New Technology and Labour Law

Selected topics

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Preface

New Technology and Labour Law: A "crowd course" and a collective volume

At the turn of the decade, the Department of Law of the University LUISS 'Guido Carli' in Rome decided to activate a brand-new course on *New Technology and Labour Law*, and asked me whether I was interested in taking charge of it.

The idea was for me both appealing and challenging. As the majority, if not the totality, of labour lawyers across the globe, I had been following with the greatest interest the rich debate surrounding the theme of New Technology and labour law since several years; and yet, when I started thinking in what manner was I supposed to draw a proper structure of the course, I felt quite bewildered by the task: which approach was better suited to deal with this topic? Which issues, among the possible many, had to be included in the course for the greatest benefit of students?

It was precisely at that moment that the idea of a "crowd" course came to my mind as a valuable option to overcome my "pedagogical" dilemmas: What better idea than letting students perceive the multiple facets of "technology at work" by offering them a multi-teacher course where they might learn from the voices of those who have done insightful research on the topic? This is why I asked a number of colleagues and friends whose previous writings on the topic I had appreciated, to come – albeit only virtually – in Rome and give a lecture on the theme they are expert of.

The result was an experimental – and yet, I'd dare to say, successful – collective course [*], at the conclusion of which it came quite "natural" to transform such a cooperative effort into a collective volume. The Chapters of this book mirror the content of the lectures that each of the Authors has given in the course; several essays have however the ambition to go beyond the simple description of the state of affair, and to provide a critical assessment of the many interactions between Labour law and technology.

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[*] I wish to express my most sincere gratitude to my colleague Dr. Antonio Zumbo for the invaluable collaboration he gave in the organization of the course and in the management of students' seminar activities.

Our readers will evaluate the outcomes of this editorial initiative; for my part, I am confident that this text, born for students, will also be useful for advanced study and research in this crucial area of our contemporary societies.

Antonio Lo Faro

Part I
TECHNOLOGY AT WORK

New technology and labour law: challenges and perspectives

Antonio Lo Faro

1. Back in the nineties, a pioneering project funded by the European Commission[1] emphasized the need to investigate "the social shaping of technology", with a view to explore the reciprocal interactions between technology and society and to find out adequate methods to interpret them: «Technology studies is a hybrid research field […] it is a transdisciplinary undertaking, using cross-disciplinary resources in its efforts to conceptualize and analyse the interface of technology and society […] An understanding of the choices built into the creation of new technologies, as well an evaluation of technological policy options, are central to the understanding of the social shaping of technology».

Viewed in a historical perspective, the relationship between what we call technology and the world of work understood as an essential part of any social organization, is not a new nor an easy one. From the Aristotelian notion of τέχνη (*tèchne*) intended as an inherent dimension of any human productive activity, to the XIX century "machine breakers" Luddites worried by the social disruptive potential of the rising industrial model, to the current debates on the "de-humanizing" effect of artificial intelligence, it is widely acknowledged that «Technologies are not foreign to human nature but inseparable from it».[2]

Technology, then, is not just a matter of engineering, electronics and robotics, but a concern for humanities and social sciences too, including philosophy, ethics, sociology, economics. And of course, Law.

Labour law, in particular, stands as an ideal standpoint to observe the legal system's responses to the digital revolution, insofar as for a long time now it has been acknowledged that the major concerns for a socially unrestrained use of technology regard precisely the impact of new technologies in the work-

[1] COST – European Cooperation and Coordination in the Field of Scientific and Technical Research, Action A4, *Impact of the social environment upon the creation and diffusion of technologies*. See the final report edited by J. Perrin-D. Vinck, *The role of design in the shaping of technology*, Office for Official Publications of the European Communities, 1996.

[2] D. Nye, *Technology Matters: Questions to live with*, MIT Press, 2007.

place.[3] Once agreed that both technology and labour law qualify as factors of the production process, it becomes easy to understand why the intrinsic link connecting labour relations' rules on the one side, and the various manifestations of "technology at work" on the other side, gives rise to a "double" question: how does technology affect the production process and its organization? And how does the legal system respond to these innovations?

2. Answering such questions requires the sweeping notion of "technology at work" to be further disentangled, with a view to catch the many possible different angles through which technology intersects the labour market, the labour relations, and the organization of work.

A great deal of debates has been engaged as to the extent in which technology transformed manufacturing activities in the direction of what is now called "Smart factory" or "Industry 4.0". It is well-known, indeed, how advanced robotics, augmented reality, internet of things, digital twins technologies, and other artificial intelligence tools have already been experimented in several leading world factories (Ericsson, Tesla, Siemens, General Electric, Mitsubishi, Honeywell) with the aim of increasing automation and improving productivity and efficiency. Whereas such kind of developments are not directly dealt with in this book, since its full understanding would require different competencies than the legal expertise of its authors, there can be no doubt, however, that lawyers cannot ignore the rapidly changing technological superstructure affecting the manufacturing process and more in general contemporary economic relationships, as Stefano Bini advocates in his Chapter by acquainting Blockchain technologies and Smart contracts as instruments of disintermediation potentially capable of modifying existing labour market policies and labour relations arrangements, both at an individual and collective level.

Beyond technical issues impacting upon single segments of the labour-related administrative or contractual action, the labour law agenda at the time of the "Fourth Industrial Revolution"[4] is actually filled by a a series of multifarious questions related to the labour market effects of new technologies. Not only, as it is obvious, with reference to the "quantitative" job replacement effects of automation, which tend to be coupled with the introduction of new technologies since ever.[5] But also, in a different and "qualitative" perspective, with regard to the

[3] P. Adler, *Technology and the Future of Work*, Oxford University Press, 1992.

[4] K. Schwab, *The Fourth Industrial Revolution*, World Economic Forum, 2016.

[5] For a reconstruction of the history of economic thought on this traditional issue, dating back to Keynes, see D. Susskind, *Technological Unemployment*, in J. Bullock and others (eds), *The Oxford Handbook of AI Governance*, Oxford University Press, 2022. The supposed unavoidability of technological unemployment is vigorously denied by E. McGaughey, *Will Robots Automate Your Job Away? Full Employment, Basic Income and Economic Democracy*, in *Industrial Law Journal,* 2021, who claims that such scenario could be avoided through adequate policy actions.

transformations of both the labour market's structure – from the so-called "hourglass" effect[6] to the mismatch of competencies – and the employer/employees relations dynamics, with the rise of new organizational models built upon artificial intelligence altering rigid classification systems and existing firm hierarchies in favour of more flexible schemes of task assignments within a context of job enrichment and job enlargement, as Michele Faioli submits by taking as an example the changing Italian discipline of job assignments.

On the whole, there is a widespread awareness, also at an institutional level, that «there is a need to accompany people through this transition – and some tasks will be replaced, workers will have to work with machines, traditional occupations will be modified and new activities will emerge», as the European Commission put forward in one of its several policy documents dedicated to the technological transition and its effects on the labour market.[7]

3. If the multiple questions which have just been mentioned might be gathered together under the heading of what we could call *the non-human plant*, a different series of issues – still more relevant to labour law's analysis – arises when the "technology at work" topic is scrutinised within what could be defined as *the non-human employer* perspective.

Within such a "non-human employer" approach, technology matters as a prototypical labour law issue insofar as it affects the ways in which "classic" managerial powers are exercised through "new" technological means, namely by algorithm-based tools assisting (if not substituting) employers in doing what they typically do as parties to an employment contract: *selecting* workers, and *surveilling* their activity in order to decide upon compensation, promotion, or termination of their contracts. Algorithms, hence, essentially irrupt on the scene of labour relations as "Selection technologies" (§. 5) and as "Surveilling technologies" (§. 4).

Before entering into the detail of such a scenario, it is essential to state that the use of algorithms as Surveilling and Selection technologies in the workplace, is by no means always or necessarily coupled with a highly technological plant context: put another way, the "non-human employer" and the "non-human plant" do not necessarily go hand in hand, since the algorithmic-based exercise of employers' prerogatives is not exclusive to a smart or 4.0 factory. On the contrary, algorithmic management is now rather ubiquitous and extensively practised in "tradi-

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[6] Where high- and low-income tiers expands, while middle-wage and routine jobs tends to shrink, see University Alliance, *The way we'll work: Labour market trends and preparing for the hourglass*, University Alliance Reports, 2012 (*https://www.unialliance.ac.uk/wp-content/uploads/2012/03/The-way-well-work-final-for-web.pdf*, accessed 05.03.2023).

[7] European Commission, *A concept paper on digitisation, employability and inclusiveness. The role of Europe*, 2017.

tional" companies and sectors too,[8] thus confirming that «Instead of taking away workers' jobs […] advances in AI-driven decision making will first and foremost change their managers' daily routines, augmenting and eventually replacing human day-to-day control over the workplace: we are witnessing the rise of the 'algorithmic boss'».[9]

4. To begin with "Surveillance technologies", it is quite easy to understand how technological developments and artificial intelligence offer employers a vast array of new means of control in the working place,[10] thus risking neutralizing existing legislative limitations designed in a period in which the possibility to control workers through GPS, wearable devices, sociometric badges, facial recognition and even mental and emotional monitoring systems, was simply unimaginable.

As Antonio Aloisi illustrates in his Chapter, the development of technological controlling capacities of employers has undoubtedly resulted in a «'mutation' and an 'augmentation' of managerial authority», which distresses and alters the equilibrium between employers' supremacy and workers' dignity as inherited from the historical construction of the contract of employment. Whether such dehumanization of managerial control's prerogatives could be governed through existing regulatory frameworks, or whether, on the contrary, technological surveillance goes along with a complete overturn of traditional labour law structures, is still open to discussion. While it is claimed that «The employment contract is a flexible form which is not tied to the integrated industrial enterprise of the mid-twentieth century […] if it fails to survive, it will not be because the model is inherently incompatible with the technology of the digital economy»,[11] it is also true, conversely, that the most relevant legal instrument thus far available in contrasting abuses of managerial control and surveillance powers in the working place, is not a piece of labour legislation, but rather the general legislative provisions on personal data protection (GDPR). The question is, as Elena Gramano points up, whether this is sufficient or not: and indeed, if on the one side it is undeniable that some GDPR provisions, namely art. 22, did have an actual relevance

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[8] For an overview of the several AI applications in the world of work, see B. Waas, *Artificial Intelligence and Labour Law*, Hugo Sinzheimer Institute for Labour and Social Security Law, HIS-Working Paper 17/2022; and A. Aloisi-V. De Stefano, *Your Boss Is an Algorithm: Artificial Intelligence, Platform Work and Labour*, Oxford, Hart Publishing, 2022.

[9] J. Adams-Prassl, *What if your boss was an algorithm? Economic incentives, legal challenges, and the rise of artificial intelligence at work*, in *Comparative Labor Law & Policy Journal*, 2019, 1, p. 146.

[10] A. Aloisi-E. Gramano, *Artificial Intelligence Is Watching You at Work. Digital Surveillance, Employee Monitoring and Regulatory Issues in the EU Context*, in *Comparative Labor Law & Policy Journal*, 2019, 1, p. 95.

[11] As maintained by S. Deakin-C. Markou, *The Law-Technology Cycle and the Future of Work*, Centre for Business Research, University of Cambridge, Working Paper 504/2018.

in some recent judicial cases regarding "automated" dismissals,[12] a step further is probably needed, with the desirable adoption of an *ad hoc* labour law instrument which could adapt data protection legislation to the specific issues related to workers' dignity, as Gramano suggests in the final remarks of her Chapter.

5. When it comes to "Selection technologies", it is by now commonly acknowledged that in a world (of work) dominated by the massive computational capacity to process the enormous amount of data available through warehouses gathering multiple data sources, what is currently emerging is a gigantic process of substitution of the "human" employer's choice in favour of decision-making processes entrusted to algorithmic automation applied to the management of employment relationships "from cradle to the grave", to paraphrase Beveridge; i.e. from hiring to firing.

Within such a perspective, artificial intelligence intervenes not only to reshape the exercise of traditional employer prerogatives of control and surveillance, but also to orientate managerial choices that a human decision-maker would hardly be able to manage due to the extension of the variables to take into consideration. As Emanuele Dagnino describes in his Chapter, algorithmic decision making (ADM), also referred to as "Human Resource Analytics" or "Algorithmic Human Resource Management",[13] essentially identifies as a series of workers' selections – in the pre-hiring, post-hiring, and termination phases of the employment relationship – whose allegedly flawless "scientific" rationality might indeed be biased by several factors: some of them related to the quality of data processed (§. 6), and some other related to the algorithm's decisional logic (§. 7).

6. As concerns the quality of the data set processed by ADM systems in the selection of workers to be hired, promoted or dismissed, it is rather well-known that algorithms are fed by the enormous variety of information each of us leaves – consciously or unconsciously – in the big data universe, from job-related information (previous work experiences, schools and universities attended), to personal information (place of residence, family status, personal convictions and belief, GPS tracking data, age, gender, health conditions, social network interactions,

[12] Reference is made to the "Robo-firing" cases, dealt with by Antonio Aloisi in this volume.

[13] See J. Meijerink-M. Boons-A. Keegan-J. Marler, *Algorithmic human resource management: synthesizing developments and cross-disciplinary insights on digital HRM*, in *The International Journal of Human Resource Management*, 2021, 12, p. 2545, who describe it in the following terms: «HRM algorithms augment human decision making by offering predictions which are used to forecast how a current decision may impact future outcomes. These so-called predictive algorithms operate regression-based forecasting techniques that, for example, help managers predict which employees are likely to leave the organization (and thus how to make decisions about retention), or to predict the future performance of a job candidate (and thus help hiring managers with selection decisions)».

sexual orientation, off-work activities, on-line purchase preferences and statistics, even sleeping patterns or heart rates recorded on smartwatches and other fitbit devices) not directly relevant to the job performance evaluation.[14]

Such erratic assortment of data and information, which might also include AI analyses of body language and speech patterns recorded in video interviews with candidates to a job offer, raises a number of concerns basically referable back to one of the first catchphrases of the computing era: "rubbish in-rubbish out" (sometimes referred to as GIGO: Garbage In-Garbage Out). In other terms, in algorithmic decision-making system – as, after all, in any decision-making system – the quality of the outputs is determined by the quality of the inputs, and this explains why in a report dedicated to the possible AI biases (also) in recruitment procedures, the EU Agency for Fundamental Rights has warned that «algorithms are only as good as the data that are used to develop them».[15]

"Clean" data are hence as important as the "fairness" of the system processing them. As it has been written by one the leading experts on the topic: «if data (and correspondingly datasets) are to be considered the new currency, the new oil, they must circulate with rules as should the solutions based on them. Data circulation and use rules remain at the core of any meaningful AI governance because data are the fuel of AI design, development and deployment in their entire lifecycle».[16]

7. When it comes to the algorithmic inner decisional logic, the common idea according to which algorithms do always provide the "right" answer to a selection problem, is increasingly questioned by a series of observations based on experience, revealing on the contrary that their pretended perfect rationality – by definition neutral, objective, and therefore always preferable to a cognitively limited human choice – might actually produce discriminatory[17] or simply irrational decisions based on the often mysterious self-learning processes generated inside the algorithmic black box, irrespective of the actual intentions of the parties.

A quite well-known example evoked in the American and European literature[18] could be here recalled in order to make it clear how an "eccentric" dataset

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[14] L.F. Eisenstadt, *Data Analytics and the Erosion of the Work/Non-Work Div*ide, in *American Business Law Journal*, 2019, 3, p. 445.

[15] Report of the European Union Agency for Fundamental Rights on *Bias in Algorithms. Artificial Intelligence and Discrimination*, 2022.

[16] G. Comandè, *Unfolding the legal component of trustworthy AI: a must to avoid ethics washing*, in *Annuario di diritto comparato e di studi legislativi*, 2020, p. 39.

[17] See J. Gerards-R. Xenidis, *Algorithmic discrimination in Europe. Challenges and opportunities for gender equality and non-discrimination law*, Luxembourg, Publications Office of the European Union, 2021.

[18] A.G. King-M. Mrkonich, *Big Data and the Risk of Employment Discrimination*, in *Oklahoma Law Review*, 2016, 3, p. 555, and E. Dagnino, *People Analytics: lavoro e tutele al tempo del management tramite big data*, in *Labour&Law Issues*, 2017, 3, p. 3.

might produce irrational outputs when left to "unsupervised" algorithms capable to extract from them statistical patterns deprived of any rational meaning. In the example in question – related to the case of a company wishing to hire computing engineers through the means of an algorithmic-based selection procedure – the algorithm suggested that priority should be given to engineers having a personal predilection for a particular kind of comics: namely, the Japanese manga. It is quite clear that no consequential relationship exists between appreciating a certain type of comics and having high-profile professional skills as a computer engineer; yet, such a connection, although rather inexplicable, statistically exists, and this was sufficient to induce the algorithm to detect a "pattern" based on which it predicted that manga lovers are the best computing engineers (or vice versa).

Such "unforeseen" results of the algorithmic decision-making processes essentially affect the outputs generated by "Machine-learning algorithms", i.e. systems that, as Stefano Bini explains, are characterized by their ability to learn from the data set and to produce an outcome without being explicitly programmed to do so. Antonio Aloisi and Emanuele Dagnino further investigate this topic by focusing on the fundamental conceptual distinction between the "causation" logic of human decisions, and the mere "correlation" logic of algorithms. Inasmuch as extracting a rule from a statistical correlation amounts to transform "normality" into "normativity", it can be said that in many cases algorithmic decisions simply mirror the past, thus perpetuating previous structural disadvantages and discriminations.[19] Not because algorithms are purposely programmed to select people on the basis of prohibited factors of discrimination such as gender, age or ethnicity; but rather because their decisions might be hampered by "proxies", i.e. personal characteristics which although not enumerated among the forbidden discrimination factors are statistically correlated to them.

Additionally, the "conservative" role algorithms might have with regard to a historically conditioned labour market does not only materializes "when candidates go to the job opportunity". In some recent investigations, indeed, potential algorithmic discriminations emerge also in the reverse situation, i.e. "when job opportunities reach the candidates".

This is the case of the algorithmic optimization of advertising-targeting strategies, i.e. algorithms capable to identify the ideal recipients of job vacancies advertised on the web. A recent experiment conducted on the Facebook advertising platform (Facebook Ads) demonstrated that three job vacancies advertisements – all of them rigorously gender, race and age neutral – reached different personal Facebook pages according to an algorithm which determined the following results: the job ad for a supermarket cashier position targeted an audience made up of 85% women; the job ad for a lumberjack appeared on the Fa-

[19] R. Slaughter, *Algorithms and Economic Justice: A Taxonomy of Harms and a Path Forward for the Federal Trade Commission*, in *Yale Journal of Law & Technology*, 2021, 23, p. 1.

cebook profiles of white males in the 90% of the cases; and the job ad for a taxi driver targeted an audience made up of 75% blacks.[20]

All in all, and quite paradoxically, algorithms – epitome of the future – seem rather prone to remain prisoners of the past,[21] thus urging lawyers to find a way to manage "old" problems running on "new" technological means. Something which could be far from easy, as noted by those authors who, with regard to algorithmic biases above mentioned, wrote that since «the resulting discrimination is almost always an unintentional emergent property of the algorithm's use rather than a conscious choice by its programmers, it can be unusually hard to identify the source of the problem or to explain it to a court».[22]

8. Synecdoches could be fallacious if one fails to remember that the part is not the whole. In the case of the New-technology-and-labour-law issue, there is no doubt that a sort of conceptual synecdoche has captured the legal debate, since a "part" of the issue – platform work – has often been represented as the "whole" of it.

Actually, there is no denying that many of the questions dealt with in the previous pages have been brought to the attention of the scientific debate precisely starting from the experience of platform work: legal questions related to algorithmic management, discrimination, entirely automated decisions, profiling, algorithmic opacity, increased surveillance and protection of workers' data, started to fill the agenda of labour lawyers following the booming rising of platform work in the second half of the 2010s. And yet, it is also unquestionable that – alongside the just mentioned issues, transversally crossing the entire world of digital work – platform work raises a series of other quandaries to traditional labour law categories, specifically linked to its peculiar organizational dynamics. These "platform-specific" issues are dealt with in the second part of this Volume, and they basically refer to the possible alternative representations of the platform as an employer,

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[20] M. Ali-P. Sapiezynski-M. Bogen-A. Korolova-A. Mislove-A. Rieke, *Discrimination through Optimization: How Facebook's Ad Delivery Can Lead to Biased Outcomes*, in *Proceedings of the ACM on Human-Computer Interaction*, 3/2019, p. 199. Although on the heels of publication of the research's results, Facebook declared its intention to remove these biases, subsequent research confirmed that they are still affecting the ads targeting systems used by the company, see K. Hao, *Facebook's ad algorithms are still excluding women from seeing jobs*, in *MIT Technological Review*, 09.04.2021 (*www.technologyreview.com/2021/04/09/1022217/facebook-ad-algorithm-sex-discrimination*, visited 20.02.2023).

[21] In an article published on *The Guardian*, the rather paradoxical case of futuristic algorithms susceptible to remain prisoners of the past is represented in this way: «computer scientists face an unfamiliar challenge: their work necessarily looks to the future, but in embracing machines that learn, they find themselves tied to our age-old problems of the past» (*Rise of the racist robots – How AI is learning all our worst impulses* (*https://www.theguardian.com/inequality/2017/aug/08/rise-of-the-racist-robots-how-ai-is-learning-all-our-worst-impulses*, visited on 20.02.2023).

[22] S. Barocas-A.D. Selbst, *Big Data's Disparate Impact*, in *California Law Review*, 2016, p. 671.

as a service provider or as an intermediary (§. 9); to the "mother of all questions", i.e. the legal qualification of platform workers (§. 10); and to the challenges such a dispersed organization of work poses to the existing forms of collective representation (§. 11).

9. As the qualification of platforms is concerned, the triangular conformation of the typical platform transaction, implying the presence of someone providing a service (the worker) and someone else receiving it (the client), requires identifying the substantive role, and therefore the legal qualification, of the third actor to the deal: i.e., the platform.

It must be pointed out, in this regard, that "platform work" is a multifarious notion not to be limited to the food delivery and urban transport models we all tend to envisage when talking about platforms. Several analyses have now made it clear that a composite organizational reality exists, within which work and platforms might be combined in a variety of different models, usually categorized through alternative binary options. Following the most accepted of them, submitted by a group of experts in an EU Commission-promoted study,[23] a division can be made between "*On-location* platform work", typically referring to passenger transport, food/parcel delivery, personal and household services and domestic work on the one side; and "*On-line* platform work" on the other side, where a series of tasks and micro-tasks not implying the physical presence of the worker in a given geographical location, are performed remotely trough the web, such as translations, research assistance, data encoding, tagging pictures, software maintenance. The same distinction is also referred to in the form of another binary alternative between, respectively, "Working *for* platforms" and "Working *through* platforms". Additionally, the typological variety of platform work models could also be classified – as Eurofond proposed some years ago[24] – according to the task allocation strategy subtending it: tasks might be allocated either by the platform, in what is defined as *"platform-determined work"*;[25] or by the client, in what is defined as *"client-determined work"*;[26] or by the workers, in what is defined as *"worker-determined work"*.[27]

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[23] *Study to gather evidence on the working conditions of platform workers* (VT/2018/32) – *Final Report*, 13.12.2019.

[24] European Foundation for the Improvement of Living and Working Conditions (Eurofound), *Employment and working conditions of selected types of platform work*, Luxembourg, Publications Office of the European Union, 2018.

[25] In the Eurofond study mentioned at the previous footnote, this is the case for "classic" food delivery or urban transports activities, where riders and drivers «typically receive task offers allocated by an algorithm, which they can accept or decline» (p. 55).

[26] This happen when the client selects through the platform a specific worker, as it happens for house cleaning services or other personal services where the client wishes to have some references (or previous knowledge) of those who will provide the service.

[27] This is the case when «clients post a task on the platform and the workers can select the ones they prefer».

It goes without saying that within such a multifaceted scenario, the economic role and the consequent legal qualification of platforms might change according to the different models from time to time at stake, varying from being considered as outright employers, to alternative qualifications representing platforms as labour market intermediaries and/or service providers, as both Luca Ratti and Annamaria Donini explain in their Chapters by offering unconventional views over the possibility to protect platform workers even in those cases where a subordinate employee qualification is not possible in the light of the specific facts of the case.

10. Once the analysis is focussed only on what is commonly understood as "platform work" – i.e., to mention the categories evoked in the above, on the cases of either "*On-location* platform work" or "Work *for* platforms" or *"platform-determined work"* – a different kind of questions arises, entirely concentrated on the much-discussed possibility to qualify "riders and drivers" as subordinate employees (or at least not as independent contractors).

The intense debate on the issue – whose conventional origin might be dated back to the 2015 *Cotter v. Lyft* case and to its celebrated "square pegs and round holes" dilemma[28] – is thoroughly reconstructed in this Volume by Piera Loi and Marco Biasi through an analysis of the judicial and legislative developments recently intertwined in several jurisdictions. Such comparative analysis is of particular interest insofar as it clearly offers the panoply of instruments which might be used, also in a policy perspective, in order to secure due social protection to a substantial part of the labour force in contemporary (and post-pandemic) societies.[29] As Marco Biasi notes, the available policy options might be aggregated alongside a basic alternative: either the "assimilation" option, according to which platform workers could be protected (only) to the extent that they may be utterly qualified as subordinate employees; or the "ad hoc" option, according to which they could receive statutory protection through the conferring of a set of rights specifically drafted for them. Even if the EU Directive proposal currently under discussion[30] does provide for a limited number of rights to be applicable to any

[28] *Cotter v. Lyft Inc*., US District Court for the Northern District of California, 60 F. Supp. 3d 1067 (2015). As both Piera Loi and Marco Biasi remind in their Chapters, the difficult task the court was called to perform in deciding whether Lyft drivers were to be qualified as employees or independent contractors, made the court candidly admit that «the jury in this case will be handed a square peg and asked to choose between two round holes».

[29] According to a recent ETUI survey, 4,3% of working age adults did platform work in the previous 12 months, and 1,1% can be classified as "main platform workers", i.e. working 20 hours or more per week or earning more than 50% of their income through platform. See A. Piasna-W. Zwysen-J. Drahokoupil, *The platform economy in Europe. Results from the second ETUI Internet and Platform Work Survey*, Brussels, ETUI, 2022.

[30] Proposal for a Directive of the European Parliament and of the Council on improving working conditions in platform work, COM(2021) 762 final of 09.12.2021.

«person performing platform work» irrespective of their employment status, it is however unquestionable that according to the proposal, «platform workers» might receive full labour and social protection only to the extent that the legislative presumption of subordination is not rebutted. In this sense, it can be said that the (future) EU regulation is basically inspired by the "assimilation" option, thus probably missing an occasion to make of platform work a sort of testing lab where to explore new ways of granting basic labour rights to any person who works «regardless of their employment status or contractual arrangements», as many observers, including ILO, retain that should be the case in an era where the traditional subordinate/self-employment dichotomy risks to be evanishing.

11. *Alone in the crowd* was the brilliantly self-explanatory title of an essay in which, some years ago, Giuseppe Recchia scrutinized the intrinsic difficulties of even imagining forms of collective representation and action for an atomized multitude of platform workers deprived of any "working place" and of any physical bound with their workmates.[31] In the present book – building on a careful observation of what has happened thereupon – Recchia returns on the same topic to point out how a series of experiences and practices slowly but progressively emerging in the platform's "industrial relations system", call into question the supposed "ontological" incompatibility between platform work and collective representation and/or unionisation.

Actually, the current scenario is indeed far from being settled, but the dawning of a new era of "platform-adjusted" collective counterpower is clearly discernible. In specie, in the absence of platform-specific legislative instruments, the social construction of the workers' voice in the expanding world of platform work seems to replay grassroots models already experienced at the beginning of the industrial era. As Recchia notes, voluntaristic, spontaneous, bottom-up movements emerge, sometimes as an alternative to traditional unions, and other times pushing them to renovate their policies, as it happened in the case of the quite innovative strategic litigation policy implemented in support of food delivery workers by Italian unions.[32]

Be that as it may, it seems rather indisputable that future challenges for the collective representation of platform workers are inherently associated to the "mother of all questions" regarding the legal qualification of those relationship. Insofar as platform workers will continue to be considered as self-employed, the danger of collective bargaining[33] being captured by market rules considering ne-

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[31] G. Recchia, *Alone in the crowd? La rappresentanza e l'azione collettiva ai tempi della sharing economy*, in C. Alessi-M. Barbera-L. Guaglianone (a cura di), *Impresa, lavoro e non lavoro nell'economia digitale*, Cacucci, 2019.

[32] See G. Gaudio, *Algorithmic management, sindacato e tutela giurisdizionale*, in *Diritto delle Relazioni Industriali*, 2022, p. 30.

[33] J.M. Miranda Boto-E. Brameshuber (eds), *Collective Bargaining and the Gig Economy. A Traditional Tool for New Business Models*, Hart Publishing, 2022.

gotiated agreements for self-employed as restrictions of competitions between "undertakings",[34] is extremely high, at least until the recent Commission Guidelines on the (non) application of competition law to solo self-employed collective agreements[35] will start to produce some tangible (judicial) effect.

Admittedly, emerging forms of non-union representation, evolving unions' strategies and extension of collective bargaining beyond the borders of subordinate employment, are social phenomena not confined to platform work. The context of platform work, however, undoubtedly offers an ideal experimental field where to observe and investigate such transition, thus confirming that the relationship between (labour) law and technology is a bidirectional one: the former tries to govern the latter, while the latter contributes to change the former. This is why "New technology and labour law" is an issue deserving careful consideration by anyone interested in understanding how technology, societal organization and law mutually and continuously interact, as I feel confident that the following pages will prove.

[34] As it happened in Denmark with the HILFR (a platform for cleaning services in private houses) collective agreement, considered as incompatible with EU competition law by the Danish Competition and Consumer Authority, see N. Countouris-V. De Stefano, *Collective bargaining rights for platform workers*, in *Social Europe*, 06.10.2020.

[35] EU Commission *Guidelines on the application of Union competition law to collective agreements regarding the working conditions of solo self-employed persons* (C(2022) 6846 final of 29.09.2022).

Boss ex machina: employer powers in workplaces governed by algorithms and artificial intelligence

Antonio Aloisi

1. Introduction: wiring the labour market

Contrary to alarmist forecasts concerning a potential "future without work", modern technologies are not rendering human labour redundant (Estlund 2021). Yet, while game-changing innovation is finding astonishing ways to replace dangerous, repetitive and tedious tasks, technologies are arguably making many jobs less enjoyable by exerting considerable pressure on their content, value and availability. This reality should prompt researchers and policymakers alike to broaden their perspectives and consider the qualitative rather than the quantitative dimension of the digital workplace revolution.

The ongoing transformation calls into question the rules and limits that regulate the exercise of employer powers, which were designed during times that predate the advent of algorithms, one of the new vectors that are currently rapidly reshaping workplaces (Wood 2021). Indeed, data-driven tools are helping to intensify the position of upstream authority retained by managers, while at the same time they are severely constraining workers' agency by introducing implicit disincentives and overt guidelines that shape behaviours and force compliance in an opaque manner. As a result, workers are forced to operate in a constrained environment where critical contributions are discouraged in favour of adherence to rules (Veliz 2021).

Over the last decade, much ink has been spilled in relation to the appropriate classification of platform workers, with debates raging as to whether they are employees or self-employed and what kind of protection they are entitled to. This book presents a thorough overview of the manifold legal challenges exacerbated

by the emergence of labour platforms at both the individual and collective levels. Although the European Union's (EU's) institutions have now decided to engage in an ambitious attempt to improve the working conditions of gig workers,[1] it will take time to address the present conundrums. Meanwhile, after years of bewilderment, several courts in countries across Europe have stated that classical domination can also be applied by means of technological tools, that is, artificial intelligence (AI) and algorithms have been recognised as mechanisms for imposing employer powers on workers.

While case law is especially fact-dependent, and while not all platforms are the same, it must be acknowledged that the main legacy of "gig work" can arguably be described as both a "mutation" and an "augmentation" of managerial authority, which has been achieved thanks to several digital techniques and design features. Here, think of customer reviews being used to assess workers' performance, accelerometers on smartphones being adopted to monitor their driving behaviour, random or regular screenshots being taken to verify their compliance with instructions issued by clients or time-tracking apps being used to measure the number of hours worked and prevent cyberslacking (Ivanova *et al.* 2018).

In short, platform work will likely be remembered as a testing ground for the technologies and practices that are currently spreading across the labour market in both ordinary and innovative sectors (Borzaga 2021). The COVID-19 pandemic has, in turn, resulted in a widespread *platformisation* effect felt by many blue- and white-collar workers, who are now required to access buildings after satisfying facial-recognition scanners, self-report the time spent on a project for billing purposes, share health-related data with third-party applications (apps) and resort to the use of collaborative platforms to work with far-flung colleagues.

The volume, variety and scope of the current tectonic shift towards the datafication and wiring of the workplace require labour lawyers to reassess the concept of employer powers and their heavy theoretical baggage. The emergence of algorithmic management practices, namely the delegation of human resources (HR) functions to devices enabled by AI and algorithms, is placing a strain on existing regulatory frameworks, which were designed for professional settings where managerial authority was exercised in a direct, open and immediate manner. Rather than viewing the digital transformation from the perspective of worker classification litigation, this chapter aims to examine the alteration in both power dynamics and the information imbalance (Zuboff 2019).

From a legal standpoint, one question worth asking is whether authority today is the same as authority in the past. To tell the truth, the present imbalance is not a genuine novelty. In the next section, the existence of managerial prerogatives will be presented as the justification for the contract of employment. Hierarchies have

[1] Proposal for a Directive of the European Parliament and of the Council on improving working conditions in platform work, COM(2021) 762 final of 09.12.2021.

always been a feature of professional contexts (Muehlberger 2005). In contemporary workplaces, however, information asymmetries are increasingly and unprecedentedly tilted towards data holders and away from data subjects. The data collected and processed by ubiquitous technologies or even self-reported by workers allow managers to devise new organisational strategies when it comes to targeting job adverts, recruiting new staff members, setting remuneration, awarding promotions, assessing productivity and even firing workers. Such changes have been accompanied by the unstoppable growth of automated decision-making systems (ADMSs), which are now in charge of the management of both public and private administrative processes (Rogers 2020).

Is the existing legal framework appropriate for algorithmic bosses? What if technology ends up disrupting the traditional limits of the legitimate exercise of managerial powers? To answer these questions, it is crucial to reassess the foundations of the boss-worker pyramid. By means of dynamic progress, a varied combination of employment law instruments and resources derived from other close legal fields have long alleviated the risk of managerial prerogatives extending beyond the extent deemed acceptable in liberal societies. In Italy, for example, the Civil Code of 1942, the Workers' Statute of 1970 and a number of other special laws were primarily designed for this purpose (Tullini 2021). At the same time, collective autonomy has contributed to the establishment of boundaries that employers and bosses cannot exceed (Bavaro 2021).

The overarching goal of this chapter is to determine whether digital automation, which can be broadly understood as the adoption of digitised instruments and solutions in the workplace, has resulted in the augmentation of the organisational, control and disciplinary prerogatives of employers, managers and supervisors. Prior to validating the hypothesis of the magnification of powers, which gives rise to what we call *boss ex machina*, it is worth examining the spectacular extravagance of the contract of employment. In fact, this legal template is tasked with functionally enabling an organisation in which one private party is permitted to "command and control" the other, with the latter party being subject to such upstream authority in exchange for economic security and employment stability.

In modern societies, this arrangement has been tolerated due to being considered an effective means of upholding efficiency, while at the same time, its excesses have been mitigated in order to implement the principles of human dignity, equality, good faith, due process, proportionality and reasonableness. If viewed through the lens of power, the employment relationship is structurally ambivalent (Supiot 1994) because it both enables a condition of employer supremacy and tones it down through mandatory provisions, process-based restraints and collectively negotiated counterweights. This entire system of "controlling factors" is currently experiencing sustained stress. What is strikingly different from the past is the fact that power can be wielded without the limitations inherent to human bosses, whose traditional authority had to be exercised within unavoidable constraints.

Using plain language, this chapter adopts an analytical-descriptive approach and, after these introductory remarks, is structured into four sections. Section 2 reflects on the apparent aims of the employment relationship by disentangling the meaning of the dominant position held by employers. Building on this, Section 3 catalogues the most widespread technologies currently invading the workplace and argues that, despite their heterogenous usages, the common denominator is the possibility of capturing and elaborating information that can be used to support managers in making executive decisions. Section 4 establishes the perils of the augmentation of managerial prerogatives through the adoption of ADMSs. Taking a multidimensional approach, it also introduces possible remedies from the neighbouring areas of data protection and non-discrimination law that could be read in conjunction with employment legislation to tame these rampant algorithmic bosses. Section 5 wraps up the chapter and offers some concluding remarks.

2. The functions of managers and the end(s) of the employment relationship

The ongoing digital transformation is altering the structure of work relations, rather than directly affecting the overall job count. Although the hypothesis of the soon-to-be end of work has been convincingly refuted by many labour economists (Organisation for Economic Co-operation and Development [OECD], 2019), the end(s) – understood as the purposes – of this legal institution are worth examining at a moment when the employment relationship is said to be facing obsolescence due to the growth of unorthodox company settings that both privilege external contracting over direct employment and impair the ascription of employment-related responsibilities while continuing to retain a dominant attitude.

This section presents an overview of the technical and economic tasks of employers and managers. Paradoxical though it may sound, a significant part of the workforce is now experiencing "loosened" forms of hierarchical power due to being free to organise their schedules and perform their duties remotely and independently (Del Punta 2018). By contrast, a portion of workers are facing the intensification of managerial prerogatives due to the need to obey new bosses hidden beneath the veneer of innovation (Falsone 2021). Independent contractors are increasingly being subject to the degree of authority once reserved for employees (Countouris 2018). Thus, the classical dichotomy between employment and self-employment no longer offers an unfailing yardstick for defining the scope of employer powers.

While the notion and boundaries of the employment contract or relationship have attracted significant attention and generated widespread discussion in recent years, mostly due to the intense litigation strategy pursued by (misclassified) wor-

kers in the platform economy, the justifications and aims of this contractual format have been explored to a much lesser degree. By shifting the perspective, it is possible to consider this issue by examining the powers exerted by entrepreneurs over the workforce.[2] Undeniably, as illustrated by dogmatic analyses, workers' subjection to employers' domination represents the hallmark of the employment relationship, alongside the duties of obedience, loyalty and cooperation, which shape an uncommon arrangement between private parties (Collins 1986).

So what do bosses do? Vested with ample latitude to issue orders, monitor compliance and punish recalcitrant or deviant behaviours on the part of workers, bosses unmistakably govern the workplace. In nearly all jurisdictions, a party to the employment contract is legitimately entitled to exercise unilateral authority over the other contracting party with the aim of efficiently attaining organisational objectives. Almost a century ago, Coase (1937, 388) observed that, within a firm, endless market transactions are substituted by «the entrepreneur-coordinator, who directs the production». In a similar vein, Edwards (1982) clarified how workplaces are ruled from the top down because hierarchies are considered more profitable than ephemeral arrangements in the market. Upon closer inspection, the increase in organisational costs linked to direct employment is compensated for by the possibility of exercising fully fledged managerial authority (Aloisi-De Stefano 2020a).

In short, the employment relationship has traditionally been seen as a private governance structure with a neat division between task designers and task executors (Collins 1986). To understand the relationship's essential socio-economic functions, it must be kept in mind that exceptional authority is conferred on the person of the employer, who is able to leverage wide discretion in terms of decision-making concerning matters that were not agreed upon at the moment the contract was entered into. As a result, in contractual terms, the debtor (i.e., the worker) is bound to suffer any changes in the terms without the possibility of giving or denying consent – an exception to general legal principles which postulate that any alterations made to a contract are invalid unless agreed upon by both parties.

An employment contract is considered "incomplete" by default because it is expected to last for a certain period of time. Therefore, reaching continuous agreements on all aspects of the contract in light of the changing needs of the employer would not prove cost-effective. At the same time, it would likely prove impossible to specify all contingencies in advance (Williamson 1985). In this scenario, the employee agrees to follow the orders of managers, thereby giving open-ended consent. Thus, transaction costs, that is, the costs incurred when it comes to acquiring information, negotiating terms and conditions and enforcing the provi-

[2] In this chapter, I use the words "entrepreneur" and "employer" interchangeably. The same is true of "manager" and "boss".

sions of agreements, are reduced within the firm because formal and hegemonic powers replace both time-consuming negotiation and price-mechanism governance.

From an organisational perspective, the consequence of all this is the creation of an atmosphere of internal flexibility, widely considered a cornerstone of the employment relationship, thanks to which managers can adjust processes in order to accommodate production needs. Authority makes it possible to achieve cooperation among parties through a single scheme that entrenches a set of evolutionary conditions. Interestingly, it is often overlooked that such an arrangement stimulates labour productivity by fostering an environment of collaboration that upholds individual and corporate performance and increases competitiveness (Deakin-Fenwick-Sarkar 2014). When viewed in this way, subordination is the result of the contract of employment, with its socio-economic task being the realisation of the employer's economic interests. A key consequence is that the contract of employment enables the existence of the modern undertaking (Persiani 1966; Williamson 1981).

Such a reading of the intended purposes of the contract of employment partially disproves or, even better, counterbalances the die-hard assumption according to which the primary (if not exclusive) purpose of employment regulation is to protect workers, who are recognised to be in an inferior bargaining position. This is a truism in the majority of cases, mostly due to certain structural conditions such as the monopsonistic nature of the labour market (Daskalova 2018), whereby buyers (employers) outnumber sellers (workers) and can, therefore, set terms and conditions that maximise their economic benefit. Thus, reinforcing the bargaining position of workers in both the market and the relationship with their employers represents a clear objective of modern social protection. However, this remedial function of the contract of employment says very little about the condition of supremacy that is reserved for employers in all jurisdictions, a legal determinant that used to represent a distinguishing feature between employment and self-employment.

As will be discussed in subsequent chapters of this book, several courts, including the Court of Justice of the EU, have been asked to verify the presence and intensity of such power in order to demonstrate the existence of an employment relationship in cases in which the contract's label was inconsistent with the actual circumstances of the performance execution in light of the "primacy of facts" principle (De Stefano *et al*. 2021).[3] In recent years, cases concerning the platform economy have again made it clear that employment status is often rejected to avoid the obligations and costs that come with it, while its main advantages are

[3] Opinion of Advocate General Szpunar delivered on 11.05.2017, *Asociación Profesional Elite Taxi v Uber Systems Spain* – Request for a preliminary ruling from the Juzgado Mercantil de Barcelona, para 52.

replicated by extra-legal mechanisms that allow the employer to occupy a position of domination (Tomassetti 2016).

The key source of authority is, however, the legal framework. For the sake of simplicity, managerial prerogatives can be conventionally unboxed into three complementary and mutually reinforcing roles, namely the powers to direct, monitor and discipline the workforce (Aloisi 2022). Direction concerns setting what needs to be done in what order and in what time frame by issuing top-down instructions, while monitoring involves supervising and assessing workers' performance in order the verify the correspondence between the issued orders and their actual implementation. In addition, discipline defines the system of sanctions and rewards intended to elicit collaboration and enforce compliance. Regardless of the means used to wield them, these powers operate jointly and pursue the coordination of economic factors.

A common misunderstanding involves viewing these powers as watertight compartments. On the contrary, they all represent a continuum and are functionally intertwined. Despite certain domestic specificities, a relatively uniform model in this regard can be found across jurisdictions in both civil and common law systems. There is no doubt as to the allocation of powers. As argued elsewhere (Aloisi 2022), employers can monitor and redeploy work tasks constantly and down to every single action. Workers can be transferred to different locations and assigned different duties to those for which they were hired. They can also be assessed prior to and after recruitment, admonished for corrective reasons and even dismissed under certain circumstances and following a specified procedure (Perulli 2002).

The employer is the holder of this multiform power and can delegate its exercise to managers and supervisors. The latter, while still subject to her authority, can rule their colleagues on behalf of the employer. Article 2086 of the Italian Civil Code states that «the entrepreneur is the *head of the business* and her collaborators *hierarchically depend on her*» (emphasis added). Simultaneously, according to Article 2104, «the employee must also observe the instructions for the work execution given by the entrepreneur and by her collaborators (managers and supervisors)».[4] Employers are provided with broad, albeit not completely unfettered or arbitrary, discretionary power. This arrangement spurs on both adaptability and versatility, thereby guaranteeing responsiveness to the ever-changing natures of socio-economic contexts (Rönnmar 2006).

Make no mistake: this power is not limitless (Marazza 2012). More specifically, sticking to the three-dimensional notion of authority, direction must be executed in line with workers' professionalism and without leading to demotion practic-

[4] Article 2094 of the Italian Civil Code specifies that «a subordinate employee is a person who binds herself, for remuneration, to cooperate in the enterprise by contributing her intellectual or manual work, in the employment and under the management of the [entrepreneur]».

es. In several countries, including Italy, worker representatives must be consulted prior to the installation of surveillance tools, and they can also veto their adoption (Aloisi-Gramano 2019). Any data that are collected in violation of this codetermination paradigm or inconsistently with data protection provisions cannot be used as an evidentiary instrument during a disciplinary procedure (Otto 2016). Based on the gravity of the infringement, failure to fulfil the duties of loyalty and obedience may give rise to the application of disciplinary sanctions, the most severe of which is dismissal. Employees can be lawfully terminated in all EU jurisdictions, and recent reforms have even streamlined the remedies for unlawful dismissal, although procedural and substantive rules must still be followed (Collins 2021).

In the peculiar relationship between employers and workers, some top-down elements prevail in a unidirectional sense. Yet, various institutions, principally those specified by labour and employment regulations, have historically counterbalanced the hegemonic position of employers and supervisors with a series of individual and collective guarantees. In a nutshell, several types of legal ammunitions can be deployed to reduce the level of unilateral decision-making. These intrinsic limits serve two purposes. First, to make authority consistent with the constitutional principles enshrined in modern democracies. Second, to design a process that is predictable, transparent and contestable. This should render the exercise of power accountable, reasonable and rational in the eyes of those that are subject to it and, more broadly, from the perspective of individuals and entities who hold a legitimate interest in its exercise.

Algorithmic management is poised to upset this model, as it allows employers to dodge legal rules intended to limit the scope of managerial prerogatives. The "authoritarian" face of the employment relationship, which is now facing the scrutiny of judicial bodies and academics (Anderson 2017), will be further exacerbated without the prompt activation of countermeasures tailored to a type of authority that is far less sophisticated, intrusive and omniscient than data-driven bosses. This suggests a rather intriguing research question: how can controlling factors premised upon a more analogue form of authority be adapted to deal with algorithmic bosses?

One preliminary conclusion is that power is shedding its skin and undergoing a "genetic variation" in its scope and shape. Moreover, a non-negligible movement from centralised decision-making toward scattered and outsourced centres of power has taken place, often involving co-workers and even customers (Rosenblat-Stark 2016; Levy-Barocas 2018). In addition, given this transformation, the activation of limits to whimsical decision-making will not prove straightforward, as the boundaries of human powers can be easily circumvented by means of technical devices able to bring command-and-control power into intimate spaces, non-working time and non-professional tasks. Thus, it is worth exploring whether mandatory and collectively negotiated rules that have been calibrated with regard

to the human-based exercise of power are resilient enough to provide a first line of defence against abuses arising from ADMSs.

3. A brief taxonomy of game-changing workplace technologies

Nowadays, AI and algorithms are everywhere. For instance, they handle your email spam folder, select "recommended" movies on streaming platforms and match you to the best available e-commerce offers. Increasingly, thanks to ubiquitous technologies and strong computing power, AI and algorithm-driven tools are used to complete actions once performed by humans. Such tools are implemented to a massive degree in public administration, welfare programmes, university admissions, as well as criminal justice and predictive policing. However, the workplace is the arena where the rise of what labour lawyers term "algorithmic bosses" is revealing its most contentious face (Adams-Prassl 2019).

Almost all company choices concerning the management are supported by data-driven instruments. How can performance bonuses be distributed in a competitive way? How can workers be matched to the tasks that they are most proficient at executing? How can diverse and balanced teams that combine heterogeneous skillsets to ensure bulletproof outcomes be compared? In the case of a restructuring process, how can it be ensured that the most committed workers remain with the company? Managers are striving to learn the solutions to these quotidian dilemmas, and AI and algorithms may have the answers (not necessarily the right ones).

AI and algorithms can be defined as instructions for achieving a programmed goal on the basis of given premises thanks to probabilistic evaluations of datasets. They can be more or less complex according to the variables that they are fed with, and they often lack volition as they pursue a goal that has been "taught" to them by programmers, providers or end users. In other cases, thanks to machine-learning (ML) features, algorithms can select meaningful outcomes with a certain degree of autonomy and minimal human oversight by detecting patterns in existing data in order to build models that predict future outcomes. ML tools can shape conduct in changing situations (Lee *et al*. 2015). Still, contrary to the widespread misunderstanding, there are always humans behind algorithms, and they are not absolved of responsibility in the case of unlawful results, privacy infringements or discriminatory impacts, not even in the case of ML techniques (Yeung 2017).

From a labour law perspective, the key activity performed by both AI and algorithms, at least for the time being, involves supporting humans in making decisions or deciding on humans' behalf in a limited number of situations. The umbrella term "algorithmic management"[5] can be used to refer to new HR practices

[5] Other authors use alternative expressions such as "management by algorithms", "people analytics" or "workforce analytics" (Dagnino 2017).

that leverage several AI-supported pieces of work equipment and techniques that help to manage, evaluate and discipline workforces. Such functions would not be possible without the near-constant and wide-ranging process of data collection and processing that represents the starting point for inferential analytics, that is, the ability to deduce the traits of the workforce by, for example, testing hypotheses and deriving estimates (Kellogg-Valentine-Christian 2020).

The "assistance" or "replacement" by algorithmic modes of governance occurs throughout the entire cycle of workplace interactions. To this end, data constitute the most critical underlying infrastructure that allows for the operation of this new model of workplace governance (Aneesh 2009). Personal data are collected from myriad devices and then analysed and repurposed for a broad range of roles, thereby allowing for automated or semi-automated decision-making. Moreover, the dizzying blurring of personal and private lives offers the opportunity to blend professional information with sensitive data, resulting in a fishbowl-like situation where employers can observe, infer and deter human behaviours to an unparalleled extent.

Another fundamental shift is also noticeable. For algorithms to work in the most efficient way, «data need to be collected from different sources, which implies that almost every worker's activity is, in principle, to be subject to monitoring and tracking» (De Stefano-Taes 2021, 3). The temporal and spatial limits of capturing data are increasingly crumbling, as it is now technically feasible to read personal emails and monitor the geolocation of workers thanks to company Global Positioning System (GPS)-equipped tools. In addition, fitness trackers/smartwatches and sleep-monitoring devices can harvest highly sensitive information and share them with employers in the context of corporate wellness programmes or insurance plans encouraging healthy lifestyles. This granular knowledge confers a God-like perspective on employers, who can use software to measure workers' productivity, commitment and engagement.

This section presents a catalogue of both physical and immaterial tools (e.g., hiring platforms, wearable sociometric badges, self-reporting dashboards, collaborative environments and various surveillance devices) that can be considered a precondition for the exercise of power in today's workplaces. Their impact on workers is twofold. First, they directly change and redesign the tasks employees currently perform. Second, they increase the demand for labour in jobs and industries that are more technologically advanced (Petropoulos 2018). In nearly all cases, these tools appear innocuous, although new risks are emerging.

The adoption of algorithmic tools can be described in chronological order by looking at all of the phases of employment relationships (Mateescu-Nguyen 2019). Several tools capable of making predictions are integrated throughout the (automated) hiring process in an effort to streamline it, especially when hundreds of candidates are likely to apply (Agrawal *et al.* 2018). Employers begin by attracting potential candidates to the vacant role through targeted advertisements,

job postings and individual outreach. Then, they can easily sift through résumés, manage the subsequent steps in the application process, run background checks and conduct remote interviews. As a result, the entire hiring "funnel" can be outsourced to platforms that replace HR managers in conducting this critical activity (Bogen-Rieke 2018).

Traditionally, workers have been vetted before being hired in order to assess their attitudes and ensure that they are a proper fit for the professional community they may be about to join. Moreover, by combining information on skills with the available data concerning earlier successful applicants, workers are selected on the basis of their conformity with previous cohorts (Ajunwa 2019). During the second phase, candidates can go through remote interviews intended to capture and process their facial expressions, tone of voice, use of specific words, sentence length and talking speed. In this case, the quantitative leap lies in the possibility of analysing a large amount of data to infer personality traits that are not visible.[6]

Were we to write a brief history of digital HR, we would note that automated scheduling systems first appeared in sectors such as household services, trade and consultancy in order to optimise the allocation of shifts. Amalgamated data are now processed to draft schedules at short notice and based on real-time preferences. From a labour law perspective, this system of tacit penalty and reward is also expected to enforce compliance, thereby subtly reconfiguring interactions. Thus, workers' choice is severely hindered by *prescriptive* tools that, albeit in a sophisticated fashion, limit their agency. This issue has proven pivotal in demonstrating the existence of an employment relationship in platform work litigation, although it is now a shared characteristic of larger segments of the labour market.

In industrial sectors, advanced robotics allows tasks to be performed almost independently, with more flexibility and accuracy than traditional robots due to sensors and a very high level of dynamic programming (Eurofound 2018). Not only can they be easily reprogrammed, but they will also interact and respond in an autonomous way if there are changes in their environment. In addition, these robots are manufactured in such a way that they can adapt to and collaborate with humans, meaning that they can perform the more burdensome physical activity and humans can focus on the knowledge-based aspects, if they are not busy fixing dysfunctional machines or removing frictions.

"Logged" robots and Internet of Things (IoT)-enabled devices rely on sensors to collect information (Hildebrandt 2015) and connect manufacturing settings to the digital world. This helps to compile data concerning the production process in order to make it more efficient by avoiding bottlenecks and waste. Other emerging tools include wearable devices that have different types of applications in both manufacturing and services (Eurofound 2020). For example, these devices can

[6] Companies such as the USA-based HireVue analyse the tone used by candidates and their facial expressions as they are recorded answering similar questions (Manokha 2021).