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INTRODUCTION

Introduction to the Review Dossier on *The Digital Factory*: Continuing a Long-Standing Debate

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Abstract
Theories about the impact of digital technology on society and the development of capitalism and debates about the influence of digital information technologies on the future of work have been abundant since the end of the twentieth century. Most of the academic debate has taken place outside labour history, leaving the actual effects of digital technologies on human work and labour relations often overlooked. Moritz Altenried's *The Digital Factory: The Human Labor of Automation* focuses precisely on these effects, and as such provides a good opportunity to engage with these debates from a labour history perspective. This Review Dossier includes four comments on Altenried's book, by Bridget Kenny, Nico Pizzolato, Görkem Akgöz, and Greg Downey, to which the author responds. The contributors focus on different aspects of *The Digital Factory* depending on their own perspective on recent developments in the digital economy in the larger context of global capitalism.

Theories about the impact of digital technology on society and the development of capitalism have been abundant since the end of the twentieth century. The *IRSH* contributed to this from a labour history perspective with a Special Issue in 2003 titled "Uncovering Labour in Information Revolutions".[1] Back then, theorists in this field were divided into two camps: those who believed that rapid technological developments in information and communication technology are causing drastic changes in modern capitalist society, implying an epochal change, and those who emphasize continuity in technological, economic, and social developments. Unlike the mainstream perspectives that emphasized technology, the Special Issue took a historical perspective on how information technology, conceived as broadly as

[1]Aad Blok and Greg Downey (eds), "Uncovering Labour in Information Revolutions, 1750-2000", *International Review of Social History*, S11 (2003), available at https://www.cambridge.org/core/journals/international-review-of-social-history/issue/E8D785DBBFF981515EC1752620B70169, last accessed 3 June 2024.

possible, was shaped by human labour and, at the same time, changed work and labour relations. The editors then chose to start from the broader perspective of information technology, both in its analogue and its digital form, to analyse how existing theories and theorists have primarily looked at the perspective of technology, leaving the role of human labour largely hidden in the dark. Since 2003, debates about the influence of digital information technologies on human labour and labour relations have continued to take place mainly outside of labour history, chiefly among sociologists, anthropologists, and researchers in communications, media, and migration. This journal, too, has fallen behind in addressing the topic of digital or information labour.

Twenty years after the original Special Issue, we are now in the midst of another debate about the future of work in light of artificial intelligence. Currently, the rapid development of evermore powerful digital technologies, especially AI, continues to give rise to all kinds of dystopian and utopian visions of the future of work. As discussions alternate between automation-induced apocalyptic panic and utopian fantasies, we are bombarded with news stories highlighting worries about robots replacing human workers and disappointment over technology's delays in reducing the need for labour.[2] Market and technical fundamentalism have dominated much of the conversation about the future of work up until recently. Predicting the magnitude of technology-driven job destruction or presenting government intentions to aid workers in navigating a future of major industrial upheaval have been more typical narrative foci than worker experiences and activities.[3] The true impact of digital technologies on work and labour relations is often overlooked, although many employees' working conditions have already changed. Recently, there has been a proliferation of research that uses analytical methodologies to revalue labour within a human-centred future of work that goes beyond a simple technology perspective. A growing body of research on Uber, Deliveroo, Amazon fulfilment centres, and Amazon Mechanical Turk exposes hidden labour relations modified by digital technology in an effort to dispel AI myths and highlight human decision-making and exploited labour.[4] Recent research

[2]Richard Gray, "How Long Will It Take for Your Job to Be Automated?", BBC, 19 June 2017. Available at http://www.bbc.com/capital/story/20170619-how-long-will-it-take-for-your-job-to-be-automated, last accessed 15 April 2024.

[3]Tobias Schulze-Cleven, "Beyond Market Fundamentalism: A Labor Studies Perspective on the Future of Work", in Tobias Schulze-Cleven and Todd E. Vachon (eds), *Revaluing Work(ers): Toward a Democratic and Sustainable Future* (Ithaca, NY, 2021), pp. 27–54.

[4]Lilly Irani, "Difference and Dependence among Digital Workers: The Case of Amazon Mechanical Turk", *South Atlantic Quarterly*, 114:1 (2015), pp. 225–234; M.K. Lee *et al.*, "Working with Machines: The Impact of Algorithmic, Data-Driven Management on Human Workers", in B. Begole *et al.* (eds), *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (New York, 2015), pp. 1603–1612; Frank Pasquale, *The Black Box Society: The Secret Algorithms that Control Money and Information* (Cambridge, MA, 2015); Rob Kitchin, "Thinking Critically About and Researching Algorithms", *Information, Communication & Society*, 20:1 (2017), pp. 14–29; Alex Rosenblat and Luke Stark, "Algorithmic Labor and Information Asymmetries: A Case Study of Uber's Drivers", *International Journal of Communication*, 10:27 (2016), pp. 3758–3784; Trebor Scholz, *Uberworked and Underpaid: How Workers are Disrupting the Digital Economy* (Cambridge, 2017); Alex Rosenblat, *Uberland: How Algorithms are Rewriting the Rules of Work* (Oakland, CA, 2019); Callum Cant, *Riding for Deliveroo: Resistance in the New Economy* (Cambridge, 2019); M.L. Gray and S. Suri, *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass* (Boston and New York, 2019); A. Veen, T. Barratt,

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has increasingly examined the impact of platform-based labour on various aspects of work, such as labour processes, organizational structures, control and accountability, identities, and collectives, with a particular focus on how these new structures introduce a set of inequalities that complicate the concept of "work" and erode workers' rights, leading to increased precarity.[5]

We think it is critical to ground our analysis in the historical and contemporary function of automation within the constraints of capitalism in order to have a clear picture of what the future holds for labour in an ever-increasing development of automation. *The Digital Factory: The Human Labor of Automation* by Moritz Altenried provides a good opportunity to engage with the question of how the dynamics of digital labour are emblematic of wider trends in historical and contemporary capitalism.[6] Much research views the use of digital technologies, in various forms, as a departure from previous methods of organizing work. Less is known about how these applications of digital technology complement or adapt previous forms of managerial control in practice. Altenried begins exactly from this perspective of continuity and effectively connects disparate ideas about the impact of digital technologies on labour, using digital Taylorism as a conceptual framework. He finds that Taylorism is no longer confined by the disciplinary architecture of the industrial workplace; its improved potential to subsume labour extends well beyond the Taylorist factory. Digital technology creates worker relations that are strangely comparable to those of Taylorist factories in situations that do not always appear to be factories. Digital technologies have expanded the factory, transforming it from a physical workshop into a labour regime. Taylor's time-and-motion experiments can now be carried out in urban areas, for example, using advanced remote control technology that relies on interconnected equipment, sensors, and applications, rather than being limited to warehouses and factories.

Despite all the smart machines and promises of automation, Altenried convincingly argues that human labour is not being replaced. "Today's world", he

and C. Goods, "Platform-Capital's 'App-etite' for Control: A Labour Process Analysis of Food-Delivery Work in Australia", *Work, Employment and Society*, 34:3 (2020), pp. 388–406; Birgit Mahnkopf, "The Future of Work in the Era of 'Digital Capitalism'", *Socialist Register*, 56 (2020), pp. 104–142, 111–112; Jason E. Smith, *Smart Machines and Service Work: Automation in an Age of Stagnation* (London, 2020); Arianna Tassinari and Vincenzo Maccarrone, "'Riders on the Storm': Workplace Solidarity among Gig Economy Couriers in Italy and the UK", *Work, Employment and Society*, 34:1 (2020), pp. 35–54; Armin Beverungen, "Remote Control: Algorithmic Management of Circulation at Amazon", in M. Burkhardt, M. Shnayien, and K. Grashöfer (eds), *Explorations in Digital Cultures* (Lüneburg, 2021), pp. 5–18; Phoebe Moore and Jamie Woodcock (eds), *Augmented Exploitation: Artificial Intelligence, Automation and Work* (London, 2021); Kate Crawford, *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence* (New Haven, CT, 2021).

[5]Some recent examples include Valerio De Stefano, "The Rise of the 'Just-in-Time Workforce': On-demand Work, Crowd Work and Labour Protection in the 'Gig-economy'", *Comparative Labour Law & Policy Journal*, 37:3 (2016), pp. 471–504; M.A. Anwar and M. Graham, "Between a Rock and a Hard Place: Freedom, Flexibility, Precarity and Vulnerability in the Gig Economy in Africa", *Competition & Change*, 25:2 (2020), pp. 237–258; N. van Doorn, F. Ferrari, and M. Graham, "Migration and Migrant Labour in the Gig Economy: An Intervention", *Work, Employment & Society*, 37:4 (2023), pp. 1099–1111; J. Vilasís-Pamos *et al.*, "Social Media and Platform Work: Stories, Practices, and Workers' Organisation", *Convergence*, 30:1 (2024), pp. 410–427.

[6]Moritz Altenried, *The Digital Factory: The Human Labor of Automation* (Chicago, IL, 2022).

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concludes, "is still a world of labour". His book provides insight into the micro-processes that drive various labour control regimes at the level of the workplace, as well as the broader industrial relations that sustain them. The work's appeal stems from its combination of small-scale ethnographic research and a global perspective on how technology affects labour relations in capitalism. His long-term ethnographic research demonstrates how sensors, applications, and algorithms track, supervise, and forecast individual activities in a variety of contexts, including the platform economy, warehouses, and logistics. The strength of Altenried's work lies in its connection of labour process theory to the study of digital labour, challenging the neutrality that platforms often maintain. Altenried uncovers the new "hidden abode" by examining the technological components of digital algorithms and how they are put into action in specific work locations.

The sites Altenried has chosen in his book to explore the ways in which algorithms are used to manage the labour process and influence labour relations in digital factories range from the field of logistics; the world of video games; the crowdwork platforms on which digital homeworkers play a crucial role in the production and training of artificial intelligence; and the world of social media, focusing on the hidden human labour of content moderating and rating. He uses an ethnographic approach, being present at the digital factories in question, either physically, as in the Amazon warehouses, or online, participating in online games and in various crowdwork platform. Building on the work of scholars such as Nick Dyer-Whiteford, George Caffentzis, Ursula Huws, and Lilly Irani, he engages in existing debates around immaterial labour, by focusing on how digital technology "creates a set of very different labor situations, in which a new digital Taylorism exists alongside more autonomous forms of (immaterial) labor". He emphasizes that this digital Taylorism is but one of more co-existing heterogeneous labour regimes, and that this heterogeneity is an important characteristic of modern capitalism.

In this Review Dossier, the author responds to four contributors' remarks on his book: Bridget Kenny, Nico Pizzolato, Görkem Akgöz, and Greg Downey.[7] The dossier is based on a social and historical understanding of labour's role in the digital age, as well as the impact of digital technologies on social, spatial, and temporal divisions. Using *The Digital Factory* as a starting point, the dossier explores the controversies, tensions, and ambiguities of digital labour and situates them within the broader historical development of global capitalism. Altenried and the discussants explore the heterogeneous labour regimes based on the mobilization, renewal, and recombination of crucial Taylorist principles that are at work in a wide range of workplaces, ranging from warehouses and call centres to the Google scanning department.

The four comments in this Review Dossier focus on different aspects of *The Digital Factory* depending on their authors' own perspective on recent developments in the digital economy in the larger context of global capitalism. Bridget Kenny asks how

[7]The first three participated in a roundtable on the book organized by Görkem Akgöz at the 2023 European Social Science History Conference in Gothenburg, and Greg Downey was invited as one of the editors of the 2003 *IRSH* Special Issue on information labour.

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Altenried's tendency to generalize the phenomena observed in his fieldwork relates to the conjunctural nature of the labour conditions in the various localities explored in the book – conditions that always have their own specific historical roots. She discerns a similar tension in the combination of documenting the fragmentation and multitudinous social relations of new forms of labour in place, and a perceived impulse to find a new universal political subject in the form of the migrant worker. She suggests looking at the role of glitches in understanding the various contradictions at play, as these make conjunctural materialities apparent that are constitutive of globalized digital technological capacities.

Pizzolato points to two aspects of platform capitalism – its de-spatialization and its use of workers' autonomy – that each need their own historical contextualization to understand how they continue to enable employers to control labour and minimize labour costs. He argues that both aspects have their continuities in the history of industrial capitalism. Just as large-scale outsourcing practices have existed since the 1970s, platform work hinges on the different costs of labour between the Global North and the Global South and therefore on a continuation of the dependency and inequality of labour. This is amplified by the ways in which labour relations in the "gig economy" are discursively redefined as independent, enabling workers to control their own schedules and workloads while at the same time leaving them without any social protection and facing continuously lower rates.

Akgöz argues that the factory itself as a form of labour control has its historical roots beyond the heartlands of industrial capitalism, especially in the plantation, and therefore the factory as a metaphor should also be understood in this context. She makes the case for acknowledging the historical embeddedness of Taylorism and offers alternative perspectives on the ways in which managerial labour, labour control, and workers' autonomy may evolve in unexpected directions under digital capitalism. Akgöz's piece shows that the impact of digital technologies on work design is not predetermined but rather influenced by various factors, including the nature of the technology, the organization's characteristics, managerial decisions on its deployment, and worker resistance. The rise of digital labour must be contextualized within historically particular processes of capitalist development, structural transformation, and labour market restructuring.

Finally, Downey's comments show how the shortcomings of using the factory – or the office, the platform, or the network, for that matter – as a metaphor for labour control under digital capitalism may in fact help us develop new ways of understanding how labour control has been shaped historically. But he argues that going beyond the use of placeholders, such as digital factory, digital Taylorism, network capitalism, or platform capitalism, may also help us to gauge new ways of understanding how labour relations continue to shape people's lives.

In his response, Altenried points to an important common feature in many of the discussions around the impact of automation and digital technology on labour and the labour market, referring to Aaron Benanav's *Automation and the Future of Work*:[8] a consistent overestimation of unemployment as a result of technological progress.

[8]Aaron Benanav, *Automation and the Future of Work* (London, 2020).

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These "automation discourses" have predicted more than once a "jobless future", while we regularly witness a recurring shortage of labour in many sectors. Altenried emphasizes that not only do digital technologies not necessarily result in the end of labour, neither do they mean that labour overall is getting more immaterial, or cognitive. Just like Kenny in her comment, he sees conjuncture as an important concept to understand the heterogeneity of the impact of automation on labour processes and regimes. The diversity and complexity that lie behind the concepts of the factory and Taylorism used as models to understand the ways in which automation and algorithms influence labour may limit our perspective, but at the same time they may help to focus on aspects that otherwise are easily overlooked in the ephemeral world of digital technology. Altenried agrees with the comments that point to the ways in which management and control of labour through algorithms may create their own forms of resistance and options to dodge control, and argues that together with the heterogeneity of digital labour these may form promising entry points for new research.

Before we conclude, we should point out the lack of a crucial analytical lens in the discussion in this Review Dossier: gender. Despite the "feminization" of labour in modern capitalism and the growing demand for "feminine skills" of flexibility and constant adaptability in the setting of precarious employment systems, research on digital labour has mostly focused on male-dominated industries such as e-hailing and delivery work.[9] The extent to which platform firms are contributing to the marketization and commodification of social reproductive labour, as well as maintaining or changing the gender division of labour, has received less attention.[10] Furthermore, much of the current discussion regarding digitalization's potential to boost labour force participation rates and open doors for marginalized women and groups to enter the workforce is predicated on the idea that these platforms enable women to juggle paid employment with domestic duties. This is a theme that Altenried also includes, however briefly, where he discusses how crowdwork and care work are combined by women who work from home, to feed, for example, artificial intelligence systems.[11] This inevitably begs the question of digital network and technology accessibility, and whether these tools help women's ability to obtain employment opportunities and enhance their wages, thus enabling them to overcome long-standing inequalities. Empirical research shows that algorithmic management techniques further reproduce and reinforce unequal gender dynamics, undermining women's positions in male-dominated occupations. Women frequently face consequences from

[9]Cristina Morini, "The Feminization of Labour in Cognitive Capitalism", *Feminist Review*, 87:1 (2007), pp. 40–59, 41; Kylie Jarrett, "The Relevance of 'Women's Work': Social Reproduction and Immaterial Labor in Digital Media", *Television & New Media*, 15:1 (2014), pp. 14–29.

[10]Ursula Huws, "The Hassle of Housework", *Feminist Review*, 123 (2019), pp. 8–23, 20.

[11]Altenried, *The Digital Factory*, pp. 113–116; UN Women, "The Digital Revolution: Implications for Gender Equality and Women's Rights 25 Years after Beijing", 2020, available at https://www.unwomen.org/sites/default/files/Headquarters/Attachments/Sections/Library/Publications/2020/The-digital-revolution-Implications-for-gender-equality-and-womens-rights-25-years-after-Beijing-en.pdf, last accessed 27 May 2024.

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algorithmic management, including lower evaluations, lower pay rates, and discrimination, as a result of caregiving responsibilities and safety concerns.[12]

Beyond the necessity to address gender inequalities in digital capitalism, feminist political economy provides a theoretical framework for analysing the exploitation of activities external to the formal labour relationship. Until recently, the work of feminist scholars on affective labour carried out at home received less attention in ongoing arguments over the significance of immaterial labour in the realm of digital economics.[13] For instance, the Marxist feminist perspective on domestic work and both paid and unpaid sexual labour provides a framework for understanding the (re)productive aspects of self-tracking practices and situating these practices within the increasingly problematic interface between productive and reproductive labour.[14] While reading *The Digital Factory*, we could not help but think that the book would have benefited greatly if Altenried had included digital care work as one of his case studies. In the future, we hope to engage with the ongoing discussion regarding what focusing on reproductive labour can do for our knowledge of digital labour and its areas of struggle in this journal.

Notwithstanding this drawback, we believe that the comments and responses in this Review Dossier can contribute to a better understanding of the changes in labour processes, regimes, and relations in the digital economy, as well as how these are influencing labour's position in global capitalism. Common features in all contributions are an emphasis on the conjunctural and heterogeneous character of the processes and relations involved, contributing to the invisibility of labour in the digital economy. It is this invisibility of digital labour that necessitates further research.

[12]A. Micha, C. Poggi, and F. Pereyra, "When Women Enter Male-Dominated Territories in the Platform Economy: Gender Inequalities among Drivers and Riders in Argentina", *Gender & Development*, 30:3 (2022), pp. 575–600; L.A. Centeno Maya *et al*., "Food Delivery Workers in Mexico City: A Gender Perspective on the Gig Economy", *Gender & Development*, 30:3 (2022), pp. 601–617; W. Sibiya and D. du Toit, "Sweeping Up Decent Work: Paid Domestic Work and Digital Platforms in South Africa", *Gender & Development*, 30:3 (2022), pp. 637–654; S. Kalla, "Hacking Platform Capitalism: The Case of Domestic Workers on South Africa's SweepSouth Platform", *Gender & Development*, 30:3 (2022), pp. 655–666; D. Dhar and A.A. Thuppilikkat, "Gendered Labour's Positions of Vulnerabilities in Digital Labour Platforms and Strategies of Resistance: A Case Study of Women Workers' Struggle in Urban Company, New Delhi", *Gender & Development*, 30:3 (2022), pp. 667–686.

[13]Kathi Weeks, "Life Within and Against Work: Affective Labor, Feminist Critique, and Post-Fordist Politics", *Ephemera*, 7:1 (2007), pp. 233–249; Donatella Alessandrini, "Immaterial Labour and Alternative Valorisation Processes in Italian Feminist Debates: (Re)exploring the 'Commons' of Re-production", *Feminists@Law*, 1:2 (2012), pp. 1–28.

[14]Karen Dewart McEwen, "Self-Tracking Practices and Digital (Re)productive Labour", *Philosophy & Technology*, 31:2 (2018), pp. 235–251, 241; Kylie Jarrett, "Through the Reproductive Lens: Labour and Struggle at the Intersection of Culture and Economy", in David Chandler and Christian Fuchs (eds), *Digital Objects, Digital Subjects: Interdisciplinary Perspectives on Capitalism, Labour and Politics in the Age of Big Data* (London, 2019), pp. 103–116, 104–106.

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