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CHAPTER

1

Labour Process Theory and the New Digital Workplace

Kendra Briken, Shiona Chillas, Martin Krzywdzinski and Abigail Marks

The digitalisation of work has become a key topic in public and academic debate over the past few years. The leading prophets have promised nothing less than a 'digital revolution' that radically changes labour markets (Brynjolfsson and McAfee, 2012). 'This time, it's different', promise others (Ford, 2015). The difficulty – but also the fascination – with this ongoing discussion on digitalisation is that it brings together very different technological and social developments. While the public debate focuses on a rather black-and-white picture, the academic debate provides a more nuanced insight into the changing world of work.

On one hand, we can observe a new phase of technological change in traditional manufacturing industries, which is linked to the development of the Internet of Things, new robotic approaches, wearable computing and other technologies (such as 3D printers) and is described using terms such as 'advanced manufacturing techniques', 'digital manufacturing techniques', 'the smart factory' or '*Industrie 4.0*' (Lucke et al., 2008; IDA, 2012; Forschungsunion and Acatech, 2013). On the other hand, there are (relatively) new Internet-based business models and companies in which data generation and management play a central role extended in scale and scope. Though business models and companies are diverse and range from huge transnationals like Google, Facebook, Amazon and Uber to smaller, more niche-related businesses, an important feature is that they all distinguish themselves from 'traditional' companies (Lazonick, 2009). As we can see, it is precisely the employment relationship that is challenged, as well as existing forms of control and resistance.

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Even though we know that some of the concepts are either at the test stage, niche developments or just clever marketing strategies, this does nothing to alter the fact that both Braverman's (1974) thesis of a degradation of work as well as the old 'engineering utopias' of an automated factory run by a few knowledge workers are back on the public agenda and open for debate (see Ford, 2015). From a labour process perspective, the current debates reflect a long-standing tradition. Since capitalist production obeys the 'imperative to constantly renew production' (Hall, 2010), technology-driven changes in the workplace have been key to labour process analysis. In this regard, the following macro-level questions are at stake: How are employment structures and industries changing? What jobs are under pressure to rationalise? Where are new forms of work and employment emerging? Moreover, there are more subtle issues and questions that require exploration.

- How are the skills and competency requirements, and thus also the basis for power relations in companies, changing? Where are competencies being devalued, and where are new, critical skills originating?
- How are control regimes and approaches to performance regulation changing within companies? Is there an increase in surveillance and a subordination of labour to self-regulating technical systems? Or, are new opportunities for worker self-organisation evolving?
- What room for autonomy and worker discretion do new technologies allow for? Can we observe new forms of resistance?

The key aim of this collection is to address some of these issues by inviting writers from around the world to discuss the impact of changes regarding jobs and labour in the digital economy. These contributions were selected from papers presented at the 2015 (Athens) and 2016 (Berlin) International Labour Process Conferences. Themes familiar to labour process researchers emerge in the chapters. Chief among these are issues such as how technology facilitates job loss via substitution and the potential of technology to deskill existing workers. An overarching theme is cost-cutting strategies as the driver for new technologies at work.

Part 1: Robots and Virtualities – The Changing Face of Manufacturing Work

Terms like 'digital manufacturing techniques', 'advanced manufacturing techniques', 'cyber-physical systems', 'smart factory' or – particularly in Germany – *Industrie 4.0* frame public debate on the transformation of manufacturing work through new automation concepts. The core

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elements of these concepts include the spread of the Internet of Things in factories, which is discussed under the heading 'cyber-physical systems'. German labour-studies scholar Dieter Spath understands this term as referring to 'objects [machines and components] equipped with their own decentralised steering mechanisms, which are interconnected via an internet of data and services and are independently self-steering' (Spath and Ganschar, 2013, p. 23). Another key feature is the spread of flexible robots, who, in line with the slogan that 'the robots are leaving their cages', can now directly interact with people. Finally, the use of assistance systems in manufacturing work is considered crucial for the new era: for example, smart eyeglasses or watches.

With regard to the social consequences of this development, there are diametrically oppositional scenarios. On the one hand, there are the providers of the new technological solutions – as well as trade associations and governments – who see the new technologies as a driver of growth and a potential engine for the creation of new, highly skilled jobs (MIT Technology Review, 2016; Forschungsunion and Acatech, 2013; President's Council of Advisors on Science and Technology, 2011). On the other hand, there are authors who emphasise the potential for major social upheaval. What these latter, pessimistic scenarios have in common is that they link new technologies to a substantial leap in the objectification of human (production) knowledge; this devalues human labour and increases the complexity of the systems, which also makes management by experts increasingly less controllable.

In this vein, Frey and Osbourne (2013) claim that in the medium term, 70–90 per cent of manufacturing jobs may be rendered unnecessary by new advanced manufacturing technologies. Brynjolffson and McAfee (2014) present a similar argument: they see the risk of rapidly rising social inequality linked to this development. It is suggested that ordinary workers will increasingly have to compete with 'smart' automation concepts; their wages will stagnate or fall in the medium term; and meanwhile the incomes of the highly skilled workers who can control the new technologies will rise rapidly.

As Howcroft and Taylor (2014) note, many of the bright promises made by the supporters of the new manufacturing technologies and many of the dark scenarios painted by their opponents are far from novel. The relationship between technology, skills, work organisation and control is a central theme of labour process theory (LPT). At the same time, the current discussion is suffering due to a dearth of empirical data suitable for assessing the varied interpretations and predictions. Almost all existing studies base their arguments on estimates (or in some cases, on speculation) about what is technologically and

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technically feasible. Against this backdrop, it is worth looking at earlier discussions on technology and work in the context of LPT.

A linchpin of the debate was Braverman's *Labor and Monopoly Capital* (1974) revisiting Marx's theory. According to Braverman, technology is deployed by management to improve control over the work process and the workers: Braverman argued that companies use (and will further use) automation to replace or simplify skilled jobs to such an extent that they can be performed by unskilled workers. This strengthens the position of the company in the labour market and reduces the power of the workers.

Braverman's universalist thesis of deskilling was contested within labour process research (cf. Wood, 1982; for a critique, see also Attewell, 1987). Thompson and Harley (2007, p. 149) stress that 'the notion of the workplace as a contested terrain is a central motif of LPT'. This means that the acceptance of new technologies is a site of potential conflict. Workers' responses to technology and their capacity to limit management prerogative must also be accounted for (Hall, 2010). It should not be assumed that workers' knowledge and experience can be completely replaced by automation – they remain an important resource for management, in turn forcing management to ensure consent is maintained when introducing new technologies. Hence, LPT does not argue that deskilling is an inevitable long-term trend in capitalist societies; it instead emphasises that the interest of management in controlling the work process represents a major constraint on upskilling (Thompson and Harley, 2007, p. 157), because highly skilled workers have reservoirs of knowledge not controlled by management.

Much of the empirical research on the use of automation has focused on the automotive industry, which has been at the forefront of the use of industrial robots since the 1970s and in the use of computer-integrated manufacturing (CIM) since the 1980s. Closely paralleling today's debates, some authors in the 1980s anticipated a trend towards upskilling in response to technological change (Adler, 1988; Katz and Sabel, 1985), while others perceived a move to deskilling (Shaiken, 1985; Shaiken et al., 1984). Over time, a more nuanced assessment of the change process emerged from empirical analyses. These studies identified a polarisation of skill requirements: while deskilling trends prevailed in direct production, workers in maintenance areas noticed an upskilling of their work (Jürgens et al., 1993; Milkman and Pullman, 1991; Gallie 1991); ambitious attempts to integrate production and maintenance tasks were not entirely successful (Jürgens et al., 1993, p. 214).

Some 20 years after the debate on CIM and the use of robots, the topic of automation is returning to the forefront of discussion

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with renewed intensity. In this context, LPT lends itself as a research approach for a number of reasons: the first reason for this is that it favours in-depth case studies, which are necessary for understanding the changes that are underway. The second advantage of the LPT approach is its understanding of the 'workplace as a contested terrain', which prevents it from advancing deterministic theses. Hence, LPT counsels scepticism towards both optimistic and pessimistic, apocalyptic scenarios of all-encompassing technological monitoring (Warhurst and Thompson, 1998). LPT emphasises the importance of the subjective knowledge and experience that companies still depend on in the work process; it emphasises the capacity of the workers (and their representatives) to resist, and it underscores the fact that workplaces are also social constructs, which cannot be organised according to technical concerns only. The contributions in this section of the book focus on such debates, updating and introducing new theoretical frameworks and offering contemporary evidence for their claims.

Pfeiffer's research departs from core labour process theory and takes Burawoy as her main influence. One of Burawoy's most important points of departure from Braverman is that rather than being 'coerced' by the capitalist system, workers participate in the system and consent in various ways to the very system which constrains them. Following in Burawoy's footsteps, Pfeiffer looks at the origins and the development of the current discussion on advanced manufacturing systems and in particular the German debate on *Industrie 4.0*. She demonstrates that these concepts are very strongly encouraged by political and economic elites in Europe and North America to protect the lead the Global North has in the competition with emerging economies. While public presentations of these concepts emphasise opportunities – such as the opportunities to improve job quality, create healthy and creative jobs and increase prosperity – the actual manufacturing concepts emphasise the objectives of rationalisation and standardisation. The technical possibilities of new manufacturing technologies risk promoting deskilling and a 'digital despotism' in the workplace.

Butollo and Lüthje analyse China's manufacturing sector in the light of policymakers' drive to make China more competitive in the global marketplace. The 'Made in China 2025' initiative that references the German *Industrie 4.0* scenario and proposes large-scale robotisation of manufacturing in China prioritises economic growth above social and/or environmental considerations. Although China has assumed a leading position in transforming the infrastructures of electronic commerce (network capitalism), the authors see little new (or promising) for workers in Chinese manufacturing and suggest that widespread reform in the basic

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institutions of socioeconomic regulation is a far more pressing problem than a programme of substituting workers with robots, which in any event is an example of neo-Taylorist rationalisation strategies. The long-term effects on the labour market, and specifically on migrant workers in China, have been overlooked in the strategy.

Will-Zocholl critically assesses the promised benefits of digitisation by examining how digitisation and virtualisation practices occur in another familiar territory for labour process researchers, automotive engineering. She notes conceptual differences in informatisation, digitisation and virtualisation, which are progressively more particular in scope and worthy of differentiation in research accounts. The findings, focusing on the tacit knowledge of engineers, lead her to argue that attempts to standardise the profession have not been successful. She argues that digitisation is not a straightforward transfer from the physical to the digital world: in this context localised knowledge and practices prevail, and fragile professional cooperation is explained by differences in the training of engineers, localised software packages and an inability to transfer virtual prototypes back to the physical world.

Part 2: Clouds, Crowds, and Big Data – Changing Regimes of Control, Changing Forms of Resistance and Misbehaviour

In the second part of this book, we focus on the digital workplace and how the integration of new technologies changes the employment relationship. On one hand, Ford (2015) and Carr (2014) describe scenarios in which workers will become mere servants of ever 'smarter' computers and robots, whose complexity will increasingly defy workers' capacity for understanding. Moore and Piwek (2015) emphasise the opportunities for control and monitoring that are opened up by the new wearable technologies (on the role of social media as an instrument of control, see McDonald et al. (2016)). Reports on the use of wearables at Tesco and Amazon show that this technology can be used to analyse employees' productivity data, movements and interactions. The case of a Tesco distribution centre in Ireland has become notorious as an exemplar of the 'dark side' of technology (Wilson, 2013; Rawlinson, 2013; Moore and Robinson, 2015). In this case, warehouse workers wear 'smart' bracelets that assign their tasks and measure their movements, and their pay is directly linked to their measured work performance. The emergence of performance management systems controlled by technology is critically assessed (Taylor, 2013), and some empirical evidence shows how much

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the monitoring system still depends on direct control regimes (Briken et al., 2016). In this book we will focus on new(er) forms of contracts influencing employment relations.

For some decades now, researchers have emphasised the 'culture of labor market flexibility' in the information and communications technology (ICT) sector (Carnoy et al., 1997, p. 47; Benner, 2002), which is based on the use of temporary contracts and outsourcing/offshoring and on a very high mobility of high-skill workers among firms. The use of cloud technologies allows for large-scale storage in virtual spaces (in very material locations) and for cloud computing. The parallel use of hardware infrastructures offers new options for employers in terms of time and spatial relations. Tasks can be redefined and outsourced directly but also by using technology-mediated channels. Labelled as online outsourcing by the World Bank (Kuek et al., 2015), this technique allows employers as clients to outsource wage labour to a 'large distributed, global labour pool of remote workers, to enable performance, coordination, quality control, delivery, and payment of such services online' (Kuek et al., 2015, p. 1). Tasks can be outsourced to the crowd as micro-tasks – that is, as small jobs without special skills requirements – or as macro tasks – that is larger assignments, sometimes with high skills requirements. Typical micro-tasks include writing short texts such as product descriptions, conducting web searches or categorising images and videos. These individual tasks come with pay that may range from a few cents to a few euros. By contrast, macro tasks, which are typically outsourced in the field of software programming or design, can take little time or up to several weeks. Although some authors see crowdwork as a key element of the 'Global Digital Economy' (Huws, 2014, 2015), which is leading to the development of a global 'cybertariat', there are few empirical studies on this form of work organisation. In the field of micro-tasks, the available studies highlight the competition between crowdworkers as a central element of the control regime. But the limited information that is currently available on this subject refers only to individual platforms, especially to Amazon Mechanical Turk (Silberman et al., 2010; Irani and Silberman, 2013). Here, the excessively low wages established through the market mechanism seem to be accompanied by the greater dependence of crowdworkers on clients' evaluations of their work. Clients have the power to block crowdworkers from tasks arbitrarily and without explanation and may reject finished tasks without payment. Initial efforts by unions have been made to help organise crowdworkers (for an overview of Europe, see Valenduc and Vendramin, 2016, p. 41f; for the US, see Irani, 2015), and early studies have interrogated the new work identities that are emerging (Lehdonvirta and

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Mezier, 2013); however, there are few empirical studies that discuss the changing employment relationship.

This is where *Schörpf, Flecker and Schönauer* make an important empirical contribution to the debate in analysing how the now triangular employment relation between crowdworkers, employers/clients and platform operators creates new forms of control and/or allows for dissent. The authors describe the strategies and structures of crowdsourcing platforms for creative work and the temporal aspects of creative crowdworking. The design of the online platforms provides a framework within which clients offer tasks and workers present themselves and perform work. The platforms' terms and conditions give a general framework defining its intermediary function. Some aspects like the blurred boundaries of work are common in the self-employed world of work. However, the authors show how standardised measures around reputation differ from the reputation in direct social settings because it is, as the authors point out, 'standardised and one-dimensional'.

D'Cruz and Noronha draw on empirical evidence from ICT workers in India to understand the scope and character of workplace bullying in the (new) digital workplace. Far from removing such behaviour, the authors find that different and more pervasive forms of bullying occur in the digital workplace, noting that online abuse is transmitted more broadly, that bullying tactics are more difficult to resolve and that they in fact become more pervasive. The ICT sector might be at the forefront of digital labour, but existing (and in this case negative) forms of workplace behaviours are reproduced in a more sophisticated form, often with the tacit acceptance of managers.

Movitz and Allvin present longitudinal data on the role of technologically related change in digitised workplaces, specifically in a Swedish bank. They chart the stimulus for, and progress of, various change programmes through the lens of intergroup conflicts around the ownership of IT systems. The authors acknowledge that their claim that change programmes are politically infused is not new, representing classic capital and labour power conflicts over jobs and resources. However, they argue that individualised employment relationships produce intergroup conflicts; groups of workers, who make temporary alliances that cross professional and departmental structures, struggle against each other, with limited evidence of collectivisation against the will of senior management. The authors see cutting costs as a major organisational driver for technological change, resulting in job losses, a reconfiguration of power structures and failed and failing change programmes. Irrespective of the promise of efficiency and effectiveness driving the rationalisation of IT systems, technology is side-lined in the change process, and the

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threat of job loss, relocation and loss of influence are key sites of intergroup and intragroup conflict.

Last but not least, *Boes Kampf, Langes and Luhr* discuss the scope and momentum of digital transformation, again making use of the informatisation approach that incorporates social processes in digitisation. Their evidence is based on a study of knowledge workers (broadly defined), and they locate their research in the 'historical development of work and organization', suggesting that the contemporary digital workplace is at the forefront of a 'paradigm shift' in the nature of work. Industrialisation underpinned by complementary mental labour is no longer sustainable, they argue; instead, information is now the dominant mode of production. This new world of work offers possibilities of empowerment and increases in mental productive forces, yet the evidence presented seems to lean more towards a reduction in autonomy and increased control over workers across the occupational hierarchy. Boes et al. surface a key theme around the pace of technological change, a point that is mentioned only in passing in other chapters in the book. At the same time, they suggest that from the 1990s onwards, digitalisation has also encompassed the creation of a new sphere of social action. It is precisely here where they suggest that the world of work is at a crossroads. Either the digital sphere of social action could lead to the use of opportunities to support the empowerment of employees, interlinking knowledge resources and increases in mental productive forces, or new production models will create a 'control panopticon of data and a new extent of exchangeability' at all skill levels.

Part 3: The Digital Workplace (Worker) – Gendered, Self-Exploitative, and Vulnerable?

In the third part of the book, we take a closer look at the ways in which the digital workplace reproduces and reinforces existing inequalities. Broadly speaking, from the literature we know that motivation to engage in creative work is influenced by the idea of working in a very specific sector where entrepreneurial ideas and innovative spirit are valued (Marks and Huzzard, 2010). For complex, highly skilled tasks such as the design, programming and testing of software applications, intrinsic motives such as recognition, fun and challenge are emphasised. Companies in the ICT sector cultivate the image of being a 'creative employer'; they seek to maintain flat hierarchies and promote a corporate culture that heavily emphasises direct, informal relations (Barrett, 2004; Baldry et al., 2007; Hodgson and Briand, 2013). Performance is

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managed via reputation systems and competitions. We also find elements of 'gamification' here, which stimulate emotional needs like the pursuit of success (Blohm and Leimeister, 2013, p. 275). As *Maclean, Marks and Chillas* show in their contribution to this volume, the acceptance of these forms of employment relations builds on the recruitment of a particular type of employee and becomes crucial for an often neglected aspect in LPT approaches, namely the underlying reproduction of gender relations. Their chapter focuses on the theme of reproduction and transformation that is a guiding question for researchers of technological developments. The authors take the under-representation of women in ICT work as a focus, arguing that technology in a broad sense reinforces structural inequalities. Their chapter introduces two theoretical resources, the work of Pierre Bourdieu and recent work on affordances as lenses through which to view reproductive tendencies, both of which might usefully provide explanatory frameworks to complement labour process analyses, particularly in the social realm. The authors argue that early socialisation is key to understanding under-representation, in a social world that is structured by androcentric principles. At the same time, the suggested theoretical framework goes beyond gender analysis and may also be applied to other structural inequalities.

The aforementioned lack of formal rules and guarantees at the organisational level exploits a high degree of self-control and self-rationalisation that seems to be ingrained in the knowledge worker in many parts of the ICT sector (Howcroft and Bergvall-Kareborn, 2013; Mayer-Ahuja and Wolf, 2009). The informality of workplace cultures frequently prompts the expectation that workers can be contacted by peers or supervisors by email at any time (Mazmanian et al., 2006); however, the resulting breach in the work-life boundary leads to dissatisfaction among software workers (Scholarios and Marks, 2004). Moreover, organisations rarely live up to the 'creative dream' and frequently return to bureaucratic structures (Baldry et al., 2007).

Wright's chapter shows some of the ways in which this paradoxical situation is perceived by the employees in examining the digital games sector as a sub-set of creative labour (Smith and McKinlay, 2009). He notes the lure and fascination attached to careers in the creative sector. Creative careers are seen as requiring workers to make sacrifices in work-life balance and requiring them to adopt an enterprising mentality. The analysis shows that passion, commitment to work, an entrepreneurial attitude and the need for attachment are the ways in which these workers rationalise exploitative working practices such as unpaid work and long hours. Digital workplaces are far from the brave new world of work,

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and individualised working practices fully normalise self-exploitation in the sector. The resultant work intensification and working for low pay are seen as acceptable trade-offs that are needed to make connections in the industry and also to feel part of an occupational community. Working *with* technology is shown to act in a way that distances workers from each other, something that must actively be worked *at* to gain and maintain social relationships.

Paradoxically, the perception of software programming as creative work coexists with a growing standardisation of work in software companies. As Beirne et al. (1998) show, there have been attempts to standardise and industrialise software development work from as early as in the 1960s, and most commonly, programmers have defended their need for autonomy. In the last decade, we have witnessed a new wave of flexible methods allowing for standardisation at a new qualitative level. What are called the 'agile' approaches rely on iterative and incremental processes including failure feedback loops and different time loops which become more and more standard for process organisation in software development and other digital workplaces (Popendieck and Popendieck, 2003). Like lean production, what is called the 'scrum' process emphasises empowered teams, standardised and collective forms of knowledge and the continuous improvement of processes. These approaches co-opt the team spirit and seem to enforce collaborative or co-productive working relationships since they claim to reduce bureaucratic controls. At the same time, the transparency of each and every task increases under such regimes and, with it, the measurability of this work and the pressure on employees to perform. While some research has been done on the question of how the processes of the formalisation and standardisation of work in the Internet-based industries influence skill requirements and employees' skill profiles, as well as control and discretion, not many studies investigate this question in different national settings.

Teipen's chapter examines working conditions in the video-game industry, integrating the varieties of capitalism and global value chain approaches with labour process analysis in an attempt to cover macro- and micro-level dimensions of work and employment. To illustrate the proposition, she provides empirical cross-national evidence of video-game developers in Germany, Sweden and Poland, an ambitious yet fruitful project. She finds that despite significant variation in institutional arrangements in these countries, the labour process of game developers is remarkably similar, attributed to the vulnerable position of game development studios in the sectoral value chain. Even in high-skilled work such as this, numerical flexibility and insecurity dominate. Echoing Wright, she notes that self-exploitative practices are endemic.

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Conclusion

How revolutionary is the technological transformation in the 'new digital workplace' and how revolutionary will its impact on work be? Without wishing to deny the importance of the ongoing changes, we must nevertheless stress that transformation is an open and contested process. The questions of which scenarios will prevail at the end and whether we are dealing with gradual or disruptive changes are open to debate. Predictions on the effects of digital technologies – whether they take the form of optimistic upskilling promises or of pessimistic deskilling and surveillance scenarios – are currently rather speculative in character. In this regard, *Briken and Thompson* critically assess some of the big-picture narratives. Their argument is that contemporary social theory and the ongoing debate on 'postcapitalism' (see Mason, 2015; Srnicek and Williams, 2015) has generally put forward rather flawed conceptions of the pathways between (1) developments in capitalist political economy and (2) digitalised work and employment relations. The chapter begins with a brief commentary on some of the general characteristics of social theory concerning the workings of capitalism before its more detailed exposition and critique of increasingly influential variants – cognitive and postcapitalism or digital capitalism. Drawing on other labour process research, within that critique, the authors' observations point towards a more realistic picture of digital capitalism at work, including the importance of the financialisation of the economy. Briken and Thompson's argument invites readers to reflect on the plea made nearly 30 years ago in the introduction to an edited collection drawing on the 3rd and 4th International Labour Process Conferences, entitled *New Technology and the Labour Process* (Knights and Willmott, 1988):

> [it is] only through historical comparisons that a fuller understanding of the significance of contemporary developments in new technology may be gained. (Burnes et al., 1988, p. 3)

Although it is now almost three decades later and the pace of technological change has speeded up significantly, there are remarkable similarities in the concerns present in both that volume and this book. Both note that research is located in the aftermath of crises (in 1988 of energy, inflation and fiscal, which have perhaps been updated to environmental, financial and regulatory in this book), and the themes of substitution as well as the inevitability of technological development loom large in contributed chapters. As in our book, engineers in the 1988 book are a key focus of the empirical evidence, and the introduction celebrates the exchange of ideas between German (in those days, West German) industrial sociologists and Anglo-American

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labour process theorists. Unsurprisingly, control regimes, skill trajectories, power relations, work intensification, substitution, the role of technology in the labour process and cost-cutting strategies are discussed and critiqued, around the twin themes of continuity and change. Animating questions such as 'how new is new?' are explored much in the same way as authors in this volume address in their own analyses, albeit contextualised within contemporary workplaces. The missing element in our book is, however, clear evidence of collectivisation and resistance: it appears that individualisation of employee relations, an emerging threat in 1988, has strengthened to become a dominant feature in the digital workplace. Where collectivisation appears in the current volume, it is almost an oddity, or mentioned in passing, rather than the norm, which is portrayed in the 1988 book. We can only speculate as to the place of technology in strengthening individualised employment relations which is evident in the digital workplace and in contemporary researchers' concerns. However, we contend that the lack of attention to collectivisation represents a 'line in the sand' and is a provocation for future research in technological workplace developments.

We can then say that in some respects the digital workplace offers the promise of radical change, but in many cases, it seems that 'business as usual' prevails. There is no clear and final response to the questions about changing employment structures, the skills, control regimes and the spaces for autonomy that we raised at the beginning of this introduction. However, the contributions reinforce how necessary it is to analyse experiences with new technologies in practice, to identify the spectrum of different approaches that can be used, as well as their conditions and consequences. What is certain is that this research requires perseverance, and obviously, even industrial revolutions do not take place overnight.

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