Robots and Organization Studies: Why Robots Might Not Want to Steal Your Job

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Abstract

A number of recent high-profile studies of robotics and Artificial Intelligence (or AI) in economics and sociology have predicted that many jobs will soon disappear due to automation, with few new ones replacing them. While techno-optimists and techno-pessimists contest whether a jobless future is a positive development or not, this paper points to the elephant in the room. Despite successive waves of computerization (including advanced machine learning), jobs have not disappeared. And probably won't in the near future. To explain why, some basic insights from organization studies can make a contribution. I propose the concept of 'bounded automation' to demonstrate how organizational forces mold the application of technology in the employment sector. Work will probably not vanish in the age of AI, but poorly paid jobs will most certainly proliferate I argue. Finally, a case is made for the scholarly community to engage with wider social justice concerns. This I term *public organization studies*.

Keywords: Artificial Intelligence, Bounded Automation, Neoliberalism, Public Organization Studies, Robotics, Unemployment, Work

Introduction

When Google's prototype of the driverless car was first announced as a viable commercial technology in 2014, not all envisaged a sci-fi future of computerised convenience. A widely discussed concern focused on unemployment and the future of work. For example, in America alone around five million commercial drivers could be made redundant (Greenhouse, 2016). Add to this the manufacturing jobs that have been mechanized since 2000, around 85% of the workforce or 5 million employees (international trade accounted for only 13% of those losses) (Hicks & Devaraj, 2017), then a dire situation might be emerging. In societies that are founded on the institution of work, in which having a job is considered essential to one's wellbeing and social acceptance, Google's driverless cars and the degree of automation it signals might easily turn late capitalism into a jobless dystopia (Cameron, 2017).

Anxiety about technological unemployment is not new. It dates back to the Luddite movement in the early days of industrialism (Hobsbawm, 1952) and has periodically resurfaced ever since. For example, writing in the 1930s, John Maynard Keynes (1930) predicted machines would abolish work within two generations. The same was said in the 1980s (Leontief & Duchin, 1986) and 1990s (Rifkin, 1995; Aronowitz & DiFazio, 1994) in light of computerization, even as others more cheerfully spoke of a tremendous 'upskilling revolution' with the arrival of post-industrialism (Drucker, 1993). But the situation is very different today according to recent commentators who predict the death of work on a mass scale. The 21st century will be marked by a 'second machine age' where Artificial Intelligence (or AI) absorbs not only manual work but also cognitive and non-routine jobs, especially those once considered beyond the reach of mechanization (Brynjolfsson & McFee, 2014).

According to the McKinsey Global Institute (2017), around half of current jobs in the UK and US could be automated in near future. In a related study by the Oxford Martin School

(2016a), 57% of jobs in the OECD are susceptible to mechanization in the next twenty years, 69% in India and 77% in China. Unlike past modes of automation which centred on repetitive manual work, highly cognitive jobs are now vulnerable. Moreover, sophisticated AI breakthroughs mean that the low-skilled jobs we presumed were 'too human' to be replaced by robots (e.g., hairdressers, waiters, etc.) are also at risk.

Because digital automation is unfolding in an era of low growth and low demand, the 'compensation principle' (where the destruction of old jobs is offset by the creation of new ones elsewhere in the economy) might no longer apply according to Brynjolfsson & McFee (2014). A robot writing a news report – as they presently do in the business media (Keohane, 2017) – doesn't prompt me to consume more news. And from the supplier's side, increased demand for a product with a marginal cost of zero has little impact on the amount of labor necessary to produce it or even the commodity's price, as it did during the heyday of Fordism.

Those now leading the discussion about the societal implications of the 'second machine age' – mainly in economics and sociology - either take an optimistic view of this workless future (e.g., more leisure time) or a bleak one, envisaging levels of unemployment never before seen.[1] But herein lies the elephant in the room. Even a cursory glance at many Western economies – and beyond – indicates that jobs are not disappearing. Indeed, far from it, particularly in relation to low skilled occupations.[2] Countries that do have chronic unemployment today – Greece and Spain, for example – are more victims of macroeconomic pressures (e.g., sovereign debt crises, trade deficits, etc.) rather than of automation. Of course, this could all radically change tomorrow with a new breakthrough in computational intelligence and cybernetics. But that is improbable, I argue, because machines are not the real issue here. Organizations are. If we extrapolate from present occupational patterns, some of which are already heavily reliant on digital automation, a very different question needs to be answered:

why does work appear to be thriving in the coming AI and robotics era … rather than vanishing?

I believe insights from organization studies can help address the question. Technological innovations do not simply unfurl according to their own endogenous potential. They are delimited by socio-organizational forces, which regulate why, how and whether a job and/or task is automated. I term this *bounded automation*, highlighting social considerations (i.e., the price of labor, organizational power relations and the nature of the task) over qualities intrinsic to the technology itself. Arguing somewhat against the grain, therefore, I suggest that a robot probably won't steal your job. But that's no cause for celebration because 'bounded automation' also elucidates why the jobs that do proliferate in the 'second machine age' are considerably poorer in terms of skill, responsibility and pay.

The aim of this paper is to illustrate how organization studies can engage with pressing societal controversies that abound today, like automation and the future of work. Perhaps the scholarly community can do this in a collective and sustained manner. A *public* organization studies is posited towards this end.

The Second Machine Age

The 'first machine age' – propelled by steam power, the combustible engine, electricity and so-forth – mainly affected manual labour (Brynjolfsson & McFee, 2014). Given how industrial production is traditionally organized around a deep division of labour in which tasks are broken down into standardized and repetitive tasks, factory jobs were always in danger of being replaced by machines as soon as engineering science caught up. Unsurprisingly, successive waves of automation wiped away whole occupations (such as hand compositors in the newspaper industry, etc.) because technology could do the work at a fraction of the cost and without the conflict that dogged many industries (Thompson, 1963; Edwards, 1979).

The so-called 'second machine age' (Brynjolfsson & McFee, 2014) refers to the rapid maturation of digital, robotic and computational technology, and most recently AI or 'machine learning'.[3] Thousands of routine jobs disappeared with the first appearance of computer technology in the 1980s, combined with the off-shoring of work to the Global South (Gordon, 1996). So what distinguishes applications of AI from past uses of automation? Unlike factory machines, robotics can perform non-routine labour of the physical, cognitive and even emotional kind (Ford, 2015). What some technologists term 'the singularity' takes the argument one step further (Chace, 2016). Highly advanced computer algorithms not only mimic human capabilities – such as opening a door - but display a sort of person-like reflectivity while doing so (e.g., judging when and how the door should be opened in a polite manner). Activities we never dreamt a robot could perform are soon to become real (Cameron, 2017). In light of Moore's Law, in which digital processing power doubles every 18 months, some kind of highly roboticized future is looking increasingly probable. Brynjolfsson & McFee (2014) note this in their book, *The Second Machine Age*,

> … not only are the new technologies exponential, digital, and combinatorial, but most of the gains are still ahead of us. In the next twenty-four months, the planet will add more computer power than it did in all previous history. Over the next twenty-four years, the increase will likely be over a thousand-fold (Brynjolfsson and McFee, 2014, p. 32).

The McKinsey Global Institute (2017) study chimes with these observations, suggesting that the latest phase of computerization will radically restructure society as we know it, particularly the jobs we do. The study disaggregates each occupation in the economy according to their specific tasks and aptitudes, including social, cognitive and physical roles. These are then broken down into a large number of sub-capabilities and mapped against current

and projected digital trends. Viewed from this perspective, routine/semi-routine manual and cognitive jobs will soon be conducted by robots. They make up 51% of the US economy. Accountants, lawyers, butchers, waiters, drivers are relevant here, which equates to around US$2.7 trillion in wages (McKinsey, 2017).

As for non-routine jobs, major advancements in machine and cybernetic learning technologies could soon threaten them too, in part at least. Analysts examined occupations spanning the income spectrum, from hairdressers and bartenders, to airline pilots and corporate lawyers. The total time spent on these jobs can be divided into four key activities and ascribed a corresponding figure regarding its amenability to automation: managing and developing people (9%), applying expertise to decision making, planning and creative tasks (18%), interfacing with stakeholders (20%) and performing physical activities and operating machinery in unpredictable environments (26%). Most jobs involve a combination of all four tasks, with a variable proportionate mix depending on whether you are an airline pilot or waiter. Occupations leaning mostly towards the final two tasks are in big trouble according to this report. More importantly, it's not just *complete jobs* that risk roboticization, but isolated activities within a given occupation, especially those that afford employees a degree of income/skill arbitrage. This makes automation rather insidious because although a job might not be replaced *in toto*, definitive skills are. Seismic shifts are expected: "the real robotics revolution is ready to begin … the share of tasks that are performed by robots will rise from a global average of around 10% across all manufacturing industries today to around 25% by 2025" (Sirkin, Zonser & Rose, 2015).

Countries like Japan - with a strong comparative advantage in computer engineering - are pioneering the implementation of AI in work environments. For example, the health insurance firm Fukoku Mutual Life Insurance gained notoriety in 2016 when it made 34 employees redundant (Horton, 2017). They were replaced by IBM's Watson Explore, an AI-

application that forecasts hospital visits swifter and more accurately than human analysts. In another case, shipbuilders Mitsui OSK Lines and Nippon Yusen announced the design of the first unmanned cargo ship (McCurry, 2017). An industry spokesperson enthusiastically said that "we will see a remote-controlled ship in commercial use by the end of the decade."

The Oxford Martin School (2016a) study presents a fairly similar evaluation regarding the coming future of work in the age of robotics and smart computers. They use a type of role analysis to estimate the probability of computerisation in 702 occupations and conclude that about 49% of jobs in the US may be mechanized. Unlike the McKinsey project, these researchers are more circumspective about their findings: "this analysis doesn't take into account other factors that we absolutely do believe will have an impact on whether an occupation is taken over by a machine, such as human wage levels, social acceptance, and the creation of new jobs" (Oxford Martin School, 2016b).

Notwithstanding these small-print qualifications, sensationalist headlines ensued in the US and UK following the report, with many portending the demise of innumerable occupations in Western economies and beyond. For example, the UK think-tank Reform estimated that 250,000 public sector jobs could be automated within a few years (Hitchcock, Laycock & Sundorph, 2017). Nursing and routine surgical procedures are obvious candidates. Legal advice is another (also see Susskind & Susskind, 2015). And even policing is predisposed to roboticization according to the analysis as crowd-monitoring drones and facial recognition systems come to the fore.

Recent examples of machine learning appear to justify the fanfare around the issue, illustrating how some very human abilities may soon be performed by a robot. Take the AI-enabled talking sex doll called Harmony (Wakefield, 2017). She is being developed by the Californian firm RealDoll. What's surprising about Harmony is her true-to-life emotional interactions with 'real' humans. CEO McMullen said he programmed his model to be jealous.

As a result, she scornfully demands he "remove that girl from Facebook!" Outside the domain of sex work, Harmony opens up a myriad of possibilities in the social care industry. For instance, a firm called Aldebaran Robotics has designed a humanoid (called 'Pepper') for this very purpose, equipped with emotional intelligence and advanced pro-social traits (Mlot, 2014).

Another eye-catching example of advanced robotics is the humanoid priest called BlessU-2 (Sherwood, 2017). In 2017 he was unveiled at a Wittenberg festival to mark the 500th anniversary of the Protestant Reformation. This sophisticated android gives blessings in five languages and beams rays of light from its hands. BlessU-2 joins Xian'er, a robotic monk at the Longquan Buddhist temple on the outskirts of Beijing (Andrews, 2016). He's dressed in saffron-yellow robes, chants wise mantras and has an expression of permanent surprise on his face. Perhaps the future of spirituality is indeed machinic.

Unmotivated Robots

These reports rightly attract a good deal of attention in the media and popular culture. But I suggest there is a rather large elephant in the room. If we are on the verge of a workless future, then why are there more jobs now than ever? In fact, unemployment rates in much of the Western world are comparatively low and are predicted to remain so. In the UK, for example, as of March 2017 joblessness has been at its lowest point since 1975 (Monaghan, 2017). Of course, such figures are open to manipulation and there may be a degree of artificial over-employment in the economy that distorts the real situation. Nevertheless, the British comedian cum activist Russell Brand had a point when he recently joked about the so-called rise of the robots or lack thereof: "yeah, when are all these robots going to get off their fat arses and start doing our work for us so that we can laze around and have more picnics?" (Brand, 2016). It is a good question. If we extrapolate from present occupational patterns and take into

consideration the fact that automative computerization has been well integrated into the employment sector for over 25 years, then perhaps the real question is this: why might work – particularly poorly paid jobs - actually *proliferate* in the era of AI and robotics rather than be automated away?

I suggest that insights from organization studies can offer an explanation, countering the jobless future thesis that is presently so dominant. This is not the place to survey all of the research on technology in the field. My feeling is that automation and mechanization has seldom faded from the research agenda (with scholars more interested in how labor is controlled rather than replaced by machines). But one essential motif is still very helpful: it is not technology that determines employment patterns or organizational design but the other way around. The specific use of machinery is informed by socio-organizational forces, with *power* being a particularly salient factor. Critical labour process theory, for example, reveals how technological diffusion tends to reflect the political ambitions of powerful actors (see Braverman, 1974; Knights & Willmott, 1988, 1990; Sewell & Wilkinson, 1992). Other studies have arrived at similar conclusions, explaining why, for example, identical technologies can sometimes be put to strikingly different uses depending on 'strategic choices' and vested interests (Child, 1972, 1997; Barley, 1986; Zuboff, 1988; Orlikowski & Yates, 1994; Guillen, 1994). As Clegg, Kornberger and Pitsis (2008, p. 545) neatly summarize, "technology does not determine organizational behaviour; in fact, it is the organizational relations of power and knowledge that are significant."

This insight is not exclusive to organization studies, of course. But by emphasizing the notion in the context of the ongoing discussions pertaining to AI and the end of work, I believe we can make a number of useful interventions.

First, the analysis is able to avoid fetishizing automating technologies; this is where AI's *potential* to replace jobs is too easily equated with its empirical *realization*. Between the prototype of Tesla's driverless car and its vast usurpation of commercial workers across Europe and the US, for example, lies a complex set of political choices and limitations that will mediate the gap between the technical feasibility and mass implementation. Many of the dramatic discussions about robotics and digitalization outlined above often jump from the self-contained achievability of certain innovations (e.g., BlessU-2 giving benediction) to their broader, systematic organizational use. Whereas from an organization studies viewpoint, automation displays a good deal of *indeterminacy* that needs to be theorized.

And second, it places us in a better position to explain why (human) work persists, especially jobs that are noticeably inferior, attracting poorer pay and conditions. If the second machine age has indeed reorganized the employment sector then it doesn't function by replacing workers alone. Digital mechanization has most noticeably smoothed the way for the growth of insecure and underpaid jobs. This reflects the socio-political features of neoliberal capitalism and not the intrinsic attributes of technology. Because of this, robotic automation might even help deepen the institution of paid employment in Western economies, not release us from it.

I term this *bounded automation* after Herbert Simon's (1957) famous concept of bounded rationality. Just as pure rationality is delimited by accessible information (and processing abilities) in a constrained environment, so too is the organizational application of automative technology. This is why a robot's endogenous potential to completely supplant a job hardly ever sees the light of day.

Why There Are No Pilotless Passenger Jets

Bounded automation refers to the socio-economic influences that fundamentally shape the diffusion of digital technologies in certain occupational settings. The idea helps explain why an algorithm's inherent capacity to takeover a job in transport or the legal profession, for example, is frequently not realized. Three factors stand out. Robotic mechanization is molded and constrained by the *pricing of labour*, *organizational power relations* and the nature of *the task* itself, all of which are interrelated at various levels.

Let's consider *labor pricing* first. This relates to the market rate at which organizations purchase labor. Why is this so important? Well, take 43-year old Devi Lal from Delhi, India. In 2012 he was declared to have *the* worst job in the world (Miller, 2012). He is a sewage pipe diver. In the more overpopulated districts of Delhi the sewage system periodically fails and blockages occur. Devi is paid £3.50 per day (plus a bottle of bootleg liquor) to spend hours submerged in human waste to clear the blockage, dressed only in his underwear. During a six-month period alone it was estimated that 60 sewage divers like Devi died on the job (Limaye, 2016). There's one primary reason why Devi performs this awful work. He is selling his labour in a deeply impoverished economy where any income is welcome. Over 20% of Indians live below the national poverty line and 23.6% subsist on less than US$1.25 per day (Limaye, 2016).

In cities like London and Oslo the manual cleaning of underground sewage systems is relatively rare. Automated 'spinning head wet spray' systems are used instead. And if a person is required to enter this deplorable environment, they're usually skilled technicians, well-versed in the latest health/safety protocols and most importantly, equipped with an expensive protective suit. The difference between Delhi and London, of course, is the price of Devi's labour, which is significantly cheaper and more accessible in a context of economic hardship

and lax labour regulations. Devi's market wage-rate undercuts the cost of investing in a machine.

However, the same logic characterizes richer countries too, which is why a robot probably won't be cleaning your house anytime soon. It's cheaper to employ people. These types of jobs that have been growing rapidly in the UK, US and many parts of Europe, helped along by neoliberal employment policies that seek to deregulate the system. In England, for example, around 7.1 million employees now have jobs that are deemed precarious, work that could suddenly end without notice, a prevalent feature of part-time and on-demand roles in particular (Booth, 2016). In 2006 the figure stood at 5.3 million. Black, Asian and minority ethnic workers are disproportionately represented in this insecure workforce (Resolution Foundation, 2015). In the US, a burgeoning working poor and incredible gap between rich jobs and underpaid one's is similarly evident (US Bureau of Labor Statistics, 2016; Moody, 2016).

There's a sad irony in these figures. Techno-pessimists claim that inequality renders workers more vulnerable robotic automation. But a less obvious and arguably more depressing dynamic is probably transpiring. Firms are not only asking whether a job *can* be mechanized but if it is economically *worthwhile* given the cheap labour available. After all, the capital/maintenance costs of investing in AI equipment is considerable.

This brings us to the second driver of bounded automation. Robotic and digital mechanization is delimited by the *power relationships* that define any given organizational situation. This clearly links with the aforementioned influence of labor pricing because deunionization has been cited as a key cause of the rise of precarious work and wage stagnation (Kalleberg, 2011; Pew Research, 2016). These jobs are clearly not worth automating. But on the other side of the coin an obverse tendency emerges to illustrate the point. Consider workplaces that have remained highly unionized. Here employers are very keen on automation, especially if the union is (or threatens to be) militant. The ride-hailing firm, Uber, presents an

interesting example. No doubt the apps used entail the partial automation of this work, which reduces skill levels *vis-à-vis* traditional taxi drivers who undergo training. Moreover, drivers receive significantly lower wages due to their self-employed status (Hill, 2015). At this point they are cheaper to employ than robots. However, during 2016-2017 these workers rapidly unionized in the US and Europe, demanding full employment rights (including holiday pay and sick leave) and improved wages (Wong, 2016). A major class-action in California is pending as I write.

It is no coincidence that amid a driver-revolt, among numerous other scandals, Uber announced a serious investment in self-driving car technology (Morris, 2017).

Should Uber drivers be concerned? Perhaps. Industrial relations over the past fifty years is replete with cases of automation being *explicitly* used to neutralize or eliminate strike-prone workforces. A good example are dockworkers in major logistical ports. These employees were once renowned for their fierce and often violent militancy, closing down some ports for months on end (Silver, 2003). Automated docks are designed to do away with this menace, as Sydney's Port Botany, in Australia demonstrates (Maritime Union of Australia, 2014). In 1998 a major waterfront dispute escalated between the stevedore firm Patrick Corporation and the Maritime Union over an illegal restructuring of the workforce. At the time 70 per cent of Australia's imports and 78 per cent of exports travelled through facilities like this. The dispute was prolonged and acrimonious. At one point Patrick fired its entire staff, totalling thousands of employees. Eventually an agreement was reached.

Visit Patrick container terminal today and the first question is, where're all the workers? An official explains the haunting scene: "this is fully automated, there are no human beings, literally from the moment this truck driver stepped out of his cabin from then onwards this AutoStrad [robotic vehicle] will take it right through the quay line without any humans

interfacing at all" (Saulwick, 2015). What about the 1998 strikes and lockouts? That "battle was won" by the Patrick corporation and the AutoStrad (Saulwick, 2015).

The third feature of bounded automation relates to *the task* itself, especially if some sort of human component is indispensable, even in highly mechanized work. Many jobs cannot do without a human, even if an underpaid and oppressed one. Take the rise of call centres. They once epitomize occupational computerisation. It was even predicted back in the 1990s that call-centres could completely replace customer service providers of the all-too-human type. But it never happened. There are now one million people employed in call centres in the UK and 2.2 million in the US (Woodcock, 2016). The global workforce is huge (Parker, 2017). The reason why is simple. Customers cannot do without a living person on the other end of the phone when, for example, they suspect their bank account has been compromised by hackers. Needless to say, pay and conditions tend to be atrocious in this line of work (Biggs, 2015).

Another example of occupational computerization being constrained by the task related to commercial airline pilots. This job has been intensely computerized over the last twenty years. The use of fly-by-wire and flight management systems mean that pilots typically fly the plane during takeoff and landing only, about 5% of total flight time during a 2.5 hour, short-haul journey (Reiner, 2016; Scott, 2017). So, could this job be totally automated? Of course, according to Boeing's Chief Technology Officer. The equipment is ready: "we are quite confident that technologically, the toolkit is filled. With respect to a commercial airplane, there is no doubt in our minds that we can solve the problem of autonomous flight. It's a question of certification procedures, regulatory requirements …" But there just one catch for Boeing. A final obstacle stands in their way, namely, "public perception. Will the flying public be comfortable getting onto a commercial plane with no pilot?" (Reiner, 2016).

Workers of the World … Don't Relax

When occupational automation is approached as a socio-economic and organizationally bounded phenomenon, it becomes apparent that digitalization (or lack thereof) is not a straightforward matter. Environmental factors external to the actual smart-machine can have a significant bearing on its organizational feasibility.

The concept of bounded automation invites us to examine how the institution of work might actually be reinforced by technologies that we would otherwise expect to create joblessness. A classic case are secretarial jobs in the 1970s. Word processors like Delta Data, Toshiba JW-10 and Micom 2000 didn't instantly replace secretaries or typing-pools in large offices, despite their advanced cassette text-storage capabilities. Typing pools had been an integral feature of large offices since the 1920s. As text-storage devices were adopted in the early 1970s, IBM simply renamed typing-pools 'administrative support centres' whereby workers were sent script by 'word originators' or managers (Saval, 2014). No great change there. But the desirability of secretarial work suffered as task autonomy declined and the role was restructured around measurable performance indicators (e.g., keystroke speed, documents per hour, etc.). With the advent of word processors, PC's and then email in offices during the 1980s and 1990s, the typing pool predictably disappeared too …. or more precisely, was *diffused* throughout the broader employment environment. Now almost everyone in the office performs communicative tasks (e.g., email). Ironically, what first appeared to be a labour saving device thirty years ago has inadvertently fuelled a culture of overwork, as any employee permanently glued to their smartphone will sadly attest. And in some cases, computerization has merely shifted the work task from paid employees to (unpaid) consumers, as we note in the airline industry (Srnicek, 2016).

What about the wider structure of employment in post-industrial economies? How has bounded automation influenced the quality and distribution of jobs? To reiterate, we see little

evidence in the US, UK and Europe of the mass unemployment so vocally envisioned by techno-optimists and techno-pessimists. Having said that, neither is there much credibility to the once popular claim that technological progress will bring about a tremendous upward skills revolution, transforming us all into specialized knowledge workers (see Bell, 1973; Drucker, 1994; Autor, 2015; Davenport & Kirby, 2016). Rather, robotics and digitalization has intersected with extant organizational forces to encourage three distinct occupational patterns. What follows is not a numerically exact or exhaustive classification of job-types in Western economies but a general heuristic to help map how computerization has reinforced paid employment in specific ways.

First are highly skilled and remunerated elite workers. They will often possess technological expertise that seamlessly blends with managerial responsibilities, making their jobs difficult to completely computerize: senior directors in the financial service industry, entrepreneurs, medical experts and so-forth. They *oversee* and/or manage emergent robotic technologies. It's worth noting that included in this category are the 'new management elite' (Savage, 2015) in public and private sectors. They are able *shield* themselves from the threat of mechanization by forging strong alliances with stakeholders in the governmental and corporate power elite. Class background undoubtedly plays a major role when accessing these sheltered roles within the occupational hierarchy (Jones, 2014).

The second category concerns the vast number of *semi*-automated occupations. Here digitalization does not simply destroy jobs but considerably alters and/or restructures them. Regardless, some kind of human involvement is often still required. Moreover, this category of work has its own sub-hierarchy, with highly skilled, scarce and in-demand occupations at the top (e.g., airline pilots, civil engineers, doctors, etc.) and unskilled, low paid jobs at the bottom (e.g., call-centre workers, checkout assistants, etc.). Between the two poles is a long continuum, of course, where we find university lecturers, administrative employees, Uber

drivers, game designers and so-forth. Overall, skill scarcity (and demand) remains a decisive factor when determining where a job falls on this sub-hierarchy. This is why workers often attempt to manage or leverage the scarcity of their expertise, using employee associations and credentialism (e.g., Cisco, ITIL, etc.), for example, to restrict labour market entry.

For these workers, current innovations in digital automation will have a downward pressure on wages and conditions if a). the technology is employed to do as much of the job as possible b). the remaining human component is comparatively deskilled so that anyone can perform it and c). artificial scarcity (typically associated with labour unions, certification bodies, etc.) is removed from the marketplace. To reiterate, these are *socio-economic* and *organizational forces* rather than anything indigenous to the technology itself.

The third category of jobs are those that are *not worth* automating. As previously discussed, this will come down to the pricing of available labour, typically dictated by wider economic conditions, including state employment policy. Under these prevailing circumstances it makes little sense for businesses to totally automate bus drivers, waiters, and agricultural workers in the US and UK, for example. Moreover, this is where the 'new' international division of labor is important given how global deregulation since the late 1980s has directly (e.g., threats of capital flight) and indirectly (e.g., labour mobility) controlled the price of unskilled and semi-skilled labour in the US and UK most obviously.

Other than labour price, another reason why jobs may fall into this 'unworthy of automation' category (in the short-term, at least) is due to the industrial unrest it would incite if attempted. A case in point is the London underground train service (or 'Tube'). The National Union of Rail, Maritime and Transport (RMT) frequently call strikes, bringing the Tube to a painful standstill and chaos to a city of millions. Officials have long vowed to fully automate the system as a result, using Automatic Train Operation technology, for instance (Edwards, 2011; Tracey, 2015). But given the strength of the union and their indomitable bargaining

position, the turmoil that would certainly ensue logically outweighs the long-term benefits of such an initiative, for now at least.

Conclusion – Towards a Public Organization Studies?

I do not want to imply that machines will have no influence on work in the future. Indeed, the impact may be significant, including unemployment. However, the now prevalent forecast of mass joblessness is unlikely to be realized given how AI and digitalization are constrained by socio-economic and organizational forces that shape its implementation (namely, labor pricing, extant power relations and the job task in question). Furthermore, the concept of bounded automation allows us to understand why increasingly low skilled (be they unautomated or semi-automated) jobs are likely to flourish while so-called good ones become ever more difficult to acquire.

Viewing automation in the 'second machine age' as an organizationally delimited phenomenon allows us to shift attention away from technology *per se*. This is advantageous for a number of reasons. For instance, critics who look at only the technological drivers of diminishing job security, for example, are often dismissed as modern day Luddites, waging a futile struggle against the winds of progress. Whereas our argument mainly centres on the organizational forces that guide new techno-architectures and isn't calling for the outright rejection of robotics or AI. Far from it. Indeed, modern technology could easily be harnessed for emancipatory ends if placed in the right institutional context (e.g., see Gorz, 1999; Bellamy Foster, 2017). And when it comes to proposing solutions that may improve industrial democracy and employee well-being, we are able to avoid the tendency to fetishize smart machines or treat them in isolation, as most recently illustrated by the idea of a 'robot tax' proposed by Bill Gates and Elon Musk. Instead the discussion can concentrate on the socio-

economic and organizational dynamics that embed and guide computational intelligence, none of which are inevitable or predetermined.

Equipped with this perspective, three ways forward are evident when considering how to counter the negative effects of bounded automation in its present format. First, more needs to be done to cultivate and protect the skills of workers so that new technologies don't erode their bargaining power but enhance it. Second, the individualization of workers – via temporary contracts, self-employment and Uberization more generally – has seriously undermined the collective power of employees, rendering them more vulnerable to the regressive application of robotics. Workers councils and participatory budgeting, for example, would be a useful corrective here, partially democratizing robotics in the employment sphere AI. And third, decentring the institution of work more generally is essential. This would make people less reliant on jobs and the fortunes of a capricious labor market, especially in relation to computerization. In this respect, a good deal of debate has taken place concerning the viability of a three-day working week, Universal Basic Income and related initiatives (e.g., see Bregman, 2017; Standing, 2017).

Beyond the topic of automation, the preceding discussion demonstrates how organization studies can contribute to broader debates concerning pressing public problems. We might term this a *public organization studies*, taking our cue from sociologist Michael Burawoy and his call for a public sociology (also see Fleming & Banerjee, 2016). He identifies different variants of the discipline. *Traditional sociology*, for example, settles into a specialist language-game that outsiders find impenetrable, typically in the name of statistical reliability and scientific objectivity. Sociology becomes inward looking and professional careerism defines the topics to be studied. *Policy sociology* is markedly much more practical, but usually at the behest of paying clients who are pursuing a vested interest. Burawoy advocates a *public sociology* instead, one that places ethical questions affecting a wide spectrum of affected

stakeholders at the center of scholarship, compelling researchers to participate in debates and thus "… striking up a dialogic relation between sociologist and public" (Burawoy, 2005: 9).

Similarly, a public organization studies would seek to engage with germane public controversies not because it represents a good career move. Nor because a powerful funding agency is paying for the results. And a more public facing organization studies is certainly not a synonym for the near obsession with business 'impact' case studies in UK universities, as defined by the government's Research Excellence Framework and its faceless army of REFocrats. Rather, it implies a concertive attempt by researchers to engage with matters of community concern, triggered by ethical disquiet rather than instrumental incentives.[4] However difficult that aim may be to achieve (and perhaps increasingly so in this post-truth era where expertise is dogmatically rejected), a public organization studies opens itself to civic dialogue in order to echo voices that are too frequently marginalized in the governing narratives about work, gender, race and so on.

I would be naive to believe that this paper will magically influence the debate on robotic automation and jobs, of course. It probably won't. But the chances of such a thing happening dramatically increases if the field as a whole begins to speak out about the pressing ethical topics confronting organizations and society today. My emphasis has been on robotics and the steady deterioration of work. But a raft of other issues can be explored in this vein too, including wealth inequality, corporate tax evasion, racial discrimination, the Anthropocene and the awful sexual harassment revelations of the "#Me Too" movement. Some readers may have reservations about the idea of a public organization studies. Doesn't it risk politicizing the academy, making it overly partisan? This misgiving goes back to Max Weber (1946) and his separation of facts and values in scholarly inquiry. My response would be this. The university and academia is already political, not only in the themes it chooses to study (and the implicit assumptions about society therein), but the myriad of events and trends that are systematically

left *unexamined*. Many of which are unfolding before our very eyes and affect millions of people, including ourselves. If a public organization studies were to adopt a slogan, therefore, it might be something like this: The challenge is not simply to speak out … but to speak out about the *right* things. One might add, the likelihood of a robot doing this in the foreseeable future looks fairly slim.

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Notes

[1] In the techno-optimist stream of thought, Pistono's *Robots Will Steal Your Job But That's OK* (2012) stands out (also see Avent, 2016; Bastani, 2014; Bregman, 2016; Graeber, 2015; Mason, 2015; Dunlop, 2016; Srnicek & Williams, 2015; Frase, 2016). In the techno-pessimist camp, Kaplan's *Human's Need Not Apply* (2015) and Ford's *The Rise of the Robots* (2016) are salient (also see Armstrong, 2014; Leonhard, 2016).

[2] At the time of writing, unemployment stands at 4.9% in the US and 4.7% in the UK. In Germany and Australia, it is 4% and 5.9% respectively. Remember also that in the US during the Great Depression the figure hovered around 25% and was 10.9% in the early 1980s.

[3] Other terms used to describe the same technological shift include the *fourth industrial revolution* (used by the World Economic Forum), the *fifth wave of technologies* (used in the European innovation studies) among others.
[4] Sociologist Bruno Latour (2004) makes a similar call for social science to move from 'matters of fact' to 'matters of concern'.