throughout the AI lifecycle as well as during and after its implementation.

[95] *See* among others: González Vázquez I., Curtarelli M., Anyfantis I., Brun E., Starren A.*, ibid*; EU-OSHA, *ibid.*

From this standpoint, both anti-discrimination law and OSH regulation provide fertile ground for legal strategies capable of operationalizing inclusion, even in the face of algorithmic opacity and structural biases. While the AI Act takes important steps in this direction, its focus remains largely on providers, leaving significant room for complementary obligations on employers as actual users of AI systems in the workplace.

In particular, the reinterpretation of the duty of reasonable accommodation, beyond its reactive and disability-specific scope, and the proactive enforcement of OSH prevention principles suggest that the path toward truly inclusive AI systems lies in a convergence of regulatory tools. These must not only correct discrimination after it occurs, but also anticipate and remove structural barriers before they arise, as well as adapt and evolve to the surrounding environment and technological progress and to the capability of the employer to incorporate such solutions.

Overall, inclusion must not be an afterthought for algorithmic management or AI developers. It must be a constitutive design principle – legal, technical, and organizational – in order to build an AI-driven future of work that is reflective of the values of Industry 5.0: human-centred, sustainable, and resilient.

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