On work and machines: a labour process of agility

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What is the relationship between workers and machines in the 'agile' economy?

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I n the workplace, machines can be tools of quantification, measure, calculation, and potentially control. Throughout work-design history they have functioned as catalysts for quite dramatic changes, perhaps most influentially during the period of scientific management. Today, the increasing use of digital technology across industry means that we are living and working in an era that has been described as the 'Fourth Industrial Revolution'.[1]

Industry 4.0 involves the use of big data for smarter decision-making and cost efficiencies (including decisions on shedding labour and how to distribute work); the use of advanced analytics to improve product development; a massive increase in human-machine interfaces; and the development of digital-to-physical transfer, i.e. 3-D printing and rapid prototyping. The underlying aim of firms adopting these technologies is of course to increase competitiveness and profit.

The main focus of this essay is a discussion about the effects of these changes within the labour process - the management of production and the impact this has on workers.[2] In the main, the effects have been to intensify pressure on workers through the use of technology to closely monitor performance, for example through requiring workers to wear self-tracking devices in warehouses (as already happens with Amazon and Tesco); the monitoring of productivity in call centres; the use

of GPS tracking of couriers and taxi drivers; and the use of apps and algorithms to remotely monitor the performance of outsourced work in the 'gig' economy - including those working in Uber-type outfits, homeworkers using their own computers to carry out 'crowdsourced' work, or digitally-managed peripatetic care workers and cleaners.

As Schwab argues, in the fourth industrial revolution there has been a blurring of 'the line between the physical, digital and biological spheres'. We increasingly work alongside, with and against machines, in both cognitive and manual workplaces.

Given the close correspondence of new industrial ages and new styles of management, it is perhaps unsurprising that Industry 4.0 has also seen the emergence of a new management system - based on the idea of business (and worker) 'agility'.

Technology has been an increasingly dominant partner in employment relations ever since Frederick Taylor and Frank and Lillian Gilbreth busied themselves in devising schemes to understand workplace productivity as linked to specific, measured human behaviour. Those industrial pioneers of scientific management and time and motion studies championed scientific methods that could depict perfect bodily movements for ideal productive behaviours through technologically informed work design that explicitly separated mental from manual labour. Indeed, the separation of the mind from the body became a technique for control that has continued throughout the ages.

Writing in 1992, Stephen Barley and Gideon Kunda delineated a sequence of historical phases of work design, from 'industrial betterment' in the last quarter of the nineteenth century to 'organisational culture and quality' methods from the 1980s onwards: 'industrial betterment' lasted from 1870 to 1900, when it was superseded by 'scientific management' (1900-1923); 'human relations' (1925-1955); 'systems rationalism' (1955-1980) and 'organisational culture and quality' (1980- (ongoing).[3] As Barley and Kunda noted, these managerial approaches tended to adopt either 'normative' or 'rational' ideologies, and were linked to long-wave technological/economic cycles associated with specific periods of labour activity. For each period, there is a 'surge' stage associated with a particular rhetoric that emphasises specific aspects of work and what is most important within it, as well as which factors are expected to facilitate productivity (such as machines). These surges are then followed by a challenge to the dominant rhetoric, as the next surge - for the

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emerging paradigm - begins (thus replacing the previous era). We can now add to their list a sixth wave, the Agility Management System, which began to emerge at the end of the twentieth century and is currently displacing the fifth wave. This has its own ideology *and* rationality, as will be explored later in this article.

Management methods within each period of work design reflect assumptions about the mind, the body and the machine, and their role in each historical period's labour process. In each historical phase, capital has attempted to separate the manual from the mental as a means of ensuring class subordination (or as a way of otherwise obscuring class); and it has sought to identify inventive ways to measure and then profit from the surpluses in all the available forms of corporeal, affective and reproductive labour. In each historical era, technologies and machines have been incorporated to varying degrees, in order to exploit the surplus value of workers through the requisite labour processes.

It is in this context that we should seek to understand the rise in the use of technology in machine learning and artificial intelligence: it is part of the continuing process of labour abstraction through quantification, as quantification is increasingly used to capture new avenues of labour.

Labour processes and the incorporation of the machine

It is useful to begin a discussion of labour processes with Marx, who analyses both the general outlines of the labour process and the way in which capital shapes the process. Regardless of mode of production, the labour process involves the transformation of raw materials into use values through labour: 'the elementary factors of the labour-process are 1, the personal activity of man, i.e., work itself, 2, the subject of that work, and 3, its instruments'.[4] The worker's labour 'effects an alteration' in the material that s/he works upon, while the process of work itself 'disappears in the product': the product is a use-value, or 'nature's material adapted by a change of form to the wants of man'. In that sense, labour becomes materialised (but not necessarily 'seen'). Marx gives the example of the blacksmith's work, where the labour is done by a blacksmith and the product is 'a forging' (p128). In the capitalist mode of production, this labour becomes a commodity - labour power - which the capitalist buys; the 'instruments' become the capitalist-owned means of production; and the product becomes a commodity to be sold on the market. The

labour process now involves the capitalist's consumption of the blacksmith's labour power, and his/her primary target is to reduce inefficiencies, to see that 'the means of production are used with intelligence, so that there is no unnecessary waste of raw material, and no wear and tear of the implements'. The worker's labour power, the means of production and the product are each the property of the capitalist: the product of the process belongs not to the labourer but to the capitalist, 'just as much as does the wine which is the product of a process of fermentation completed in his cellar'. The grapes have their flavour and ability to ferment to offer; the worker has her labour power. Labour power is simply a commodity to be purchased by the capitalist - at a rate that allows the capitalist to earn a profit.

To gain as much as possible from the work performed, it is in the capitalist's interests to obscure the labour in the labour process, to keep it invisible - or what I call 'unseen'. (This is particularly the case in the rise of the contemporary gig economy, where informal work is managed through technology, and there is often no formally recognised workplace.) The quantification of work via the use of machines may appear to reveal work's true nature by allowing it to be expressed in terms of numbers and, often, a timeframe, but the process of abstraction works to detract from the quality of the experience of labour, to make suffering invisible, and to exclude the non-denumerable. Technology can be understood, in Marx's terms, as an 'instrument of labour', a 'thing, or a complex of things, which the labourer interposes between himself and the subject of his labour, and which serves as the conductor of his activity'. This can be mechanical, chemical, or physical - but in the capitalist mode of production it belongs to the capitalist, and business management has always looked to technology to extract maximum value from labour.

Today technology itself has begun to take over many of the roles of management. A labour process, in its ideal sense, is fuelled by the agency of labourers within it. As agency is taken away from workers by machinery - and what Marx talked about in his time as 'modern industry' - production processes are at risk of no longer being recognisable as labour processes at all. Marx stated in the *Grundrisse* that, in capitalism, 'the production process has ceased to be a labour process in the sense of a process dominated by labour as its governing unity'; there is no reference to the worker's craft or skill that is seen to be directly linked to production.[5] So, the 'man/product relation gives way to the machine/product relation and jobs and tasks are treated as the residuum of the machine/product link'.[6]

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Labour process theory today focuses on the ongoing transformations of labour power in the context of capitalism, and looks for ways in which the capitalist extracts value from labourers in settings Marx could only have imagined with the help of a very good fortune teller. Some of the earliest debates in labour process theory began with a pamphlet published in 1977 by the Conference of Social Economists, *The Labour Process and Class Strategies*, whose main focus was on 'restating and rearticulating the connections between capitalist political economy and the labour process'.[7]

Paul Thompson's account of this project focuses on the contribution of the Brighton Labour Process Group (BLPG), which put forward the 'laws' of the capitalist labour process: (i) the division of intellectual and manual labour; (ii) hierarchy or hierarchical control; and (iii) the fragmentation/deskilling of labour (p9). Thompson's main critique of the BLPG is that there can be no 'immanent law' separating manual and mental labour, particularly given the pursuits of labour capture in these non-material areas, as was seen in the late twentieth and early twenty-first century (the period I call 'agile' in my recent paper in *Body and Society*).[8] Nevertheless, there is no doubt that the processes described by BLPG are an important part of capital's repertoire of techniques for extracting value.

Thompson also notes that subsequent labour process theory has made a number of important contributions: in particular it has revealed and valorised other areas of labour, including tacit knowledge and skills, as well as elaborating the concept of socially necessary labour time. Labour process theory, then, has shown how emotional and corporeal labour has been captured by capitalist processes.[9]

Labour process theorists have also been critical of scientific management's drive to take qualitative areas of work and force them into quantified straitjackets. Among the most notable of these critics was Harry Braverman, a pioneer in this field and influencer of the CSE project.[10] Braverman took up the concept of labour power and historicised it, to reflect the working conditions people faced under scientific management. He developed Marx's thesis on the labour process by elegantly emphasising the fact that 'skill and knowledge are expropriated from the direct producer and placed in the hands of management' (p39). And he emphasised the role of the machine in dividing mental from manual labour - and the people who are selected for each of these - a division that advanced significantly in the period of scientific management. As Craig Littler argued, more advanced technologies were

allowing science to be harnessed to the labour process;[11] and this then 'compounds and complements' Taylorism because it requires a separation of conception and execution under the guiding principles of managerial control (which Braverman saw as part of the deskilling and fragmentation of work); this leads to the creation of an apparatus of 'conception' as well as methods to control labour. Furthermore, this apparatus requires its own producers, which means that a cadre of administrators (managers and technical personnel, clerical workers) has arisen to ensure that strategies are put into place. The planning, coordination and control of work 'is itself a labour process and subject to the same separation of conception and execution'. Today, the work carried out by this cadre of administrators is itself being automated or substituted and managed by algorithm.

Braverman argued that the introduction of a new range of technologies into the labour process meant that workers were even more acutely estranged from their own labour, and that our subjectivities, histories, even potentials and pre-existing skills, were being pushed aside with the onset of the new relations of production. Personal interests were being surrendered, and, indeed our very subjectivity was being undermined.

I would argue that today the normative and rationalistic thinking of agile management theory has taken this process several steps further. No kind of authentic or self-selected form of self-hood and subjectivity is permitted in the modern workplace. This is at least in part because once labour power includes person-hood itself, as it does in many kinds of work today, it will inevitably contain elements of resistance to capital. So perhaps it is no surprise there are only a handful of specific subjectivities considered suitable in the new Industry 4.0 world of work, and these must be aligned with labour processes: the entrepreneur, the 'doer', the 'go-getter' - all forms of subjectivity that are linked to the more creative side of 4.0 but which are then extended in a way that stretches the meaning to include extreme forms of adaptability to the demands of capital. In our current phase of work design experimentation - the phase of agility management systems - as technology advances and changes constantly, people's subjectivities are also expected to be constantly adaptable, flexible and changeable. We are expected to embrace the specificities of idealised subjectivities, and to identify ourselves through consuming and adopting in full an identity of affective flexibility. Skills such as 'adaptability' and demonstrating the right 'attitudes' are much sought-after by employers. This is the latest stage in

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'revolutionising the technical process of labour' - the effort to capture surplus value through the intensification of work practices and new efficiencies in production techniques. This is the continuing motion of the conveyor belt that makes ever more real the formal subjection of labour to capital.

As Foucault pointed out, every production technique includes an aspect of subjectification - the 'modification of individual conduct, not only skills, but also attitudes'.[12] Subjectification takes a particular form in neoliberalism: subjects self-define for the benefit of the external quantified gaze. And indeed the processes whereby subjectivity itself has been incorporated into the processes of capital have received the attention of a number of writers on work processes - influenced by Foucault, and/or, more latterly, Deleuze and Guattari. For example, Suely Rolnik argues that, in the neoliberal period, the individual is now split into two distinct components, the entrepreneurial self and the self-exploited proletarian.[13] As split selves, with an inner manager exploiting an inner worker, workers are induced to quantify and regulate their own affective labour so as to remain subjects of and subject to capital.

Labour process theorists have had a continuing focus on the identification of management strategies to quantify and divide labour (both socially and personally), and in this they were very often building on Richard Hyman's paper in the first edition of *Work, Employment and Society*, published in 1987.[14] Hyman indicated the ways in which 'numerical control' and the use of 'computer-based technologies' were being deployed 'not merely to displace traditional skills but also to monitor and hence discipline the remaining workforce' (p37). The selection of technology, and encouragement of resignation to its predictable unpredictability, was 'a social and political and not merely technical question'. Hyman also referenced the work of Robin Murray, and his argument that 'computer programmes in the 1980s were written to organise new systems of production, but also to control labour, rather than to emancipate it'.[15] And he also cites David Noble, another pioneer of critical thinking on capitalism and technology, who saw the introduction of numerically controlled machines into work as being deliberately designed to be a 'valuable means of taking the intelligence of production and thus control of production, off the shop floor'.[16]

In other work, labour process theorists Peter Bain and Phil Taylor have argued for a critical framework that allows for resistance, noting that workplace

surveillance, while real, is not necessarily internalised by workers.[17] They were critical of the Foucault-influenced argument by Sue Fernie and David Metcalf, in their work on call centres, that workers absolutely internalised the imperative to perform and did not recognise they were being exploited; and they also moved away from Braverman's arguments about the self in technologised labour processes.[18] Bain and Taylor argued that call centre workers' subjectivities had not (but should have) been accounted for in the kind of research that tended to totalise their experience, and often also to ignore trades unions and worker resistance. These and other labour process studies point to the need to cross disciplines in theorising the political economy of quantifying work.

Overall, though, labour process theory's emphasis on enumeration and measuring as linked to technology makes it an appropriate resource for looking at quantified work today. Thus, for example, the use of more intimate and pervasive numeration techniques, including algorithmic management and people analytics, is reflective of a strategy to control workers in a similar way to that seen in previous eras. Moreover, digitalised methods of management are being introduced in increasingly creative ways, for instance in the range of new, sensory technologies that allow the measurement of affective labour through the use of sensory devices.[19]

Labour processes within each period of management and work design have been based on a series of assumptions about potential levels and forms of divisibility between minds and hands, the mental and the physical; and they have engaged with technology and machines at varied levels. At the macro-level, work design tends to focus on 'the division of labour and technology, the formal structure of authority and surveillance, and the relation of job positions to the labour market'.[20] At the micro-level, it has tended to focus on motivation (usually in the interests of productivity), the principle being that jobs are enriched or made more motivational if specific characteristics can be observed, though there is also research on the interpersonal and social aspects of work and the contextual characteristics of workplaces.[21] But Morgeson and Humphrey note that the effects on workers of tools and equipment are still the least researched and understood in this field (p1323). When it comes to the introduction of new technology and management practices into the workplace, there is little background research that has documented or monitored either the social arena (for example in relation to occasions when the use of social media is being deployed), or the arena of

lifestyle initiatives and the physiological (for example when sensory devices are introduced, designed to measure good health and happiness in workplaces as part of productivity improvement).

Getting smart about agility

The notion of agility encompasses a range of approaches. It refers both to 'workforce agility (flexibility in matching workforce fluctuations to demand)', and 'operational agility (responsiveness and adaptiveness of processes and structures)'.[22] Thus 'agile manufacturing' focuses on increasing the efficiency of labour processes in production, but agility also has a more specific meaning within software development and the management of systems. It is also associated with a number of positive-sounding terms, such as 'smart working' or flexible working. Once again the 'high-road', hi-tech side of work design is generally highlighted in management and organisational theory literature, while the use of technology to quantify, monitor and control the workforce receives less attention.

In 2001, a group of seventeen software developers who were fed up with bureaucracy and obstacles to technological development met up in a ski lodge in Utah and drew up their ideas for how an ideal production team should operate, calling it the Agility Manifesto:

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan.[23]

The manifesto reflected the sentiment of other IT workers who felt that the 'waterfall, or traditional sequential development' system used in factories was ineffectual for software development. Agile approaches sought an alternative through helping teams to 'respond to unpredictability' through 'incremental, iterative work cadences and empirical feedback'.

Soundings

A number of developments preceded this manifesto. Perhaps the first company to show how agility could be used in manufacturing was Toyota. Just-in-time (also called the Toyota Production System (TPS)) - developed from 1948-1975 - allows for constant change in demand and technology, and tries to anticipate requirements as they develop. TPS meant that workers were encouraged to experiment with their work, challenging associations with rigidity and routine in factory work. The associated idea of *kanban* has also been used in agile work design discussions, to refer to flow-based, continuous systems that feed demand back into the production line.

Luis Sanchez and Rakesh Nagi, writing in 2001, saw the 'agile manufacturing paradigm' has having originated approximately ten years earlier as manufacturers sought to adapt to the changing global environment.[24] For Jim Highsmith, 'agility is the ability to both create and respond to change in order to profit in a turbulent business environment'.[25]

As Sanchez and Nagi point out, agile had also often been used as a replacement term for the idea of 'lean' production, though, as they argued, 'Lean manufacturing is a response to competitive pressures with limited resources. Agile manufacturing, on the other hand, is a response to complexity brought about by constant change'. They also saw agile competition as representing a shift away from 'producer-centred customer-responsive companies' and towards the 'refinement of mass production to interactive producer-customer relationships'.[26] And it is indeed the case that in much of the literature on 'agile', authority is given to clients as decision-makers, because in many of its manifestations it is a form of total quality management. In 2012, Xiaofeng Wang and colleagues coined the term 'leagile' to refer to an approach that incorporated both leanness and agility.[27]

During the last twenty-five years or so, agile has been popularised and used in an increasing number of companies in many sectors. It is now known for promoting specific principles in iterative development, self-organising teams, customer inclusion and adaptability to change.[28] Particularly since the publication of the Agile Manifesto, companies in all industries have begun to recognise the value of operational agility. It means that workers and management have the 'ability over time to respond quickly and effectively to rapid change and high uncertainty';[29] it is a 'co-evolution of workplace and work', and 'an adaptation of *kaizen*, or "continuous improvement"';[30] it is 'neither top-down nor bottom-up: it is

outside-in';[31] and this conscious co-evolution and improvement of work happens through 'experimentation, integration and disseminated learning' via just-in-time communication, rear-view mirror checking, continuous improvement and resource maximisation.[32]

Agile management also emphasises the reduction of waste - another similarity to scientific management. As we have already noted, however, under the latter system management clearly held all cognitive skill, whereas in agile conditions workers are expected to fully co-create our workplaces. But, as Lazzarato points out with regard to participative management styles in related management systems, this is a 'technology of power, a technology for creating and controlling the "subjective processes"'.[33]

Sharon Parker, who has published extensively on job and work design, argues that agility requires a 'group work design' model because 'individual roles are interdependent and there is a need for collective working'.[34] She draws on studies in organisational psychology that show that group autonomy leads to job satisfaction and organisational commitment. In an approach that seems to implicitly assume that what is good for the worker is good for the company - and vice versa - she argues for an 'input-process-output' model, wherein 'inputs' are group-led work design, group composition and contextual influences; 'processes' involve intermediary group states and group norms that become attributes; and 'outputs' are 'team-member affective reactions'. Parker also argues that group work has a positive effect on psychological empowerment.

Affect is thus not an alien term in organisational psychology, but where it is used it usually refers to positive shared emotions (which is by no means identical to discussions of affective labour in feminist research). However, Parker does acknowledge that group work does not always lead to positive outputs, noting that, at times, people may feel it is an 'insidious form of control'. The Chartered Institute for Personnel Development (CIPD) report referred to earlier (see note 22) also points out that workers can be suspicious of agile systems because they tended to be linked with unstable working conditions.

Another management technique that is favoured in the agile workplace is the 'scrum'.[35] This involves a process through which the development of a product, or the reduction of a product backlog (or an 'evolving, prioritised queue of business and technical functionality that needs to be developed into a system') feeds into a

decision to call a 'sprint' - a period within which a specified goal will be achieved, usually around thirty days. At the 'sprint meeting', all stakeholders, including 'customers, users, management, the product owner and the scrum team' decide on the goal and the functionality of the goal, as well as who will do what to make it happen. A team is then organised to carry out the project, who hold scrums to report back on work, and to ensure that everyone is up to speed on what's happening and is doing their bit. During the scrum the development team (ideally, fewer than eight people) is self-directed and self-organising, with authority to work on a sprint in any way they decide, collectively. There are three main roles for team meetings: product owner, team and scrum master. Hierarchy is shunned as out-of-date. The 'scrum master' is important, but s/he is not a traditional manager. As one such qualified 'master' indicated, they are 'there to make sure that the process runs smoothly'. Agile aims to be very different from a 'bonus-driven culture', because that kind of culture 'takes people's eyes away from what they should be doing and they lose focus'.[36]

Self-managing in agile systems

Worker self-management is inherent to the operation and success of agile systems. Perhaps obviously, agile workplaces require agile workers. In a key difference with older management systems, the relationship between workers, management and machines is itself reformed. Where technology was used in scientific management to facilitate work efficiency, in the age of agility innovations in technologies have themselves become dominant, and work competences must catch up with them. Workers are expected to self-manage the impact of constant change, including through emotional management and affective control. Managing change thus becomes an all-of-life responsibility, where well-being is part of the worker's remit. Corporate wellness programmes are then made available to help develop the resilience of their workers in the face of constant, inevitable change: i.e. workers are helped to self-manage change rather than there being any attempt, for example, to improve working conditions.

Agile eliminates the traditional company manager and instead puts the customer as manager: company managers are expected to 'fall in love with the customer'.[37] For management to embrace agile, they need to be touched and inspired at a 'deeper

emotional level', through 'experiences and leadership storytelling that enable them to embrace a different set of attachments, attitudes, values and understanding about how the world works'.

Agile is thus presented as a form of total quality management *and* a high-performance work system, oriented around the 'high road' approach whereby companies invest in human resource quality as a primary means of being competitive. Total quality, as a philosophy, inspires management to set a vision, to infuse all systems with this vision, and to involve and empower employees; while high performance practices involve the introduction of employee involvement programmes. But agile differs from both these systems of management because it was largely developed by technology experts, and has an overwhelming focus on working with and developing new technology.

The Agility Manifesto can be seen as a grassroots model, but, as the Chartered Institute for Personnel Development note in their report, the notion of agility is being explicitly incorporated by management into many workplaces. Monitoring is central to this. And, though there is a precedent in the kind of work associated with Total Production Systems, which required an element of tracking to measure performance, including self-tracking, agile management systems require ever more intimate worker tracking; and the relationship between humans and technology is being further advanced - with technology as the driving force.

Agile workers must be prepared to make personal changes - always on the move and mobile - but must also always be trackable. Workers' unseen labour also involves the constant personally generated reproduction of a company's image by aligning it with our own identities, preferences and hobbies.[38] Work, identity and life blur together, and it is increasingly difficult to log out, switch off or tune out. Agile workers 'struggle to be left alone rather than to be included, a type of refusal that would have looked strange to their Fordist predecessors'.[39] All these techniques are intensified within a digital economy where the corporeal is no longer separable from either the mind or the machine.[40]

The CIPD's 2014 report noted that companies aiming for the agile system frequently overlook workers' personal experiences of agility transformations, do not train appropriately for it, and rely on a casualised, precarious workforce. Even within agile organisational environments geared for ongoing rather than intermittent adaptation to market demands, the appropriate level of 'sophistication in designing

and implementing smart and agile working practices' is not evident (p2). The report also shows that rolling out ideas associated with agility may not be appropriate in all sectors. For example, to focus on 'the now' in public sector jobs is often inappropriate, or at least requires a different approach from what is needed in technology services; and a focus on output, or work performed, rather than hours and physical presence in offices, is not a solution to the many problems brought about by work casualisation in the public sector. According to the report, 90 per cent of agile organisations offer 'some sort of flexible working, with part-time working and flexi-time being the most commonly used' (p15). Sixty per cent of the companies looked at held formal policies on flexible workplace practices, but such policies were most likely to be about homeworking (47 per cent) and mobile/remote working (35 per cent). In spite of the expectation for constant workplace change in agile models, the report noted that companies have been less willing to provide consistent training - and half the HR correspondents to the study stated that this was due to costs. Half of organisations used multi-skilling, but considerably fewer had the scope for rapid re-training. (The private sector is most likely to provide rapid training, while the public sector tends to offer secondments and job rotations.) Unsurprisingly, precarious work is an increasingly widespread feature of agile workplaces.

Agile workers are expected to obtain affective self-awareness and to self-manage, but there are in general no benefits or perks associated with doing so. Theorists of agile management claim that it gives workers more control over changes to the workplace, but forget that this 'control' leads to work intensification, often without raising income or status, and usually precludes any possibility of self-managing in ways that fall outside prescribed methods.

It is not impossible to organise against such processes. The quantified self at work can be resisted by refusing to track and quantify activity as part of work, or by finding ways to hack quantification through organising across platforms and carrying out other forms of resistance. There has been some effective organisation by gig workers, through the Independent Workers Union of Great Britain, whose members are largely low-paid migrant workers. The IWGB has had successful campaigns with cleaners at the University of London, and has organised Deliveroo riders, particularly in a challenge to the notion that they are independent contractors and not workers. Many have argued that the new kinds of conditions at work required new kinds of trade unionism and resistance.

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However, there are many difficulties in organising at the kinds of workplaces that rely on zero-hours contracts, casualised and temporary work, and the employment of freelance or self-contracted labour: they are very often the same firms that do not recognise unions, while workforce turnover is often speedier than in other areas. Mainstream unions have not always risen to the challenge of organising among precarious workers, but there have been a number of initiatives, particularly internationally, on legislation to protect against the onslaught on privacy entailed by intrusive performance monitoring in the workplace. Unions have also campaigned against zero hours contracts and the use of agency workers, but very often this has been from the perspective of protecting the rights of mainstream workers, and has focused on policy rather than workplaces. However, the GMB has made efforts to represent gig workers, and has a campaign both to recruit Amazon workers and to publicly challenge their working practices, while Unison has organised and campaigned on zero hours contracts, and on conditions within the NHS for outsourced workers.

There is still a lot work to be done in this area, however - not least in understanding the many ways in which positive notions associated with agility serve to obscure the age-old process of finding ever more intense processes for the extraction of maximum surplus value from workers.

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Notes

1. See for example Klaus Schwab, *The Fourth Industrial Revolution*, World Economic Forum, 2016. Broadly speaking, the first industrial revolution is seen as occurring because of mechanisation; the second as made possible by mass production and the assembly line; and the third as happening on the basis of computerisation, automation, and lean management. There is some debate as to whether the fourth revolution is simply an intensification of the third, or in fact represents a qualitative change.

2. This is part of the *Soundings* series on critical terms, which seeks to explore some of the main ideas at play in the current political conjuncture. The series was introduced in Deborah Grayson and Ben Little, '*Soundings* critical terms: conjunctural analysis and the crisis of ideas', *Soundings* 65, 2017. Each instalment outlines the theoretical and

historical background of a particular idea or set of ideas - in this case the relationship between workers and machines, with particular reference to digital technology and agile management.

3. Stephen Barley and Gideon Kunda, 'Design and Devotion: Surges of Rational and Normative Ideologies of Control in Managerial Discourse', *Administrative Science Quarterly*, 37, 3, 1992.

4. Karl Marx, *Capital*, Volume 1 [1867], p127, Penguin 2015.

5. Karl Marx, *Grundrisse*, Penguin 1993, p693.

6. Brighton Labour Process Group, 'The capitalist labour process', *Capital & Class*, Issue 1, 1977, p2.

7. Paul Thompson, 'The capitalist labour process: concepts and connections', *Capital & Class*, Vol 34 No 1, 2010.

8. Phoebe V. Moore, 'Tracking affective labour for agility in the quantified workplace', *Body & Society*, 2018, in press.

9. S. Bolton, *Emotion Management*, Palgrave 2005; A. Witz, C. Warhurst and D. Nickson, 'The labour of aesthetics and the aesthetics of organization', *Organization*, Issue 1, 2003; C. Wolkowitz, *Bodies at Work*, Sage 2006. Cited in Thompson (see note 7).

10. Harry Braverman, *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*, Monthly Review Press 1974.

11. C.R. Littler, *The Development of the Labour Process in Britain*, Heinemann 1982, p22.

12. Michel Foucault, *Technologies of the Self, A Seminar with Michel Foucault*, L. Martin, H. Gutman and P. Hutton (eds), University of Massachusetts Press 1988.

13. S. Rolnik, 'The Geopolitics of Pimping', in G. Raunig, G. Ray and U. Wuggenig (eds), *Critique of Creativity: Precarity, Subjectivity and Resistance in the 'Creative Industries'*, MayFly 2011, p48.

14. Richard Hyman, 'Strategy or Structure? Capital, Labour and Control', *Work, Employment and Society*, March 1987.

15. Robin Murray, 'Benetton Britain', *Marxism Today*, November 1985, cited in Hyman.

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