NEW ECONOMICS FOUNDATION

WHO WATCHES THE WORKERS?

POWER AND ACCOUNTABILITY IN THE DIGITAL ECONOMY

PART 2: DATA, ALGORITHMS AND WORK

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PREFACE

A new economy is emerging. And this new economy is powered by a new type of fuel: data. As the data economy becomes increasingly prominent, there are troubling signs that it is worsening existing power imbalances, and creating new problems of domination and lack of accountability. But it would be wrong simply to draw dystopian visions from our current situation. Technological change does not determine social change, and there is a whole range of potential futures – both emancipatory and discriminatory – open to us. We must decide for ourselves which one we want.

This is the second of four papers exploring power and accountability in the data economy. These will set the stage for future interventions to ensure power becomes more evenly distributed. This paper explores how data is disrupting the labour market, while other papers examine: the impact of the mass collection of data; the impact of algorithms as they process the data; and the companies built on data, that mediate our interface with the digital world.

Our research so far has identified a range of overarching themes around how power and accountability is changing as a result of the rise of the digital economy. These can be summarised into four key points:

- Although the broader digital economy has both concentrated and dispersed power, data is very much a concentrating force.
- A mutually reinforcing government-corporation surveillance architecture – or data panopticon – is being built, that seeks to capture every data trail that we create.
- We are over-collecting and under-protecting data.
- The data economy is changing our approach to accountability from one based on direct causation to one based on correlation, with profound moral and political consequences

This four-part series explores these areas by reviewing the existing literature and conducting interviews with respected experts from around the world.

INTRODUCTION

The labour market has always been a delicate balance between workers and employers. History is in some sense the story of employers trying to get the most out of their employees while workers organise and fight for power and more control over their lives. The introduction of data-gathering technology, its analysis and use has disrupted that balance and shifted power firmly back to employers. This is especially true within the new on-demand labour platforms like Deliveroo or Amazon Mechanical Turk but is also filtering into all areas of work. We have identified a number of major issues related to data and labour:

- The extension of surveillance tools, both temporally and spatially, combine to create a Panopticon-like scenario whereby even though the worker knows they are probably not being directly monitored at all times, the fact that they could be being monitored at any time elicits a psychological response equal to permanent surveillance.
- Many companies that are gathering and analysing data about their workers frame it as being beneficial for everyone. The potential benefits are, however, highly skewed towards management and in fact allow for the intensification of work and the reduction of employees.
- Employers are increasingly using algorithms as a tool to obscure the specific decisions being made. At the same time, the black box nature of algorithms and the difficulty in questions their decisions leads to a loss in accountability.
- Although there is a hope that data and algorithms can work to remove individual bias, critiques suggest that algorithms are often blind to biases inherent in the training data with companies rarely if ever recording false negatives.

1. BACKGROUND

The world of work is changing across the globe with the advent of the digital economy. The combination of the mass use of Information Technology (IT) at work, the advent of Big Data, the increasing use of algorithmic human resources (HR), and the fact that IT is developing at a speed which outstrips policy[1], are shifting the balance of power away from workers[2] and reconfiguring accountability between firms and workers[3].

Rather than see the rise of the digital economy as inevitably leading a loss in worker power, we should instead see the current use of IT within a historical context. We must resist the temptation towards technological determinism – viewing the impacts of technology on power and accountability between employees and firms as inevitable - but instead ask why, where and when technologies have been developed, and applied in certain ways. The impact of technology on power is a result of the social setting from which it emerges. What technology is developed and how this technology is applied must be seen as resulting from on-going socio-economic trends. In the short term, this includes the post-2008 financial climate with an abundance of labour with decreased bargaining power[4]. From a longer-term perspective this involves the on-going shift towards a post-Fordist economic structure, with an employment model based on a core of full-time employees utilizing a larger number of peripheral workers[5]. What technology is developed is a result of these historical trends. For example, the growth of freelancers, the self-employed, remote working, together with a decline in union membership along with the decline of an employee-employer social contract is shaping what technology is developed and applied to the workplace[6], with these developments serving to exacerbate this trend by making it easier to access a disaggregated workforce.

Our workplaces are increasingly being shaped by the collection and application of large data sets, shaping what tools are being developed and applied. But data is also shaping where and how employment is taking place, shaping what the relationship between worker and firm looks like (see box 1). This briefing will focus from a workplace perspective on how data is collected through the use of surveillance tools, how data is made use of through the use of algorithms and algorithmic management, and their impacts on power and accountability

Box 1. On-demand labour platforms

The latest step in the digital economy has been the growth in on-demand labour platforms such as Uber, Deliveroo and Amazon Mechanical Turk, providing online spaces through which employers and workers are linked. While there is currently little reliable data that exists on the number of workers on such platforms, best estimates state that between 1 to 5% of the adult population of Europe has performed paid work mediated through an on-demand labour platform. Of those who undertake platform work, around 25% are financially dependent on this work, gaining 70% or more of their income through platform work[7]. These platforms are not all alike, but we can broadly characterize them into two categories based on the type of labour they provide:

1) Place-bound work: Platform-mediated work which is place bound, such as Uber, Deliveroo and Task Rabbit, are having an impact on the configuration of work and the sociological make-up of workplace interactions, both between colleagues and between employees and firms[8]. While platform-mediated work creates knowledge asymmetries, surrounding aspects of work such as how it is distributed and who is preferencedand opens up new spaces for surveillance[9], it can broadly be seen as a reconfiguration of existing precarious work situations, rather than a break with the past[10].

2) Virtual work: Work which can be conducted over the internet is removing the need for employer and employee to be in the same place. The detachment of work from its geographic bounding represents a fundamental shift in the process of out-sourcing, allowing tasks to be completed in any area of the world, in a multitude of labour market conditions. Platforms such as Amazon Mechanical Turk and Upwork act as market places where workers from across the globe compete for a constrained amount of work. This offers a number of positive opportunities, such as offering work to marginalised groups who may otherwise be excluded from labour markets, and access to higher wages for some. Yet the current absence of regulation surrounding labour platforms is creating a race to the bottom for wages as workers across the globe compete[11].

1.1 TRENDS

COLLECTION OF DATA: WORKPLACE SURVEILLANCE

Workplace surveillance "refers to management's ability to monitor, record and track employee performance, behaviours and personal characteristics in real time"[12]. While workplace surveillance has always been an ever present aspect of work within industrial capitalist societies, the advent of information technology to the workplace has extended both the scope and scale of surveillance[13]. Key to this is the growth of computers and email at work, with 66% of U.S companies monitoring employee internet browsing, and 45% logging key strokes[14].

Email is a major source of rich surveillance data, with 43% of workplaces tracking correspondences [15]. Increasingly, the monitoring of this data is automated through the use of natural language processing to measure tone and flag correspondences for potential misconduct, through readily available software such Veriato[16] [17]. This practice is already widely used within the financial services[18], with an increasing number of software tools driving down price and increasing market accessibility for a broad number of firms.

WEARABLES

Wearables and self-tracking devices offer a new frontier of surveillance[19] [20] with the number of wearable devices given out by employers expected to rise to 500 million by 2021[21]. The term wearable refers to the use of technologies worn by an individual to enable the measurement and quantification of the individuals lived experience[22]. As a category of surveillance technology, wearables are not all alike and can be seen to encompass many different forms, both in what they measure and how they are employed.

Some are specifically used to make biometric measurements, looking at the body's functions themselves, such as heart rate, quality of sleep and steps walked. The most well-known of these are made by companies such as Fitbit and Jawbone[23], which while being popular consumer goods, are increasingly purchased by firms as part of employer wellbeing programs[24]. Further examples of technological developments within this sector include Ubisoft's development of sensors to measure stress levels, and wearable devices able to measure fatigue – currently being used in long-haul lorry drivers[25].

In addition, another category of wearable technology focuses on more traditional surveillance through measuring and recording the location of workers. Examples of this include the use of GPS trackers within warehouses – most commonly associated with Amazon and Tesco[26] – and the increasingly common use of GPS tracking through an individual's smartphone. This comes through purchasable apps which are then installed on the worker's phone, or through platform-mediated work such as Uber and Deliveroo. This offers an appropriation of the workers own personal possessions for the use of surveillance, and when work is mediated through a smartphone, the space for resistance is small. In regards to platform-mediated work, the black box nature of their mobile apps – their inner workings are largely hidden from the user - means that the extent and scale of surveillance is unknown[27]. Further developments include the incorporation of microphones to record communication between workers, such as those held within the I.D badges developed by companies such as Humanyze[28].

ACTIONING DATA SETS: ALGORITHMIC MANAGEMENT

Algorithmic management refers to the automation of management functions, with software algorithms taking over all, or part of management roles. Originally coined in relation to the software systems used to distribute work to Uber drivers[29], its use also refers to the range of software based tools which aim to inform and shape decisions made by human managers, and is synonymous with other terms such as algorithmic HR. Algorithmic management allows for software tools to be trained using large data sets to perform tasks previously only capable by human staff, including shortlisting job applications, the distribution of tasks to workers, determination of pay rates, scheduling of shifts and the tracking of staff hours.

Software algorithms are increasingly used as a tool to sort and select job applicants, reducing the workload for management staff[30], with as many as 72% of CVs never being seen by human eyes[31]. This encompasses a range of different mechanisms including the use of search engine-based tools to check the working status of an individual, to more advanced uses of machine learning and personality testing to look at the determinants of what makes a successful candidate[32].

Algorithmic management is used heavily within the platform economy, including to distribute work within platforms such as Uber and Deliveroo, reducing the number of management staff and allowing these companies to grow rapidly in areas where they have no existing infrastructure. Yet this technique is not staying within the platform economy, but permeating more widely into many different forms of work. This includes

the transport and logistics sector, with software such as Onfleet allowing companies to automate the distribution of work for a monthly subscription cost[33] and in the warehouses of large distribution companies like Amazon and Asos[34].

2. ISSUES

2.1 EXTENSION OF SURVEILLANCE

Wearable technologies represent an extension of not just the scale but the sites of surveillance both temporally and spatially[35] [36]. Spatially, the use of wearables extends the site of surveillance to the body itself. While the justification for biometric measurements focuses on their role within wellbeing programs, which are framed as mutually beneficical for the individual and company, critics argues that it lays the groundwork for discrimination along health lines. In real terms, this includes cases in the USA where workers health care benefits have been cut based on an individual's failure to join the employer's wellbeing program[37]. Temporally, technological surveillance extends into the workers' lives outside of working life, contributing to a working culture where a person can never switch off[38]. In a direct sense this takes the form of cases such as the worker at a tech firm in California who was fired for turning off a tracking app installed on her phone when she wasn't at work[39].

The extension of surveillance tools, both temporally and spatially, combine to create a Panopticon-like scenario whereby even though the worker knows they are probably not being directly monitored at all times, the fact that they *could* be being monitored at *any* time elicits a psychological response equal to permanent surveillance. This leads us onto an important point about the extent to which this surveillance is used as a tool to determine how decisions are made within management, with varying accounts within the literature.

The extent to which digital surveillance is being meaningfully used to shape and determine management practices is contested within the literature. This includes cases such as in warehouses in the UK, with one UK warehouse worker stating: *"…a week before the sackings, the management said "everyone be careful, because we are going to fire someone from the temporary staff". So everybody speeded up.""*[40]. Importantly in this quote, it is not clear whether the data from trackers would be used to influence the decision, but the fact that they might was enough to make workers speed up.

Within platforms providing on-demand labour, such as Uber, Deliveroo and Upwork, the level of surveillance would appear to be near total[41] [42]. Upwork, for example, records all the key strokes a worker makes and can access a worker's camera to take pictures at any time[43], while Deliveroo monitors every move that a worker makes including the amount of time taken at every stage of a delivery[44]. Yet the extent to which this data is used to enforce punitive measures upon workers is unclear. For example, Deliveroo

riders are not punished for not making arbitrary targets[45] and deactivation (the equivalent of being fired) is easily reversed[46]. One impact of the automation of management roles within these platforms would appear to be the loss of the ability to make use of surveillance tools[47], with this task increasingly being outsourced to the consumer of a service, through rating systems and the ability for consumers to refuse payment for work[48] [49]. Drawing together these examples, we can conclude that although recent technological developments are creating a situation of near total surveillance, their use to shape punitive measures for workers is more contested and empirical research is needed to investigate further.

2.2 INTENSIFICATION OF WORK

While the use of wearable technologies are increasingly sold under the guise of being beneficial for everyone[50], the potential benefits are highly skewed towards management, allowing for the intensification of work and the reduction of employees[51]. Tesco, for example, was able to reduce its full-time warehouse employees by 18% after introducing tracking devices[52]. However, the negative impacts are almost exclusively borne by the worker[53]. These include stress related to overwork, which has been found to trigger a range of negative health impacts, such as rising risk of heart disease and higher risk of alcoholism[54]. At Amazon's warehouse outside Fife, Scotland, which uses wearable trackers for its 1500 floor staff, an ambulance visits the warehouse on average once a week to attend to staff in need of medical help[55]. Furthermore, the comparison between a worker's actual output, their colleagues output, and the ideal set by management, has been shown to trigger a rising anxiety and increased sense of precarity at work[56].

An interesting point to consider is in what workplace settings people accept surveillance and under what guises. For example, staff at the Daily Telegraph were able to resist attempts to monitor their presence at desks, through a coordinated response spearheaded by the largely unionised workforce[57]. On the other hand, the workers at the factories of Amazon and Tesco continue to be subject to much more intrusive monitoring. Part of considering the impacts of technologies used to monitor workers involves seeing its observed impacts as the result of "our socioeconomic relationship to capital, property and governance'"[58], meaning the adverse impacts will fall most heavily on the already vulnerable groups. The highest levels of surveillance – and thus its worst impacts - are found to be most strongly felt by women and migrants[59] [60]. But what is more worrying is that these groups are continually barred from contesting these inequalities through the disaggregation of workers through both technological and legal mechanisms[61]. The majority of Amazon's warehouse workers, for example, are separated

from their colleagues through algorithmic management and held on temporary contracts[62]

2.3 ALGORITHMIC MANAGEMENT AND THE PERPETUATION OF SOCIAL INEQUALITIES

The use of algorithms within the management of workers occurs in a variety of different sectors of the economy, and is employed in a range of different ways. In as such, it is wrong to make simplistic assumptions about the way in which the use of algorithmic management will impact upon power and accountability within these different sectors. However, the nature of algorithms themselves mean that recurrent themes are experienced in the different areas where they are employed.

Algorithms have the effect of obscuring the specific decisions made by management as to how the algorithm should function[63]. As Cathy O'Neil puts it, "algorithms only have one measure of what success is"[64] with management and software engineers holding the power to determine the criteria of success as they build them[65]. At the same time, the black box nature of algorithms leads to an obscuring of the decisions which underlay how they work, leading to a loss in accountability[66].

The use of algorithms has permeated all levels of our society and relate far beyond the realms of the workplace, influencing areas such the judiciary system[67] political discourse[68], the health sector[69] and our education systems[70]. So while analysis within this context is confined to the impacts of algorithms within the workplace, this does not serve to isolate this conversation from broader questions about the impacts of algorithms from society at large. Instead they should be seen as existing in tandem.

2.4 HIRING

Machine learning algorithms (MLA) are widely used to sort candidates based on a comparison between attributes which have in the past lead to a successful candidate with an applicant's individual characteristics[71]. However, limited literature exists giving concrete examples of how the use of algorithms to select and sort job applicants is re-shaping the capabilities of different groups to enter employment. On the one hand, some argue that machine learning can work to remove bias held by individuals when recruiting, limiting their propensity to select those who mirror themselves[72]. However, critiques of this process center around how MLA are blind to the social determinants that shape the ability to succeed in a workplace, such as race and gender[73]. Furthermore, companies rarely, if ever, record false negatives in hiring – i.e when a candidate is turned down who would have been highly successful – meaning that these are left out of an

algorithms training data. This holds the possibility of exacerbating inequality within hiring[74].

What we see from the cases outlined above is that with the automation of the processes related to who is hired, there is *the potential* for algorithmic functions to contain within them systematic discriminations towards certain groups. While the subsuming of these processes within the workings of software based algorithms has the potential to frame them as being bias free[75], the unpacking of the actual outcomes of these processes shows the opposite to be true; algorithms will reproduce the inequalities which exist within the data used to train them[76].

3. CONCLUSION

Technology, fed by increasing data collection and analysis, is changing the lived experience of workers around the world. Yet the way that these new technologies are implemented are highly contigent on the specific social, political and economic conditions of a place. An emergent theme within this review is that it is those disenfranchised workers, already in a state of precarity that are baring the worst impacts of the digitisation of the economy, with some being forced into generating the data to ultimatlety make themselves redundant, as with Uber drivers. The EU's General Data Protection Regulation (GDPR) which came into force in May of 2018, holds the potential to offer some protection for workers, but the threat posed by Brexit, along with the weak legal rights around work place surveillance[77], mean that greater work is needed if we are to avoid the worst effects. Far more research is needed within the UK itself, given that most of the examples cited are from other countries, on the use and impacts of forms of wearable technologies used for workplace surveillance has been limited[7879] as well as research into the impacts of algorithmic management in its various applications.

Fundamentally the practice of data harvesting from employees and the use to data together with powerful technology within the workplace is the result of the on-going negotiation of rights between workers, employers and the state, and the current trajectory is by no means inevitable. To help ensure that data and technology are a positive force in the labour market we need to empower workers, trade unions and civil society to stand up for their rights now.

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