
Commodified, Outsourced Authority: A Research Agenda for Algorithmic Management at Work

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1. Introduction: boss-as-a-service, a boss you can buy. 2. Employers' authority and algorithmic bosses. 3. Bosses-as-a-service: introducing examples of commodified authority. 4. Commodified bosses: how bosses-as-a-service re-shape hierarchies. 5. Discussion: the "Shared" authority of employers and bosses-as-a-service. 5.1. Commodified, outsourced authority and the AI Regulation: notes for future legal research. 6. Conclusions.

Abstract

This paper argues that algorithmic management should be conceptualised as a form of commodified and outsourced authority over employees. Drawing on an interdisciplinary framework that integrates insights from legal theory, organisational studies, and social computing, I advance a theoretical model in which IT companies that design, sell, and operate "bosses-as-a-service" systems effectively share with employers (parts of) authority over employees within subordinate employment relationships. Overall, this paper aims to critically engage with the existing literature by highlighting regulatory lacks in addressing algorithmic management as a commodified and outsourced form of authority.

Keywords: Algorithmic Management; Boss-As-A-Service; Employer Authority; Commodification; Outsourcing.

1. Introduction: boss-as-a-service, a boss you can buy.

Amazon Web Services (AWS) Marketplace is a well-known platform for purchasing software services, including AI solutions for employee management and supervision.¹ Employers – or anyone with internet access – there can browse thousands of offerings from various IT companies that specialise in algorithmic management. A simple search on AWS Marketplace for keywords like "Workforce Management" reveals over 400 specialised

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¹ See: <https://aws.amazon.com/marketplace> (accessed on 30 October 2024).

products to manage, evaluate and supervise employees.² Beyond these workforce management tools, AWS Marketplace hosts more than 100 additional solutions focused on human resource management, covering functionalities such as shift scheduling, payroll automation, and in-depth data analytics.³ Through this Marketplace, employers gain streamlined access to compare, subscribe to, and seamlessly implement these services, integrating them directly into their workplace environments. These online marketplaces are nowadays very common and easy to access.⁴

Today's employers thus have access to a vast marketplace of algorithmic management services, ranging from basic management tools for scheduling and employee monitoring to advanced applications designed to optimise workflows and generate strategic insights.⁵ Labour law scholarship has increasingly turned its attention to the implications of integrating these services into workplaces.⁶ A key theme emerging from this research is that these tools significantly enhance employer authority. By collecting and analysing extensive employee data through a diverse array of technological solutions, employers acquire deep, data-driven insights into employees' behaviours, performance, and productivity. This data collection process not only provides employers with more granular control over employees but also exacerbates existing informational and power asymmetries, giving employers unprecedented control over their workforce.⁷

By observing its impacts on the workforce, legal researchers have explored how best to regulate this expanded authority. Much of this research has centred on ways to limit employer power through rules that emphasise employers' accountability and worker empowerment.⁸ In other words, the focus has typically been on the employer as an agent whose power must be curtailed to protect employees from excessive oversight or control. However, it is often overlooked that this enhanced authority is not simply exercised directly by the employer but is mediated by external service providers. This shift raises important questions about the nature of authority in the modern workplace and highlights the need for a critical examination of how algorithmic control reshapes employer-employee relations.

² See: <https://aws.amazon.com/marketplace/search/results?searchTerms=workforce+management> (accessed on 30 October 2024).

³ See: https://aws.amazon.com/marketplace/b/0bdbbf42-5d7b-4ac7-8041-849983ffeaaad?ref_=mp_nav_category_0bdbbf42-5d7b-4ac7-8041-849983ffeaaad&category=0bdbbf42-5d7b-4ac7-8041-849983ffeaaad (accessed on 30 October 2024).

⁴ Among many others, I only refer here to the marketplaces of Microsoft, Google and IBM. See: <https://azure.microsoft.com/en-us/> (accessed on 30 October 2024); <https://cloud.google.com/> (accessed on 30 October 2024); <https://www.ibm.com/consulting/cloud> (accessed on 30 October 2024).

⁵ Since 2021, the NGO Coworker.org keeps a database with most of these tools and catalogues their (countless) functionalities. See: Negrón W., *Bossware and Employment Tech Database*, 17 November 2021, available at: <https://home.coworker.org/worktech/> (accessed on 30 October 2024).

⁶ Aloisi A., De Stefano V., *Your Boss Is An Algorithm: Artificial Intelligence, Platform Work And Labour*, Hart Publishing – Bloomsbury Publishing, London, 2022.

⁷ Gaudio G., *Algorithmic Bosses Can't Lie! How to Foster Transparency and Limit Abuses of the New Algorithmic Managers*, in *Comparative Labor Law & Policy Journal*, 42, 3, 2022, 707–742; Adams-Prassl J., *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*, 41, 1, 2019, 123.

⁸ Cf. Abraha H., *Regulating algorithmic employment decisions through data protection law*, in *European Labour Law Journal*, 14, 2, 2023, 117–332.

This paper argues that employers, by integrating algorithmic management into traditional workplaces, effectively outsource parts of their authority to external service providers, treating these services as commodities.⁹ This outsourcing can be further understood through Coase's transaction cost theory, which has been instrumental in explaining the rise of the "Just-in-Time Workforce" and the "Gig Economy".¹⁰ Algorithmic management in those instances has been analysed as an effective tool to outsource through market transactions tasks to independent contractors.¹¹ In contrast, I argue that when algorithmic management is deployed within subordinate employment, it enables employers to outsource aspects of their authority to the IT companies that design, sell, and operate what I term "bosses-as-a-service". These commodified, market-available services transfer elements of managerial control to third-party providers. This shift aligns with Coase's theory by redefining the firm's boundaries, as authoritative functions move beyond traditional internal structures to external providers.¹²

This paper proposes a theoretical framework that reinterprets algorithmic management as a commodified and outsourced form of employer authority. Drawing on interdisciplinary literature, the framework aims to inspire future legal research. The structure of the paper is as follows. In Section 2, moving from Italian labour law, I identify key principles to define the core features of employer authority in subordinate employment relationships. I then analyse how this authority is influenced by the rapidly expanding market for workplace management and surveillance tools, emphasising its often-overlooked role in shaping authoritative functions within standard subordinate employment settings. In Section 3, by exploring two examples from Amazon Web Services Marketplace, I show more concretely why we should consider algorithmic management as "bosses-as-a-service". Section 4 draws on Agre's research in social computing¹³ to explain how IT companies commodify employer authority, transforming it into a marketable service.¹⁴ In Section 5, using both Agre's and Ciborra's framework on organisations and information systems,¹⁵ I discuss how employers

⁹ Cf. Coase R.H., *The Nature of the Firm*, in *Economica*, 4, 16, 1937, 386–405; Williamson O.E., *The Economics of Organization: The Transaction Cost Approach*, in *American Journal of Sociology*, 87, 3, 1981, 548–577.

¹⁰ De Stefano V., *The Rise of the Just-in-Time Workforce: On-Demand Work, Crowd Work and Labour Protection in the 'Gig-Economy'*, in *Comparative Labor Law & Policy Journal*, 37, 3, 2016, 475–477.

¹¹ Aloisi A., *Hierarchies without firms? Vertical disintegration, outsourcing and the nature of the platform*, in *Quaderni 8th Giorgio Rota Best Paper Award*, 2020, 18–19.

¹² Building on Coase's analysis of transaction costs, the decision for employers to rely on bosses-as-a-service aligns with the logic of minimising the costs associated with hierarchical organisation. Coase argues that entrepreneurs can reduce costs by managing resources internally rather than continuously negotiating and contracting services on the market. This internal organisation allows employers to save on the expenses of coordinating through the price mechanism, thus defining the enterprise's boundaries. See: Coase R.H., nt. (9), 390–392. See also: Aloisi A., *ibidem*.

¹³ Social computing research focuses on the design and simulation of social interactions and contexts (like workplaces) through software and technology. Cf. Hakken D., *Computing and Social Change: New Technology and Workplace Transformation, 1980-1990*, in *Annual Review of Anthropology*, 22, 1, 1993, 107–132.

¹⁴ Agre P.E., *Surveillance and capture: Two models of privacy*, in *The Information Society*, 10, 2, 1994, 101–127; Agre P.E., *From high tech to human tech: Empowerment, measurement, and social studies of computing*, in *Computer Supported Cooperative Work (CSCW)*, 3, 2, 1995, 167–195; Agre P.E., *Accountability and discipline: A comment on Suchman and Winograd*, in *Computer Supported Cooperative Work (CSCW)*, 3, 1, 1994, 31–35.

¹⁵ Cf. Ciborra C.U., *Research Agenda for a Transaction Cost Approach to Information Systems*, in Boland R., Hirschheim R.A. (eds), *Critical issues in information systems research*, Wiley, Hoboken, 1987, 253–274; Ciborra C.U., *Markets, bureaucracies and groups in the information society*, in *Information Economics and Policy*, 1, 2, 1983, 145–160.

by outsourcing management to algorithmic providers share specific authoritative functions with IT companies, as they validate the external system's outputs without fully understanding its operation. Finally, in Section 5.1., I present some concluding remarks and, moving from the forthcoming AI Regulation, I suggest topics for further legal research on the commodification and outsourcing of employer authority. Section 6 concludes.

2. Employers' authority and algorithmic bosses.

The employment contract – by taking as example Italian labour law – grants the employer the prerogative to instruct to his or her subordinate employees.¹⁶ It is therefore build upon the premise that the employer is the “head of the business”.¹⁷ Hence, any natural person, by freely signing an employment contract, undertakes the duty to observe the instructions given by the entrepreneur on how to execute the work performance.¹⁸ We find similar definitions of employer authority in other European countries such as the Netherlands, France and Germany.¹⁹ The interdisciplinary literature that underpins this Article, particularly Coase's research on employment contracts, offers a similar definition of employer authority. It characterises this authority as a relief from the need to constantly obtain employees' consent for compliance with directives. Coase refers to this as “the fact of direction”, which empowers the employer to issue unilateral orders, manage hierarchies, and respond swiftly to unforeseen circumstances.²⁰

Ultimately, through employment contracts, employers establish their organisational framework, retaining the right to decide and reshape instruments of labour, production processes and goals, thus managing their organisations as they deem appropriate – within the limits provided by the applicable legislation.²¹ Following this scheme of employment contracts, employer authority stems *from* the contract yet goes *beyond* the contract itself: managing, monitoring, and disciplining the workforce in fact evolves with and within the

¹⁶ Article 2094 of the Italian Civil Code: “A subordinate employee is a person who commits for remuneration to collaborate in the enterprise by performing intellectual or manual labour under the direction of the entrepreneur” (my translation).

¹⁷ Article 2086 of the Italian Civil Code.

¹⁸ Article 2104 of the Italian Civil Code.

¹⁹ The *Burgerlijk Wetboek* (Dutch Civil Code) at Article 7:610 CC defines *een arbeidsovereenkomst* (a contract of employment) as a contract where *de werknemer* (the employee), undertakes for a period time to perform work under the direction and control of the *de werkgever* (the employer), for remuneration. See: Jacobs A.T.J.M., *Labour Law in the Netherlands* – Third edition, Kluwer Law International, 2020, 63. A very similar definition can be found in: France – Cour de Cassation, Chambre sociale, du 13 novembre 1996, 94-13.187; Germany – §611a par. 1 German Civil Code. See also: CJEU - Case C – 66/85 Deborah Lawrie-Blum v Land Baden-Württemberg [1986], ECLI:EU:C:1986:284, para 17, which gave a first and important formula of the “essentials” of employment status from Article 45 TFEU on the notion of worker: employment status requires “that for a certain period of time a person performs services for and under the direction of another person”.

²⁰ Coase R.H., nt. (9): “We thus see that it is the *fact of direction* which is the essence of the legal concept of “employer and employee” (emphasis added).

²¹ Persiani M., *Contratto di lavoro e organizzazione*, CEDAM, Padova, 1966, 45–46; Collins H., *Employment as a relational contract*, in *Law Quarterly Review*, 137, July 2021, 426.

dynamism of organisations.²² If he or she deems appropriate to adopt an algorithmic management system to support her managing, supervisory and disciplinary powers, the employer can do so by integrating it in the operations of her business. Therefore, the use of “computer-programmed procedures for the coordination of labour input in an organisation” is commonly accepted as an aspect of employers’ prerogative to establish, manage, and oversee their businesses.²³ Employers will validate digital tools’ assessments and decisions on the management, supervision and discipline of employees.²⁴

It is largely accepted in the socio-legal literature that data-driven tools enhance managerial functions, leading to a “genetic variation” of their scope and promoting a greater intrusiveness – or even micromanagement – into employees’ life inside and outside workplaces.²⁵ These magnifying effects on employer powers are, by all means, a serious concern for scholars, legislators and – most importantly – employees themselves.²⁶ Effects which, however, do not result from an increase in personnel dedicated to surveil and spy over employees as was the case in Fordist industries.²⁷ These effects stem from the integration of software and hardware coming from a competitive market that aims to improve how workplace hierarchies work.

Since 2021, the US NGO Coworker.org updates the “Little Tech” database with countless IT products that companies of all sizes – from start-ups to multinationals – design and sell to employers.²⁸ Cataloguing all the functionalities offered by this market is an extensive task that I cannot complete here. However, I can highlight one key point: the proliferation of affordable IT services that enhance employers’ capabilities. No employer could, without purchasing *Cogito Dialog*, instantly monitor, assess and advise on the optimal tone of voice of all his or her call centre workers interacting with customers.²⁹ Similarly, verifying and advising the best driving behaviours for truck drivers would be factually impossible without *AI DriverI*

²² See this point, developed by Perulli on the managerial power and the role of Article 2103 of the Italian Civil Code: Perulli A., *Il potere direttivo dell'imprenditore. Funzioni e limiti*, in *Lavoro e diritto*, 3, 2002, 397, 405. See also: Razzolini O., *The Need to Go Beyond the Contract: 'Economic' and 'Bureaucratic' Dependence in Personal Work Relations*, in *Comparative Labor Law & Policy Journal*, 31, 2, 2010, 281.

²³ This is the definition of “algorithmic management” according to: Baiocco S., Fernandez-Macías E., Rani U., Pesole A., *The Algorithmic Management of Work and its Implications in Different Contexts*, Background Paper Series of the Joint EU-ILO Project “Building Partnerships on the Future of Work”, 9, 2022, available at: https://joint-research-centre.ec.europa.eu/publications/algorithmic-management-work-and-its-implications-different-contexts_en (accessed on 30 October 2024).

²⁴ Gaudio G., nt. (7).

²⁵ Aloisi A., De Stefano V., *Essential jobs, remote work and digital surveillance: Addressing the COVID-19 pandemic panopticon*, in *International Labour Review*, 161, 2, 2022, 289–314; Kellogg K.C., Valentine M.A., Christin A., *Algorithms at Work: The New Contested Terrain of Control*, in *Academy of Management Annals*, 14, 1, 2020, 366–410; Adams-Prassl J., nt. (7), 144–146.

²⁶ See on this more elaborately: Molè M., *The Internet of Things and Artificial Intelligence as Workplace Supervisors: Explaining and Understanding the New Surveillance to Employees Beyond Art. 8 ECHR*, in *Italian Labour Law e-Journal*, 17, 2, 2022, 87-103.

²⁷ Ajunwa I., Crawford K., Schultz J., *Limitless Worker Surveillance*, in *California Law Review*, 735, 2017, 107–108.

²⁸ Negrón W., nt. (5). See also the 2021 report introducing the first findings: Negrón W., *Little Tech Is Coming for Workers. A Framework for Reclaiming and Building Worker Power*, in *Coworker.org*, 2021, available at: <https://home.coworker.org/wp-content/uploads/2021/11/Little-Tech-Is-Coming-for-Workers.pdf> (accessed on 30 October 2024).

²⁹ Negrón W., nt. (5). The database reports that *Cogito* is used by “Top 5 Credit Card Issuers”.

cameras.³⁰ Finally, predicting which workers are likely to quit would be unimaginable without the *Syrg Former Worker ReHiring Tool*.³¹ All these activities that would require considerable costs for supervisory and micromanaging personnel are now accessible to virtually any business. Whether these tools actually deliver on their promises is a matter for verification and research.³² I will not focus on their effectiveness here.

My focus lies on the contractual relationship formed between producers and users of these products. Employers sign agreements with external IT services. Products like *Cogito Dialog*, *DriverI*, and *Syrg*, are generally perceived as being more efficient thanks to the amenities and potentialities of data science.³³ Therefore, employers through market transactions purchase these services and let them operating over the workforce (i.e. assessing and advising on how to talk to customers, how to drive properly, workforce forecasting).³⁴

Essentially, an external company intervenes in corporate hierarchies with its advanced, patented product. Those external managers understand – and inform the employer – whether the employee answering calls is friendly, or drives well, and whether he or she is going to change jobs in the near future. When an employer buys a license for a service like *Cogito Dialog*'s, he or she is not just purchasing a software product – he or she is effectively adopting an external service management and evaluation system that reshapes the company's organisation. This restructuring comes with the deployment of the IT service: *Cogito Dialog* determines what data is collected, how employees are evaluated (e.g., analysing tone of voice or other behaviours), and the criteria used in decision-making processes. This, as I shall further explore, shifts parts of the employer's authority (e.g., employee performance assessment, monitoring, giving directives, determining shifts or promotions) to an external developer, *CogitoCorp* (*Cogito Dialog*'s developer), whose tools determine how these functions are performed.

In these instances, while the employer retains responsibility for employment-related decisions – and some algorithmic boss decisions may not directly affect employment relations – the broader trend of incorporating what I term “bosses-as-a-service” impacts the organisation of work. Once activated (through a service contract signed by the employer) this service implements its own management for a specific function (e.g. assessing employees' tone of voice). This triangular scheme involving employers, providers, and employees, leads to a model where authority is increasingly distributed to, and mediated by, these IT service

³⁰ Negrón W., *ibidem*. *DriverI*, first developed by the Californian start-up Netradyne then bought by Amazon, is present on most of Amazon delivery trucks. See also: Statt N., *Amazon plans to install always-on surveillance cameras in its delivery vehicles*, in *The Verge*, 2021, available at: <https://www.theverge.com/2021/2/3/22265031/amazon-netradyne-driveri-surveillance-cameras-delivery-monitor-packages> (accessed on 30 October 2024).

³¹ Negrón W., nt. (5). The database reports that clients of this tool currently are: McDonald's, Subway, Domino's, Taco Bell and others.

³² Gould S.J.J., *Stochastic Machine Witnesses at Work: Today's Critiques of Taylorism are Inadequate for Workplace Surveillance Epistemologies of the Future*, in *Proceedings of the CHI Conference on Human Factors in Computing Systems*, 2024, 1–12.

³³ De Stefano V., Wouters M., *AI and digital tools in workplace management and evaluation: An assessment of the EU's legal framework*, European Parliamentary Research Service (EPRS) – Scientific Foresight Unit (STOA) – Panel for the Future of Science and Technology (STOA), Brussels, 2022, available at: [https://www.europarl.europa.eu/thinktank/en/document/EPRS_STU\(2022\)729516](https://www.europarl.europa.eu/thinktank/en/document/EPRS_STU(2022)729516).

³⁴ See further below in Section 3.

and the companies that operate them.³⁵ This hypothesis raises a novel and unexplored question: *is the employer's authority being outsourced to another company when algorithmic management systems operate within the firm?* To clarify how such a relational activity as employer authority can be outsourced, I will first outline why algorithmic bosses should be regarded as commodities and how their deployment impacts traditional forms of “human” employer authority.

3. Bosses-as-a-service: introducing examples of commodified authority.

In this Section, I present two examples of algorithmic management systems that can be purchased as commodities on e-commerce platforms.³⁶ Employers today increasingly turn to the market, as tracked by the Little Tech database, and pay quantifiable amounts of money to third-party firms for workforce management services.³⁷ One notable example is the Amazon Web Services Marketplace (AWS Marketplace), a popular platform for on-demand cloud computing and Application Programming Interfaces (APIs).³⁸ To give a concrete example, *Cogito Dialog*, the AI listening to employees' voices in call centres, runs by a yearly subscription (12 months) of \$200.000 on AWS.³⁹ The webpage explains in layman terminology that the “delivery method” is Software as a Service (SaaS):

*Software as a service is a delivery model for software applications whereby the vendor hosts and operates the application over the Internet. Customers pay for using the software without owning the underlying infrastructure. With SaaS Contracts, customers will pay for usage through their AWS bill.*⁴⁰

Like any Spotify or Disney+ membership, an employer signs up for access to the infrastructure of the algorithmic boss and integrates it into the company's hierarchy, without any control over its operation and infrastructure. The interface for the employer with the algorithmic boss is a dashboard, conceptually similar to those of Spotify, Disney+ and other streaming services.⁴¹

³⁵ In organisational studies, it is well-documented that employers rely on the expertise and opinions of their subordinates who are tasked with specific functions. See: Aghion P., Tirole J., *Formal and Real Authority in Organizations*, in *Journal of Political Economy*, 105, 1, 1997, 2–3; Baker G., *Informal authority in organizations*, in *Journal of Law, Economics, and Organization*, 15, 1, 1999, 57.

³⁶ E-commerce, or electronic commerce, refers to the process of buying and selling products or services through online platforms over the Internet.

³⁷ Negrón W., nt. (5); See also: Negrón W., nt. (28).

³⁸ AWS defines APIs as: “mechanisms that enable two software components to communicate with each other using a set of definitions and protocols. For example, the weather bureau's software system contains daily weather data. The weather app on your phone “talks” to this system via APIs and shows you daily weather updates on your phone.”

³⁹ See: <https://aws.amazon.com/marketplace/pp/prodview-tw4sqfpoyopzw> (accessed on 9 October 2024).

⁴⁰ *Ibidem*.

⁴¹ On the role of SaaS to manage the workforce: Gould S., *Measuring work is hard. Subcontracting it won't help. Explainable AI won't help.*, in Ponce Del Castillo A. (ed), *Artificial intelligence, labour and society*, European Trade Union Institute (ETUI), Brussels, 2024, 105–113.

Another employer management programme available on Amazon’s AWS Marketplace is *Calabrio ONE*. *Calabrio ONE* is also delivered as a SaaS, and offers “any organization to quickly build a robust, intelligent, modern contact center in the cloud”.⁴² It claims to achieve this by capabilities such as quality management, workforce management and multichannel analytics. More specifically, it highlights that its quality management-capability approaches every interaction as an opportunity to boost relationships, loyalty, and business impact by automated recording, evaluation, and reporting, which will leave management with more time for coaching and leading. The workforce management-capability will boost employee engagement, refine forecasting and scheduling to place the right employees in the right positions. What should catch our attention is a defined and rich listing of prices for different managing-capabilities of *Calabrio ONE*:

Pricing Information

Below are the total costs for these different subscription durations.
Additional taxes or fees may apply.

Calabrio ONE		
Units	Description	12 MONTHS
Quality Management	Drive Continual Improvement in Your Customer Experience	\$492
Workforce Management	Create More Accurate Forecasts and Schedules - Faster	\$468
Calabrio Analytics	Advanced Omnichannel Analytics - Harness the Voice of Your Customer	\$828
WFM Super User	Licenses for administration, five (5) licenses included with WFM.	\$300
WFM Connectors	License for added connectors (1 historical and RTA included with WFM)	\$180
WFM Customized Payroll	License needed for each user with Payroll Export adaptations	\$52.8
WFM Customer Reporting	License for reporting access to BI systems or other reporting tools	\$6
Calabrio ONE Suite	Suite Bundle includes QM, WFM and Analytics Licenses	\$1,500
Calabrio Data Realtime	Calabrio Data Manager Reporting	\$180
Cal_CDM_Historical	Cal_CDM_Realtime Historical Reporting	\$180

Figure 1. *Calabrio ONE* pricing information on AWS Marketplace.

To price for the use of the management quality-capability is \$492 for a subscription of 12 months and the use of the workforce management-capability costs \$468 for a 12-month subscription. And so on. Every capability of *Calabrio ONE* has its own price for the employer to periodically subscribe to and as such outsource various managerial functions to a self-composed algorithmic boss.⁴³ For instance, *Calabrio ONE* can independently assess how employees interact with customers and, based on these evaluations, predict their performance and determine work schedules. Employers receive these insights and decisions via the platform’s dashboard. As a result, the evaluation of employee performance and the

⁴² See: https://aws.amazon.com/marketplace/pp/prodview-uxyd5hjxjm7gc?sr=0-2&ref_=beagle&applicationId=AWSMPContessa (accessed on 9 October 2024).

⁴³ *Ibidem*.

scheduling of work shifts are no longer handled by managers within the employer's hierarchy following internal company policies. Instead, these tasks are performed by the company behind *Calabrio ONE*. By entering into a service contract with this provider, the employer relies on these algorithm-driven outcomes, seeking to maximise the benefits of the service.

When employers subscribe to these services, they enable a third-party company to implement its boss-as-a-service within the organisation. By endorsing the decisions made by these systems provided by *Cogito Corp* or *Calabrio ONE*, employers bring external IT-driven management into their organisational structure. In Section 2, I suggested that this endorsement of decisions by bosses-as-a-service represents an indirect transfer of managerial authority to IT companies. In the following Section, I will further expand on this by examining how IT companies not only create these tools but infuse them with a well-defined and specific organisational framework on which employers have limited control. This feature of bosses-as-a-service, I suggest, reshapes the organisation, challenging the traditional construct of employer authority, where the employer stands as the central and “omniscient” figure within the hierarchy he or she has established.

4. Commodified bosses: how bosses-as-a-service re-shape hierarchies.

To understand how bosses-as-a-service re-shape organisations and interfere with employers' authority, it is interesting to start with the works by Agre in the field of social computing. His research, as I shall further explore in this Section, provides a theoretical framework that helps understanding how IT companies (and their bosses-as-a-service) influence employers' ability to direct and control their own organisations.

Agre noted that algorithmically managed work is heavily “staged”: “it's shaped through a great deal of (...) representation schemes that are capable of expressing in formal terms the range of activities that occur within a given category of jobs”.⁴⁴ For Taylor, he notes, that representational work was to break down labour processes in its smallest units. Those units were mainly physical, such as hand movements, body orientation and so on. By breaking tasks into smaller units, Taylor argued, employers could impose to the workforce “one best way” to perform the work.⁴⁵ Algorithmically managed work builds on the same idea of breaking down tasks into units, however the units are not understood in physical gestures but through informational terms (data). Another difference is that algorithmically managed work empowers workers to execute their work more spontaneously within the parameters set by the machine.⁴⁶ This illustration from Agre explains well how *Cogito Dialog* operates: the worker is not required to perform precise actions, but simply to work and let the machine interpret his or her personality (e.g. friendliness with customers) according to dynamic and

⁴⁴ Agre P.E., *From high tech to human tech: Empowerment, measurement, and social studies of computing*, in *Computer Supported Cooperative Work (CSCW)*, 3, 2, 1995, 182. See further: Linhart D., *La comédie humaine du travail: de la déshumanisation taylorienne à la sur-humanisation managériale*, Erès, Paris, 2015.

⁴⁵ Agre P.E., *ibidem*.

⁴⁶ Agre P.E., *ibidem*, 183.

contextual parameters and indices. By doing so, as Agre points out, IT companies in developing algorithmic bosses establish (and sell to employers) “grammars of actions”.⁴⁷

To create “grammars of actions” IT companies like *CogitoCorp*, anticipate all possible working activities in a given workplace (e.g. a call centre) and for given purposes (e.g. optimal interaction with customers) by coding them into a language readable by computers.⁴⁸ To reach this purpose they develop a grammar with sets of unitarized actions representing workers’ actions (e.g. kind or unpolite tone of voice) to be then read by algorithmic bosses.⁴⁹ Whenever the *Cogito’s* AI model recognises the “unfriendly tone of voice” unit it will trigger a report, the same for the “friendly tone of voice” unit. Bosses-as-a-service, in fact, do not equip employers with tools that merely observe the workforce through visual representations.⁵⁰ Algorithmic bosses can understand only linguistic representations: algorithms. Thus, algorithmic management, as Agre explains, first and foremost involves representing typically relational activities, like work, through a language that computers can understand and work with.⁵¹ To turn a working activity into a language readable by machines, Agre theorises that IT companies apply this five-stages cycle:

- I. *Analysis* of the existing forms of working activities and formation of fundamental “units” (entities, relations, functions);⁵²
- II. *Articulation* of “the grammar of the ways in which those units can be strung together to form actual sensible stretches of activities”. The aim of the articulation is to obtain a “complete, closed, formally specified picture of the activity”;⁵³
- III. *Imposition*: of the algorithmic boss with its related grammar of action, by giving it a “normative force”. Customers of its boss-as-a-service are expected, upon purchase, to adapt their hierarchy according to the grammar of actions;⁵⁴

⁴⁷ Agre P.E., *Surveillance and capture: Two models of privacy*, in *The Information Society*, 10, 2, 1994, 107. The concept of grammatisation was introduced by the linguist Sylvain Auroux and applied by the philosopher Bernard Stiegler to the third industrial revolution: “For Auroux, to grammatize means to discretize in order to isolate grammes, or the finite number of components forming a system”. “The third industrial revolution, which is the generalization of informational technologies and the resulting redefinition of knowledge, belongs to this process of grammatization - and more precisely to the third technological revolution of grammatization, the second, according to Sylvain Auroux, being the printing revolution”. See: Stiegler B., *Symbolic misery. Volume 1: The hyper-industrial epoch*, Polity Press, 2014, 54. See also: Auroux S., *La révolution technologique de la grammatisation: introduction à l’histoire des sciences du langage*, Mardaga, 1994.

⁴⁸ Agre P.E., *ibidem*, 108–109.

⁴⁹ Agre builds on the “minimum replicable units” concept developed by: Quinn J.B., *Intelligent enterprise: a knowledge and service based paradigm for industry*, Free Press, 1992, 103–109.

⁵⁰ Agre P.E., nt. (47), 113.

⁵¹ Agre develops his language metaphor on the work of Suchman, whose work showed how encoding speakers’ intentions into categories carries out an agenda of discipline and control over the members of an organisation. Suchman concludes that a theory of language cannot ontologically correspond to a theory of actions. Suchman L., *Do Categories Have Politics? The language/action perspective reconsidered*, in De Michelis G., Simone C., Schmidt K. (eds), *Proceedings of the Third European Conference on Computer-Supported Cooperative Work 13–17 September 1993, Milan, Italy ECSCW ’93*, Springer Netherlands, 1993, 1–14; Agre P.E., nt. (47).

⁵² Agre P.E., *ibidem*, 109–110.

⁵³ Agre P.E., *ibidem*, 110.

⁵⁴ Agre P.E., *ibidem*.

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- IV. *Instrumentation* of the algorithmic boss with the hierarchy of the service receiving employer. However, the service remains under the control of the IT company;⁵⁵
 - V. *Elaboration* of the algorithmic boss operating the hierarchy of the service receiving employer by “listening to” the linguistic representations mirrored in the activities of employees.⁵⁶

This five-step cycle illustrates that creating a boss-as-a-service requires developers to first analyse existing organisations and hierarchies. After representing these structures, they develop their own new organisation of work. In the case of *Cogito Dialog*, they develop a set of behavioural cues (e.g., friendly, annoyed, interested, or disinterested responses), what Agre defines as “grammar of actions”. *Cogito*’s AI model is trained to recognise these behaviours and prompt workers to avoid what the “grammar of actions” defines as negative interactions. Once an employer adopts the system, this new organisation of work is enforced.

This illustration helps me to point out that employers, by letting these IT services operating within their organisations, are signing a contract service that re-shapes how the organisation and evaluation of work is carried out. Using the example of *Cogito Dialog*, employers who purchase this service have limited influence over how the system evaluates the tone of voice. As a result, bosses-as-a-service shifts authority: employers no longer set the criteria for appropriate phone interactions with customers, as these standards are now dictated by the service. We can thus see a more direct influence of those companies on employers’ hierarchies: *CogitoCorp Inc.*, through *Cogito Dialog* provides instructions on conducting customer conversations, and the company *Netradyne*, through *DriverI*, offers guidance on proper driving techniques. And so on.⁵⁷

In Section 2, I noted how by signing an employment contract, an employee agrees to follow the employer’s instructions regarding their job. However, in these scenarios, the employee receives and follows instructions within the “grammar of actions” of these IT companies operating over the employer’s hierarchy. These third-party companies through that service contract establish their own organisational framework, while the employer receives the outcomes produced by *Cogito Dialog*, *DriverI* or *Calabrio ONE*. Contrary to the common understanding of algorithmic management as an expression of traditional employer authority, I argue that in all the cases discussed above, employers actually share authority over employees with the companies that design and operate these bosses-as-a-service. The logics underlying the decisions of bosses-as-a-service are neither generated nor fully understood by the employer due to their technicalities, and they are integrated in the company’s organisation through a service contract.⁵⁸

⁵⁵ Agre P.E., *ibidem*.

⁵⁶ Agre P.E., *ibidem*.

⁵⁷ Negrón W., nt. (28). In her report, Negrón illustrates with many examples the role of these companies in re-shaping the organisation of work.

⁵⁸ I discuss further employers’ behaving as consumers on a market here: Molè M., nt. (26), 91–92. See also: Molè M., *Labour is not a Commodity, Employer Authority is? Consumption of Work Surveillance and its Regulation*, in *Digital Monitoring Workshop (16-17 September 2024)*, Netherlands Institute of Advanced Studies and University of Amsterdam, 2024.

The fact that authority can be outsourced, however, doesn't tell us why employers would share part of their managerial prerogative with bosses-as-a-service. Thus far, I have only broadly referred to the fact that employers often view algorithmic managers as more efficient than their human counterparts. In the following Section, I offer a more nuanced account on why employers, beyond general efficiency claims of data science, opt to contract out aspects of their managerial prerogative to these services.

5. Discussion: the “Shared” authority of employers and bosses-as-a-service.

Once established that bosses-as-a-service re-shape and manage parts of a company's hierarchy, why would an employer want to use them? Bosses-as-a-service enable employers to gain deeper insights about their own workforce, it is therefore likely that employers will recur to these providers.⁵⁹ By imposing standardised “grammars of actions”, these systems allow employers to predict and control how interactions and collaborations unfold within the hierarchy.⁶⁰ This shift creates a notable distinction between human managers, who have limited information about their hierarchies, and algorithmic managers, who have access to vast data resources. As outlined in Section 2, employers, as the heads of their businesses, establish and shape their organisational frameworks, retaining the authority to direct labour, production processes, and strategic goals in ways that align with their own objectives. In the case of algorithmic management, however, employers outsource (parts of) these aspects of their managerial functions to IT companies providing bosses-as-a-service. Through this arrangement, employers essentially validate and enforce decisions generated by these external systems, leading to a form of shared authority over employees where the IT company develops decisions that the employer – with limited or no knowledge behind the operation of these systems – then applies to the workforce.

This shared authority framework introduces a distinct separation between human managers and bosses-as-a-service, and, as I argued so far, signals a process of commodification and outsourcing of managerial functions. The differences between human-led and service-based management approaches are summarised in *table 1*.

⁵⁹ This is also the conclusion of Agre in: Agre P.E., nt. (47), 122.

⁶⁰ The organisational theorist Ciborra notes that these insights are due to the imposition of formalised management acts and the subsequent quantification of social interactions through IT services. Cf. Ciborra C.U., *Research Agenda for a Transaction Cost Approach to Information Systems*, in Boland R., Hirschheim R.A. (eds), *Critical issues in information systems research*, Wiley, Hoboken, 1987, 265–266.

Aspect	Scenario 1: Human Boss (Limited Information)	Scenario 2: Algorithmic Boss (Abundant Information)
Predictability of manager-worker interaction	Low, the employment contract only requires to collaborate on unpredictable relational working activities	High, the worker has to follow the grammar of actions of bosses-as-a-service
Information Availability	Limited to human boss oversight	Abundant, extensive data analytics
Costs	High (coordination costs for the human boss are high, she needs to establish directives, control them, hire managers that report to her)	Low (coordination is orchestrated by the algorithmic boss)
Integration/Disintegration	The firm is fully integrated	Rely on open market transactions to let the boss-as-a-service operate

Table 1. Comparative Analysis of Human and Algorithmic Management in Employment (elaboration of the Author).

Without bosses-as-a-service, companies rely on traditional human oversight, where employers independently make and implement decisions on strategy, employee evaluation, and daily supervision – tasks rooted in “human” managerial skills. By outsourcing instead parts of their authority to IT companies, however, employers gain access to cost-efficient greater volumes of data and enhanced predictability. For example, systems like *Cogito Dialog* can identify deviations from set interaction standards (e.g., incorrect voice tone) and provide real-time reports on employee performance via platforms such as *CogitoCorp*’s dashboard.⁶¹

The table above illustrates two contrasting scenarios – at one end, full human-led management (Scenario 1), and at the other, complete reliance on bosses-as-a-service (Scenario 2). In practice, however, most organisations operate somewhere between these extremes, blending human oversight with automated systems according to their specific needs. Employers by exploring the market for bosses-as-a-service (See Section 3) selectively decide which aspects of authority to manage themselves and which to delegate to bosses-as-a-service, based on the specificities of solutions they purchase. For example, an employer may choose to outsource real-time performance monitoring to *Calabrio ONE* for its

⁶¹ Bosses-as-a-service like *Cogito Dialog* seem to meet what the organisational theorist Claudio U. Ciborra identified as the main feature of “information systems” in employment, i.e. they promote a more rigid – thus formalised and regimented – unfolding of working relationships, which was later framed in Agre’s “grammars of actions”. Cf. Ciborra C.U., *ibidem*, 263.

capabilities in determining shifts and performance assessments, while keeping more strategic decision-making on other workflows within human hands. This selective approach reflects the flexibility employers have in distributing authority to bosses-as-a-service according to operational needs and priorities.⁶²

This model of commodified and outsourced authority thus helps to understand the nuanced distribution of authority in contemporary workplaces. This selective outsourcing impacts the predictability, cost-efficiency, and information flow within organisations, illustrating a shift from traditional employer authority to a shared model where providers of algorithmic management systems play a significant role alongside the head of the business.⁶³ This analysis also allows me to answer the question posed in Section 2: whether employer authority is indeed being outsourced. The answer is nuanced: the spread of algorithmic management at work constitutes a complex structure of shared authority between employers and bosses-as-a-service providers. These systems shape workplace interactions, performance assessment and organisation of work, with employers having limited control, as they primarily validate, rather than actively shape, the outputs generated by bosses-as-a-service.

5.1. Commodified, outsourced authority and the AI Regulation: notes for future legal research.

The results of this research should not come as a surprise to those familiar with the new Artificial Intelligence Regulation (EU Reg. 2024/1689). The Regulation distinctly separates providers⁶⁴ from deployers.⁶⁵ Most obligations fall on the providers of boss-as-a-service systems, which are classified as high-risk under Article 6 and Annex III.⁶⁶ These developers must adhere to the criteria outlined in Chapter III (“High-Risk Systems”) when creating their

⁶² According to Ciborra what drives the employer in outsourcing (or not) is the “fact of certainty”. In other words, whenever the employer can access more information about the workforce through a market transaction – and not internally through a human-managed hierarchy – this shifts the entrepreneur’s focus to accessing that market rather than maintaining direct control of his or her hierarchy. Hence, through Ciborra’s understanding of the transaction cost approach, I understand that the entrepreneur might be willing to relinquish parts of her direction and control over the hierarchy in favour of the greater predictability of these “grammars of actions” externally managed. Cf. Ciborra C.U., nt. (15).

⁶³ Whether employers can truly make “strategic” decisions in the market for bosses-as-a-service requires further investigation. In separate research, I argue that bosses-as-a-service, as commodified and outsourced authority, resemble a consumer-driven model characterised by significant information asymmetries and a reduced level of agency for employers. I explore this dynamic in detail here: Molè M., nt. (58).

⁶⁴ Article 3(3) AI Regulation: “‘provider’ means a natural or legal person, public authority, agency or other body that develops an AI system (...) and places it on the market or puts the AI system into service under its own name or trademark, whether for payment or free of charge”.

⁶⁵ Article 3(4) AI Regulation: “‘deployer’ means a natural or legal person, public authority, agency or other body using an AI system under its authority except where the AI system is used in the course of a personal non-professional activity”.

⁶⁶ For a first “labour law” analysis of the AI Regulation, see: Cristofolini C., *Navigating the impact of AI systems in the workplace: strengths and loopholes of the EU AI Act from a labour perspective*, in *Italian Labour Law e-Journal*, 17, 1, 2024, 75–103.

AI products and inform and safeguard deployers from causing harms by deploying AI systems in their particular contexts.⁶⁷

Employers, according to Articles 26(4) and 26(5), “shall monitor the operation of the high-risk AI system on the basis of the instructions for use and, where relevant, inform providers” and “to the extent the deployer exercises control over the input data”. The European regulator, I suggest, frames this relationship in a way that mirrors consumer protections, emphasising the responsibilities of AI providers toward employers-deployers. Although employers cannot qualify as consumers under EU law since they are not natural person, the protection designed for deployers – be they legal or natural persons – is informed by a consumer-like protection, as it aims to protect agents operating outside their “trade, business, craft, profession”.⁶⁸ More specifically, providers are required to supply essential information and cooperate with employers-deployers, as high-risk AI systems are classified as “high-risk products”. Article 79 (1), moreover, qualifies bosses-as-a-service as: “product presenting a risk” by rereferring to Article 3, point 19 of Regulation (EU) 2019/1020, in so far as they present risks to the health or safety in the workplace, or to fundamental rights of persons.⁶⁹

In this regard, the Regulation grants deployers the right to receive transparent information from AI providers regarding the systems they deploy at work (Article 13). Additionally, it mandates that AI systems shall be designed to allow human oversight of their functions and effects on employees (Article 14), to empower employers in understanding and controlling AI. For example, under these provisions, an AI system monitoring drivers would need to provide an interface allowing employers to review and, if necessary, adjust the assessments generated by the AI. Article 14(4)(d) further mandates that deployers shall be able to override or reverse the system’s output, while Article 14(4)(e) provides for a “stop button” or similar mechanism to safely halt the system. Though these human oversight requirements aim to address employers’ limited control – or agency – over these systems, authority remains commodified and outsourced. Employers are still dependent on bosses-as-a-service with human oversight tools (dashboards with relevant data and a stop button) developed by the same company that produces the AI, leaving the provider as the sole counterpart to the

⁶⁷ Recital 66, EU Reg. 2024/1689: “Requirements should apply to high-risk AI systems as regards risk management, the quality and relevance of data sets used, technical documentation and record-keeping, transparency and the provision of information to deployers, human oversight, and robustness, accuracy and cybersecurity. Those requirements are necessary to effectively mitigate the risks for health, safety and fundamental rights”.

⁶⁸ The definition of consumer in EU law is: “Any natural person acting for purposes that are outside their trade, business, craft, or profession”; *see*, for instance: Article 2(1) Dir. 2011/83/EU on consumer rights and Article 2(a) Dir. 2005/29/EC on unfair commercial practices”. Employers by recurring to complex AI system seek on the market products that they don’t understand neither control. On this premise, I argue, is built the notion of deployer in the AI Regulation.

⁶⁹ Article 3(19) Regulation (EU) 2019/1020: “‘product presenting a risk’ means a product having the potential to affect adversely health and safety of persons in general, health and safety in the workplace, protection of consumers, the environment, public security and other public interests, protected by the applicable Union harmonisation legislation, to a degree which goes beyond that considered reasonable and acceptable in relation to its intended purpose or under the normal or reasonably foreseeable conditions of use of the product concerned, including the duration of use and, where applicable, its putting into service, installation and maintenance requirements”.

employer. The question of how to regulate commodified and outsourced authority, I argue, remains open: what forms of authority should (or should not) be shared between employers and IT companies?⁷⁰

A thoughtful examination by the legal scholarship of the AI Regulation shall further investigate whether these consumer-like protections provided to employers effectively compensate for their lack of control and understanding of algorithmic bosses and their impact over the workforce. Alternative approaches to AI Regulation (in the specific domain of algorithmic management) are already suggested in research,⁷¹ hence it is topical to further investigate whether specific labour regulation is needed to steer bosses-as-a-service's development towards employees' well-being and greater control and understanding by employers. For example, a legal provision could specify which managerial functions are eligible to be commodified (i.e., turned into a boss-as-a-service) and outsourced. In other words, it would outline which managerial functions employers are permitted to delegate or share with an IT company.

6. Conclusions.

In conclusion, in this paper I investigated algorithmic management as a form of commodified and outsourced authority in standard employment relationships. By adopting an interdisciplinary approach that integrates legal, organisational, and social computing studies, I explored the effects of the increasing availability of affordable and precise “bosses-as-a-service” solutions – tools that manage employees beyond employers' direct control.

Subordinate employment, particularly within the context of Italian labour law, underscore few essential elements: the employer's prerogative to instruct employees and employees' duty to cooperate and follow directives. Employers' authority to instruct, monitor and organise work – consistently recognised across various European jurisdictions – underscores the employer as the central figure in establishing and managing business operations. However, the advent of bosses-as-a-service confronts this framework. Employers increasingly deploy sophisticated technologies, such as *Cogito Dialog*, *Calabrio ONE*, and many others, which operate within their organisations through service contracts. Often, as seen in Section 3, bosses-as-a-service are simple subscriptions on online marketplaces, such as Amazon Web Services.

Through Philip E. Agre's framework of “grammar of actions”, I illustrated how bosses-as-a-service function as a form of commodified authority. This framework illustrates how IT companies designing and providing these services fundamentally re-shape the organisation of work (within the functionalities offered by the service) and manage it for the employer.

⁷⁰ I discuss “authority consumption” in forthcoming research: Molè M., *Labour is not a Commodity, Employer Authority is? Consumption of Work Surveillance and its Regulation*, in *Digital Monitoring Workshop (16-17 September 2024)*, Netherlands Institute of Advanced Studies and University of Amsterdam, 2024.

⁷¹ See in particular the Blueprint for Algorithmic Management regulation by: Adams-Prassl J., Abraha H., Kelly-Lyth A., Silberman M.S., Rakshita S., *Regulating algorithmic management: A blueprint*, in *European Labour Law Journal*, 14, 2, 2023, 124–151.

By purchasing these commodities, employers let them operate within their organisations, effectively outsourcing how and who organises and supervises work. As a result, employers share authority with these services over the organisation's operations and management.

The integration of bosses-as-a-service represents a significant shift from traditional, human-led management toward a model of shared, commodified authority. While employers once exclusively managed strategy, employee evaluation, and daily supervision based on interpersonal managerial skills, they now have the option to outsource specific elements of authority to IT companies that provide cost-effective, data-driven insights and enhance operational predictability. This analysis highlights how employers selectively distribute authority between human oversight and algorithmic management systems, as illustrated in the contrasting scenarios of full human management and complete automation.

By choosing which tasks to retain and which to delegate – such as assigning real-time performance monitoring to systems like *Calabrio ONE* while reserving strategic decision-making for human management – employers exercise flexibility in aligning their organisational needs with the capabilities of bosses-as-a-service. This selective outsourcing enables employers to balance control with operational efficiency but also introduces a shared authority structure, where the providers of these services significantly shape workplace dynamics, employee assessment, and workflow organisation.

Thus, algorithmic management introduces a nuanced model of shared authority, where employers predominantly endorse rather than direct the outputs of these systems. This blended approach underscores an on-going transformation in employer authority, with bosses-as-a-service providers playing an integral role in the management framework of modern workplaces.

In conclusion, legal scholarship should assess whether the AI Regulation's protections adequately address commodified and outsourced authority. As some research suggests alternative regulatory approaches,⁷² it's timely to further explore labour-specific regulations to guide bosses-as-a-service toward supporting employee well-being and keeping employers in (real) control. For example, I argued that legal provisions could clarify which managerial functions employers can delegate to IT companies.

My points for a research agenda on commodified, outsourced authority (and on the role of the AI Regulation) intend to encourage a critical approach to (current and future) regulation of algorithmic management. They overall aim to generate further questions and open new debates. My proposal mainly aims to introduce an interdisciplinary approach in the legal scholarship on these important issues. Beyond the suggestions I offer, any proposed research agenda on algorithmic management shall rigorously unpack and disentangle the ways in which markets shape what Coase once described as “islands of conscious power in this ocean of unconscious co-operation like lumps of butter coagulating in a pail of buttermilk”.⁷³ In doing so, it will shed light on how these external market influences (and how they are regulated) are reshaping the traditional structures of workplace authority and how labour law should approach these transformations.

⁷² Adams-Prassl J., Abraha H., Kelly-Lyth A., Silberman M.S., Rakshita S., *ibidem*.

⁷³ Coase R.H., nt. (9), 388. Coase cites D. H. Robertson on the fact that in the impersonality of the market we actually find traces of individuality/personality: entrepreneurs.

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