OPEN ACCESS

University of BRISTOL

Marston, G., & Zhang, J. (2019). *AI, Automation, and New Socioeconomic Inequalities*. (The Effective and Ethical Development of Artificial Intelligence: An Opportunity to Improve Our Wellbeing). Australian Council of Learned Academies.

Peer reviewed version

Link to publication record on the Bristol Research Portal
PDF-document

This is the author accepted manuscript (AAM). The final published version (version of record) is available online via Australian Council of Learned Academies at https://acola.org/hs4-artificial-intelligence-australia/. Please refer to any applicable terms of use of the publisher.

University of Bristol – Bristol Research Portal
General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:
http://www.bristol.ac.uk/red/research-policy/pure/user-guides/brp-terms/

AI, Automation, and New Socio-economic Inequalities? A Brief Overview

Greg Marston and Juan Zhang
School of Social Science, The University of Queensland
Correspondence g.marston@uq.edu.au

Introduction

Australia, similar to other advanced economies, has experienced rapid socio-technical change in recent years. There is a great deal of conjecture around this change and its impact on work and wellbeing. Issues related to the scope of technological unemployment, skills and retraining, and future demand for education and professionalization are hotly debated in the public realm. A key social justice question that emerges in the debate is whether or not the unprecedented pace of socio-technical changes associated with new forms of automation will lead to greater social or economic equality. While many commentators are optimistic that Artificial Intelligence (AI) and automation may create more leisure time, better quality work and more enriching lives, other caution that these technological advances may lead to a pooling of economic risk at the bottom of the income scale, with race, age, class and gender differences compounding employment precarity and existing patterns of disadvantage. The following discussion canvasses some of these risks and opportunities in regard to employment, public administration and representation.

Employment

In discussions about the economic and social effects of AI on economies and societies the impact on paid employment is perhaps the most discussed and the most contentious. In part, this interest reflects the central role that employment has historically played in Australia in regard to redistributing income, dignity and social connection. Jobs matter because they are more than a source of income, they provide valued forms of social identity and the skills built into jobs are of the drivers of increased productivity. At the same time not all work gets recognised and counted. Unremunerated work, particularly informal care work and domestic labour that continues to be performed predominantly by women, receives much less status, rewards and recognition. Whether AI and new forms of automation will redress or exacerbate these kinds of status distinctions and material inequalities remains to be seen. Much will depend on how other social institutions, such as the family, education and leisure are collectively reshaped and reformed.

It is also the case that a narrow conception of what counts as work is perpetuated by the social security system. Many of the social security settings in Australia rely on the assumption that unemployment is temporary and that workforce participation is the ultimate goal of social security, reflected in the political mantra that 'the best form of welfare is work'. This goal remains firmly fixed in the political discourse, despite the fact that paid work is becoming a less reliable form of income, belonging and dignity. While it has always been the case that Australia's labour market has been discriminatory, particularly for older and younger workers, women in low-skilled occupations and Indigenous Australians (Bell and Quiggin, 2014) there is growing evidence that decent work is becoming harder to find (The Australia Institute, 2018). It is in this broader context of a patchy and uneven labour market that we need to assess the impact of AI and automation.

Research findings from Australia and overseas claim that with advanced AI and robotics, the level of job vulnerability will likely increase (Council for Economic Development in Australia 2015, Frey and Osborne 2017, World Economic Forum 2016). Both skilled professionals and unskilled workers are likely to be affected, when paid employment opportunities are diminished due to the growing presence of "smart machines" (Head 2014), anthropomorphic robots (Suchman 2011), and advanced AI systems (Russell, Dewey and Tegmark 2015). A report by the World Economic Forum (2016)

predicted that nearly 7.1 million jobs might be lost with these new technological-social transformations, and only 2 million new jobs would be created due to robotics. Developing economies will not be immune either, as automation takes over more of manufacturing in high income countries, there will be less demand for such work in emerging markets. Such drastic changes and pessimistic predictions of the future often lead to a general concern of mass unemployment, further de-humanization of work, and increased social and economic inequalities across multiple dimensions (e.g. Ford 2013, Head 2014, Loi 2015).

These concerns are not unfounded, as past experiences have shown the disruptive force of technological and organizational innovations on the social and economic order (Schumpeter 1975). Keynes' original thesis of "technological unemployment" (1972) was proposed in the 1930s in the wake of the Great Depression when he saw that economic problems could be resolved by techno-scientific development and capital growth. Calling it a "new disease", Keynes was convinced that the "discovery of means of economizing the use of labor" would outrun "the pace at which we can find new uses for labor" (Keynes 1972:325). As a result, massive and fast shifts in the workforce would ensue, and unemployment would become a main social issue although it may be "only a temporary phase of maladjustment" (Keynes 1972:325). In the period following World War II Keynes's forecast were accurate, with unprecedented economic growth and new jobs in the services sector compensating for job losses associated with technology driven productivity gains in other industries. This paradigm started to be shaken in the 1970s when unemployment and inflation started to rise as a consequence of the OPEC oil crisis. More recently, the assumption that economic growth is a sign of a well-functioning economy has been challenged on ecological grounds, given the effects of unsustainable production and consumption patterns on the natural environment.

Others remain less convinced that there will be widespread technological unemployment as a result of a new wave of automation. The US economist David Autor (2015) has argued, for example, that throughout history concerns over automation and joblessness had always been there, causing periodic panic and public anxiety in the form of the 'luddite fallacy'. Technological advances in the past had been associated with periods of economic depression and unemployment, when businesses and investors hoped to save labor costs and enhance productivity by automated machinery. Autor's research (2014) shows that from 1900 to 2000, the US workforce employed in agriculture had fallen from 41 per cent to just 2 per cent, due largely to the use of machines. However, employment in the service sector started to expand during the same period, producing a range of new jobs and occupations. In countries like the US and Australia the service sector, which includes banking, finance, tourism, hospitality, healthcare and social services, has become the largest section of the labour market. Technological changes enabling new ways to deliver services and rising household incomes has driven much of this expansion. Optimists believe that the service sector will continue to play an important role and have the capacity to absorb displaced workers in the new machine age as new jobs are created, particularly in areas requiring high level people skills.

In the discussions about skills it is important to distinguish between jobs and tasks, as some tasks might be automated, a job can be refined to expand the human specific aspects of the work. In many studies of workforce impacts of AI, what determines vulnerability is whether a task is routine, which is why some studies predict lower skilled jobs will be most impacted first, but as machines get better at emulating cognition middle income jobs and professions will also be affected. There has been an assumption in the literature that high-skilled workers in specialized professions and management will be the least affected. If this is the case then the result will be rising income inequality (Choi, 2017). However, others insist that knowledge based workers, particularly in sectors like finance and banking, are also highly vulnerable with job cuts and restructuring already underway as a result of AI integration (such as the National Australia Bank case where 6000 employees were let go as a result of software technologies replacing jobs) (Ziffer, 2018). Helping displaced workers to acquire new

skills is therefore crucial, but it is only one of the strategies that will need to be pursued in response to workforce changes. Brynjolfsson and McAfee in their widely influential book *The Second Machine Age* (2014:11) make the case that technological progress "is going to leave behind some people, perhaps even a lot of people, as it races ahead". Workers with special skills and right education may be desirable in the labor market; but there has "never been a worse time to be a worker with only 'ordinary' skills and abilities to offer" (Brynjolfsson and McAfee 2014:11).

Researchers have identified three main risks of integrating new technologies such as AI and robotics into economic and social systems. The first risk is a growing divide between individuals who are able to adapt to new techno-social transformations, and those who might be "left behind". The emergence of the "cybertariat" (Huws 2014) or a new "digital underclass" (Helsper and Reisdorf 2016) cast shadows on future society when exploitation, class disparities, and social exclusion manifest in new forms. Loi (2015) in particular cautions that the growing substitution of human work with computer-driven automation may lead to "technological unemployment" on a large scale, which will eventually lead to "human disenhancement". Automation and digitization have already caused deskilling and the "worsening of human individual abilities and expectations" in some cases (Loi 2015:201). In his book *Homo Deus*, Yuval Noah Harari (2017) conceptualized the future social relations in terms of two divergent classes – the "gods" and the "useless". With automation and advanced AI, a minority of economic elites will thrive and become "gods" in a society of affluence, and the vast majority of humans in both the developing and developed worlds will become "useless" in economic terms. The "god" class, or *homo deus*, have access to resources, information, and platforms for machine-human integration. In contrast, the "useless" class whose labor can be effectively replaced by automated robots owned by *homo deus*, will become dispensable human beings or regarded as "burdens" to society in this dystopic future.

The second risk is the narrowing concentration of specific qualifications and skillsets that are deemed "secure" in the labour market. In the past, there might be a wide range of jobs available for individuals with diverse educational and industrial backgrounds and experiences. Now, the range of work might become narrower as technological advances bring about the "creative destruction" (Schumpeter 1975) that reshapes the ways in which humans labor. The polarization of the labor market thus takes place when wage gains go to those on top disproportionately. But evidence also suggests that apart from routine manual tasks, routine mental tasks (e.g. jobs in the service sector) will similarly be replaced by robotics and AI systems that can perform these tasks more effectively and efficiently (Makridakis 2017). Currently, intelligent, creative, and emotional skills are still considered non-replaceable by machines, and therefore still "secure" in the wake of the digital revolution. Non-routine, uniquely human skills that focus on care, creativity, and human consciousness will be critical. By combining technical and interpersonal tasks in their work, these individuals may become the "new artisans" (Katz and Margo 2014) of the new age. Future workers who are able to use these skills and deliver specialized services based on these skills will likely to remain competitive in the job market; others will lose out.

Last but not least, there is the increasing risk of "robotization" of standardized workers and workplaces. The de-humanization of work has profound ethical and existential implications on the meanings and identities of labor. Saner notes that in today's business environment, the most productive establishments "feature employees who behave like mobile animatronics that speak pre-recorded sentences", and in such places "creativity and personal judgement are not forbidden, but they are not encouraged" (Saner 2015). And with ongoing automation, digitization and computer support, human actions are restricted to a small range of possibilities recognizable to the human-machine interface. It is ironic to note that while machines are designed to be more "human like", workers facing greater labor market competitions are driven to deliver "ever greater consistencies. They become, in a manner of speaking, 'robotized'"(Saner 2015). Valuable "human qualities" such as

creativity, care, touch and communication are increasingly suppressed in standardized workplaces with a strong emphasis on measurable performance and behavioral accountability. In sum, a major risk associated with the impeding technological revolution is the risk of polarisation between highly-skilled 'future-proof' working elite and a substantial group of workers with obsolete skills who will be at risk of being entirely excluded from the future labour market.

There is a wealth of research demonstrating that young people from low socio-economic backgrounds, as well as those from rural and remote areas are more likely to choose vocational courses rather than university education, and are more likely to end up performing routine low-skill jobs (Tomaszewski, Perales and Xiang, 2017). Even if enrolled in university, students from disadvantaged backgrounds are less likely to study STEM subjects, as are women. For women, this inequity in access to certain fields of study has been formally recognised through identifying Women in Non-Traditional Areas (WINTA) as one of the designated Equity Groups in Higher Education. It is important that the Government continues to invest in providing equitable access to quality education to avoid the marginalisation of people from disadvantaged backgrounds in future labour markets.

Schools, the VET sector and universities will all need to go much further than credentialing individuals for employment. Negotiation skills, creativity, critical thinking are the sorts of human attributes that are resistant to automation and these sets of skills, knowledge and values will need to be cultivated. The 'university of the future' may therefore be a place where public ethics and the humanities are promoted in the interest of strengthening democracy, ethical AI and new forms of governance that will be necessary to manage the impacts of automation on society, the economy and culture. Implications for how to teach and train the professions, such as engineering, law and health will also need to be considered given the way automation is already impacting on these fields. In many of these professions it may a case of humans working with smart machines, rather than being replaced by machines, as routine tasks are automated leaving the professionals to undertake more complex tasks.

In the broader context it is important to note that predictions about technological unemployment are constantly being revised as new information comes to light about how work is being transformed. The landmark Frey and Osborne (2014) study, for example, into occupations that would be disrupted by automation forecast that nearly 50% of jobs in the US would be threatened by automation over the next 20 years; their more recent estimation in a 2017 report is a more conservative 20% of jobs in the US being in the most vulnerable category. The report also concludes that creativity, complex problem solving, interpersonal skills and the ability to access education and training for lifelong learning will all be essential to future workforce success. If governments and educators are slow to respond to these changing skill demands then the risk of negative impacts and rising inequality will increase.

In addition to the labour market risks identified there are also unprecedented opportunities to reduce economic and social inequality through the reimagining of the future of work. Tim Dunlop (2016) maintains that position in his book *Why the Future is Workless* that paid work is becoming a far less reliable and useful method for distributing wealth and that struggle is only going to become more acute as the technology improves; it is therefore important to rethink the relation between technology, work and how humans should live their lives. Spencer (2018:9) argues that automation and AI technologies "ought to be a means to reduce work in society – in particular, it should be harnessed in ways that allow for work time to be reduced and for work to be more evenly distributed across the population". In this respect, he claims, "it would help to overcome the present anomaly of overwork for some, underemployment and unemployment for others". Instead of focusing on "saving" current work and workplaces, AI and automation afford new possibilities to extend creative activities in work where individuals take actual ownership. In this regard, "less work"

and “better work” can become a reality with a “repurposing” of technology that is not for profit generation but for the interests of the workers (Srnicek and Williams 2016). In Spencer’s words:

> An essential point to make is that technology is not some neutral force operating in a remorseless and inexorable fashion. Rather, it is shaped by the politics of production and the forms it takes – and its capacity to improve the lives of people within and without work – depends on the ownership relations in which it is located. Under capitalism, the unequal ownership of production hems in technology and limits its use both for reducing work time and for elevating the quality of work. It can be argued in this case that if society is to harness technology for the benefit of less and better work, it must embrace democracy at work and extend to workers ownership rights over production. (Spencer 2018:10)

Autor (2015) makes a convincing point that if machines were to make human labor superfluous, the fundamental issue to face should not be that of scarcity, but one of distribution. The challenge is not just about creating wealth and enhancing productivity, but about who owns the wealth and on what basis it should be shared. These are ethical and moral questions. In Australia, it has been estimated that automation could add $2.2 trillion to Australia’s annual income by 2030 (Guzman and Bailey, 2017). However, if current trends continue the majority of these gains will not be returned to workers in the form of increased wages and conditions. A recent International Monetary Fund (2018: 1) report recently puts it rather bluntly: “automation is good for growth and bad for equality, real wages fall in the short run and eventually rise, but eventually can easily take generations”.

Income and wealth are not the only focus for redistribution. Time itself could become a resource that is less commodified in the future as people have more opportunities for exercising ‘temporal autonomy’, or discretionary time (Goodin et al, 2008). Of course, if citizens are to enjoy increased leisure time, they will still need to earn a decent wage, or a decent income that may need to be decoupled from labour. It is for this reason that a range of advocates from the technology sector, think tanks and academic researchers are examining the merits of a universal basic income (UBI) as one means to provide economic security at a time of economic uncertainty, and as a way of providing an economic floor as workers experiment with new forms of income generation in the so-called ‘gig-economy’ (Mays, Marston and Tomlinson, 2016). At its simplest a UBI is an unconditional regular payment (fortnightly or monthly) that is paid to individuals within a household. There a range of proposals for a UBI in Australia, some emphasising the unconditional and others the universal.

The prominent Australian economist John Quiggin’s (2017) is an advocate for UBI, but he prefers a stepping stone approach in implementing a UBI in Australia to favour the “basic” over the “universal”. That is, through various mechanisms and adjustments to tax regimes, to introduce a full UBI payment to selected, vulnerable populations, and then gradually increase the number of people covered until it achieved full universality. He estimated the cost of everyone in Australia receiving a full basic income to be around 5-10% of GDP. Similarly, Henderson and Spies-Butcher offered modelling that began by universalising the age pension, and by also introducing an “unconditional Youth Basic Income paid to those aged 20-24 based on a negative income tax model.” They argued “the cost of a BI might be managed through integration with the tax system ... by reconceiving part of marginal taxation as a ‘claw back’ of the payment itself.” This, they suggested, would result in a much cheaper model of UBI.

While there is no political or policy consensus on the merits of a UBI it is clear is that the policy proposal is receiving a lot of attention in the context of automation and AI discussions in Australia and overseas. Perhaps the growing interest in basic income reflects a recognition that current economic and social policies are producing unsustainable inequalities, as well as incalculable environmental harms. One outcome according to writers like Standing (2011), is that there is a

growing precariat, consisting of millions of people facing unstable insecure labour, a lack of occupational identity, declining and volatile real wages, loss of benefits and chronic indebtedness. The shares of national income going to capital and labour used to be roughly stable. That old consensus is disappearing.

Calls for a universal basic income and a shorter working are often put forward as a package of reforms that can redistribute the rewards of paid work more fairly and provide an economic floor, much like a social insurance policy that is independent of one's employment situation. There are a range of industries and countries experimenting with reduced hours without reduced pay and these experiments will need to be watched carefully. Given that part-time and low-paid workers are predominantly female a reduced working week with a decent salary could enable a more equal distribution of wage work argues Jill Rubery (2018). Rather than revert to the norm of men earning a family wage while women care for family members, more free time for both women and men could create the conditions necessary for a more equal sharing of care. Coupled with this reform will need to be a revaluing of care in terms of remuneration (Rubery, 2018).

There will also need to be changes at the level of the workplace if inequality is to be addressed. First, the current workplace structure would needs to be reformulated to "make room for democratic decision-making". Second, information and the kind of technological developments need to be made open and accessible to all, not in the hands of those who have control of resources and capital. And finally, we need to envision a society with "less work" in which "familial, community, and creative development can flourish and replace our current society's incessant production and overwork" (Stubbs 2017:709). Instead of passive recipients of technology, workers and citizens should be able to make real choices and decisions on the value of technology which impacts their lives.

In constructing a fairer future special attention will need to be given to a new politics of time, one in which discretionary time or temporal justice are properly valued in terms of their impact on human and societal wellbeing. Social Policy scholars and policy makers will need to think about other ways in which wealth, rights and belonging could be sustained in a world where there may be less paid work. Significant attention will need to be given to tax reform in order to capture new flows of capital and ensure that communities and companies are able to reap the rewards of productivity gains. The public policy agenda will need to be comprehensive to deal with the significant changes taking place in the Australian labour market now and into the future.

Public administration and representation

Public policy and administration has been slow to respond to the new risks and opportunities associated with AI and automation. The rise of the platform economy in areas such as housing and transport has had a range of unintended consequences, in some cases decreasing the supply of affordable rental housing in capital cities in the case of AirBnB, or radically devaluing a taxi license in the case of Uber. In many instances, it has been left up to residents and ordinary citizens to resist and argue for better regulation of these platforms and their displacement effects. AI and automation is also changing decision making within governments, as the quest for efficiency legitimates the use of wide scale data-driven administration. These changes raise a number of ethical and human rights issues that deserve careful attention. It is interesting to note that in 2018 the Australian Human Rights Commission has launched a major three year project examining AI and human rights, which will focus on a range of issues, including privacy, digital inclusion and procedural fairness.

Fairness and non-discrimination are central human right concerns when it comes to AI informed decision making within governments and corporations, as the Human Rights and Technology Issues Paper (2018: 28) makes clear:

> When considering bias, it is not only the operation of the algorithm that needs to be considered. Rather, choices made at every stage of development – for example, by software developers in designing and modelling their technology – will be embedded in any AI-informed decision making system. Without humans to detect or correct these problems in autonomous systems, the impacts may go unnoticed and unaddressed, and result in harm. This can entrench social injustice in AI-informed decision making systems. This injustice can reflect unintended or unconscious bias derived from the actions or values of people creating the technology, and in the limitations of the data used to train it.

Algorithms are only as good as the assumptions built into them. In recent years, the "big data" hype has attracted global attention when large datasets seem to offer new insights on patterns and trends that were previously intractable. But the hype becomes problematic when "data fundamentalism" and predictive data analysis come to be interpreted as objective truth (Crawford, 2013). Across government and non-government agencies, large, multiple databases are matched and mined to produce new understanding of service users and activities (Gillingham & Graham, 2016, p. 135). If used appropriately, the new technologies using big data could unlock limitless potentials (e.g. UN's Global Pulse initiative). But such potentials should not hide the fact that big data has significant methodological and ethical limitations, social and political implications, and epistemological challenges (Crawford, Miltner, & Gray, 2014). Big data reflects the widespread belief that "large datasets offer a higher form of intelligence and knowledge that can generate insights that were previously impossible, with the aura of truth, objectivity and accuracy" (Boyd & Crawford, 2012, p. 663).

The 'robo-debt' case study highlights the risks associated with data-driven decision making. From July 2016, tens of thousands of Australians received automated debt letters from Centrelink demanding them to explain or to pay back welfare overpayment. Officially called the Online Compliance Intervention, but now widely known as 'robo-debt', Centrelink's debt recovery programs caused tremendous public controversy. Centrelink had always used data-matching programs to collect data from other government agencies such as the Australia Taxation Office (ATO) to test and compare if individuals have reported their income accurately, which is then used as a basis to calculate the benefits one is entitled to. In the past, a Centrelink officer would perform a basic investigation before sending out a debt notice. Since July 2016, the computer system printed out such notices and sent them out automatically. This new online system is reportedly raising $4.5 million in debt to the government every day, and issues 20,000 compliance interventions a week (Tudge, 2016). From the government's point of view, the use of new technologies greatly improved the debt collection process. Prior to this online compliance system, previous debt recovery approaches only helped generate $295,000 per day, only 6% of what the system is able to achieve now (Tudge, 2016). Human Services Minister Alan Tudge in praising this new system also said that Australians should pay back debts or face prison time – "We will find you, we will track you down and you will have to repay those debts and you may end up in prison" (Mcllroy, 2016).

As the Centrelink's robo-debt controversy unfolded, highly problematic issues were revealed with regard to the inaccuracy of the algorithms used in the system, the debt collection approaches, and the painstaking appeal processes. When first rolled out it was reported that between July and December 2016, of all the 217,000 notices were automatically issued, more than 36,000 notices did not result in any debt to Centrelink. The errors occurred when the algorithms used in the automated system failed to take into account short periods of unemployment or illness, and irregular periods of work when individuals received Centrelink payments. The system used ATO's annual income data and averaged it out over 26 fortnights. For individuals who moved in and out of employment, who earned more income in some weeks than others, and whose employers might have provided inaccurate dates and details, the system's averaging calculations created a false impression that the individual was earning undeclared income while receiving welfare payments. Moreover, employer

matching carried out between Centrelink and ATO was not based on the business's ABN but its name. So slight name changes to the same business name, or even a typo, may be interpreted by the automatic system as two or more different businesses (Pett & Cosier, 2017), leading the system to conclude that the individual was hiding employment information to Centrelink. Moreover, there is statute of limitation of how far back Centrelink could dig back to uncover "debts". The alleged "debt" could go back to 2010, and Centrelink clients were asked to provide supporting documentations as evidence of their past employment record. For many individuals, it was impossible to produce financial paperwork dated several years, as many would have moved houses or changed jobs.

When the robo-debt controversy first unfolded it was reported that over 6,600 welfare recipients first learned about their alleged debt not from a government office but from private debt collectors (The Sydney Morning Herald, 2017). Between July 2016 and March 2017, over 56,000 debts were collected by two private companies Probe Group and Dun & Bradstreet, which were contracted to pursue 43% or the debts raised by the robo-debt system (Knaus, 2017). These private debt collectors have been accused of intimidation, harassment, and threats (Knaus, 2017). The South Australian Council of Social Service issued a document detailing the flaws of the robo-debt system, calling it wrong and should be stopped (SACOSS, 2017). The chief executive of the Australian Council of Social Services Cassandra Goldie also criticised the "lack of humanity" of the Department of Human Services, and said that the program must be shut down (Knaus, 2017). The Commonwealth Ombudsman launched an investigation in January 2017 and issued a report on the program's multiple failures (Davidson, 2017). Wilcock argues that the assumption of science-based neutrality masks the moral judgements involved in the process of social security data mining (Wilcock, 2016, p. 122). The process of data mining may "simply reproduce entrenched class and gender inequalities buried in the data, re-articulating them within the neutral and scientific language of computational risk (Wilcock, 2016, p. 123)." What the database creates is a "database identity" that gradually replaces individual social identity based on a "highly caricatured yet immediately available form" (Aas, 2004, p. 379). The computer constructed "database identity" is not marked by the individual's "unique biography. As Aas has argued:

> "Categorizing human identity into axis grids and risk instruments is an act of deconstruction of subjectivity. It is an act of taking unique, whole individuals apart, and then putting them together according to requirements of the system (Aas, 2004, p. 386)."

A range of critics and scholars have warned that the model of "data-driven welfare" is likely to abuse and brutalise the needy rather than helping them (McClure et al., 2015, p. 128). The people who rely on Centrelink decisions are not the only victims of 'weapons of maths destruction' in Cathy O Neill's terms, workers who don't fit the model of 'ideal health', or fail the admission algorithms for higher education are also falling foul of these efficiency tools:.

> Our society is struggling with a new industrial revolution, and we can draw some lessons from the last one. The turn of the 20th Century was a time of great progress. People could light their houses with electricity and heat them with coal. Modern railroads brought in food from a continent away. For many the good life was getting better. Yet this progress had a gruesome side. It was powered by exploited workers, many of them children. And in the absence of health regulations coal mines were death traps. Monopolists dominated the railroads and energy companies jacked up prices. Clearly, the market could not control its excesses. So government stepped in, creating safety protocols inspections for food and unions were formed and we moved towards 8 hour working days. No doubt these measures

> raised the costs of doing business, but none of us would want to return to a time before they existed (O'Neil, 204).

Overall, what the case study of 'robo-debt' highlights is how quickly good intentions can be turned to poor policy practice. What was initially designed to identify underpayments for social security recipients quickly became a punitive and indifferent administrative system through rushed policy implementation and the predictable politics of 'poor bashing' (Swanson, 2001). Centrelink's turn towards computerised automated systems also illustrates a larger trend in policy making that no longer pays attention to narratives but focuses instead on databases (Aas, 2004). Based on formatted communication, and even automated communication, welfare governance has come to rely more heavily on databases to provide the "scientific" foundation for decision-making, rather than on the expertise and experience of individuals. Prior to 2016, Centrelink officers carried out compliance procedures by performing basic investigations first and by taking into consideration the narratives of clients before sending out debt notices. It took a combination of humans and machines working together to ensure a degree of procedural fairness.

One lesson here is that there is a great deal these new technologies can accomplish, but we need to be mindful of their limitations. The first step is to keep a balanced perspective on techno-utopia. Before asking algorithms to make better decisions, we need to admit they can't do everything (O'Neill, 2015: 208). These tools attempt to hammer complexity into simplicity and in the process they can do harm and reinforce prejudice and a range of inequalities. Part of the process of ensuring greater procedural fairness and digital inclusion will be to look at strategies to increase representation of women and other groups in the community in the development of AI technologies, as well as increasing the range of disciplines that contribute and assess the value and potential impact of the software and algorithm. These steps will help ensure that products being created will meet more diverse needs. Just as gender segregation needs to be challenged at work, there will also need to be a radical reorientation of STEM occupations, given the growing demand for technical knowledge and skills (Ruberry, 2018). Similar to the UK, women make up only 16% of Australia's STEM fields (Office of Chief Scientist, 2016). Various government initiatives have failed to make the STEM industry more gender equal, which may be because they are based the assumption that increasing female participation will miraculously transform the industry without an approach that seeks to tackle workplace discrimination. Accessible design of new technology is also critically important, particularly for people with disabilities (Human Rights Commission, 2018).

Conclusion

Perhaps the most important point in any discussion about AI and economic and social inequalities is representation and agency. What matters most is thinking deeply about what we want individually and how we can it happen collectively. As the power of our technology grows so do our future possibilities. This potential increases the importance of having clarity in our goals, about the good life and the good society. Machines are not very good at this large scale planning and creativity, but humans are, as Schwab (2015:174) argues in his account of how we need to shape a preferable, rather than a predictable future:

> Neither technology nor the disruption that comes with it is an exogenous force over which humans have not control. All of us are responsible for guiding its evolution, in the decisions we make on a daily basis as citizens, consumers and investors. We should grasp the opportunity we have to shape the Fourth Industrial Revolution and direct it towards a future that reflects our common objectives and values.

Although much of the discussion on automation focuses on dystopian outcomes, this is far from certain. Debating the future of work can actually provide us an opportunity to map out a more equal

society (Ruberry, 2018), one that has a more inclusive definition of work, worth and dignity, a society that values relational and not just productive labour. To critique how paid work is currently organised and its benefits distributed is not to deny that work has any value, it is as Kathi Weeks (2011: 147) states:

- to suggest that there might be a variety of ways to experience the pleasure that we may now find in work, as well as other pleasures that we may wish to discover, cultivate and enjoy.

To paraphrase David Frayne (2015), it is a profoundly diminished society that cannot envisage a future where a sense of solidarity and purpose can be achieved through anything other than a commodity relation. It is a time for thinking strategically about the forces of disruption and for revaluing and reshaping what makes a meaningful life. In this project of realignment we may need a good education to take advantage of our leisured lives, even more than we education to survive our working lives (Chase, 2016). Addressing the risks and embracing the opportunities presented by AI and automation will require public debate and political leadership. Instead of asking the question, 'what will technology do to us' we should start with the question 'what do we want to with technology'? These questions are not new. The 20th Century philosopher Bertrand Russell provided a similar provocation to policy makers in the 1930s in his remarks in his essay *In Praise of Idleness*:

> Modern methods of production have given us the possibility of ease and security for all; we have chosen instead to have overwork for some and starvation for others. We have continued to be as energetic as we were before there were machines. In this we have been foolish, but there is no reason to go on being foolish for ever (Russell, 1932: 4).

References

Aas, K. F. (2004). From narrative to database: Technological change and penal culture. *Punishment and Society, 6*(4), 379-393.

Autor, David. 2014. "Skills, Education and the Rise of Earnings Inequality among the "Other 99 Percent"." *Science* 344:843-51.

Australian Human Rights Commission (2018) Human Rights and Technology Issues paper [available online] https://www.humanrights.gov.au/our-work/rights-and-freedoms/publications/human-rights-and-technology-issues-paper-2018

Autor, David H. 2015. "Why Are There Still So Many Jobs? The History and Future of Workplace Automation." *Journal of Economic Perspectives* 29(3):3-30.

Berg, A. Budffie, E. and Zanna, L. (2018) IMF Working Paper: Should We Fear The Robot Revolution (The Correct Answer is Yes): [available online] http://www.imf.org/en/Publications/WP/Issues/2018/05/21/Should-We-Fear-the-Robot-Revolution-The-Correct-Answer-is-Yes-44923

Boyd, D., & Crawford, K. (2012). Critical questions for big data. *Information, Communication & Society, 15*(5), 662-679.

Brynjolfsson, Erik and Andrew McAfee. 2014. *The Second Machine Age*. New York: W.W.Norton.

Council for Economic Development in Australia. 2015. *Australia's Future Workforce*. Melbourne: CEDA.

Chase, C. (2016) The Economic Singularity: Artificial Intelligence and the Death of Capitalism. London. Three C Publishing.

Crawford, K. (2013). The hidden biases in big data. *Harvard Business Review*. Retrieved from doi:https://hbr.org/2013/04/the-hidden-biases-in-big-data

Crawford, K., Miltner, K., & Gray, M. L. (2014). Critiquing big data: Politics, Ethics, Epistemology. *International Journal of Communication, 8*, 1663-1672.

Davidson, H. (2017). Centrelink debt scandal: report reveals multiple failures in welfare system. *The Guardian*. Retrieved from doi:https://www.theguardian.com/australia-news/2017/apr/10/centrelink-debt-scandal-report-reveals-multiple-failures-in-welfare-system

Dunlop, Tim. 2016. *Why the Future Is Workless*. Sydney: NewSouth.

Ford, Martin. 2013. "Could Artificial Intelligence Create an Unemployment Crisis?". *Communications of the ACM* 56(7):37-39.

Frayne, David. 2015. *The Refusal of Work: The Theory and Practice of Resistance to Work*. London: Zed Books.

Frey, Carl Benedikt and Michael Osborne. 2017. "The Future of Employment: How Susceptible Are Jobs to Computerisation?". *Technological Forecasting and Social Change* 114(C):254-80.

Harari, Yuval Noah. 2017. *Homo Deus: A Brief History of Tomorrow*. New York: HarperCollins.

Head, Simon. 2014. *Mindless: Why Smarter Machines Are Making Dumber Humans*. New York: Basic Books.

Helsper, Ellen J. and Bianca C. Reisdorf. 2016. "The Emergence of a "Digital Underclass" in Great Britain and Sweden: Changing Reasons for Digital Exclusion." *New Media & Society* 19(8):1253-70.

Huws, Ursula. 2014. *Labor in the Global Digital Economy: The Cybertariat Comes of Age*. New York: NYU Press.

Katz, Lawrence and Robert Margo. 2014. "Technical Change and the Relative Demand for Skilled Labour." Pp. 15-57 in *Human Capital in History*, edited by L. P. Bouston, C. Frydman and R. Margo. Chicago: University of Chicago Press.

Keynes, John Maynard. 1972. *Collected Writings Vol. 9: Essays in Persuasion (2nd Edition)*. London: MacMillan.

Knaus, C. (2017). Almost half of all Centrelink robo-debt cases sent to private debt collectors. *The Guardian*. Retrieved from doi:https://www.theguardian.com/australia-news/2017/apr/12/almost-half-of-all-centrelink-robo-debt-notices-sent-to-private-debt-collectors

Loi, Michele. 2015. "Technological Unemployment and Huamn Disenhancement." *Ethics and Information Technology* 17(3):201-10.

McClure, P., Sinclair, S., & Aird, W. (2015). *A New System for Better Employment and Social Outcomes: Report of the Reference Group on Welfare Reform to the Minister for Social Services*. Retrieved from Canberra:

Mcllroy, T. (2016). Labor calls for Centrelink's 'crude and inaccurate' automated debt recovery system to be scrapped. *The Sydney Morning Herald*. Retrieved from doi:http://www.smh.com.au/federal-politics/political-news/labor-calls-for-centrelink-automated-debt-recovery-system-to-be-scrapped-20161228-gtj42m.html

Mays, J, Marston, G. and Tomlinson, J. (2016) *Basic Income in Australia and New Zealand* Springer, New York.

Makridakis, Spyros. 2017. "The Forthcoming Artificial Intelligence (Ai) Revolution: Its Impact on Society and Firms." *Futures* 90:46-60.

O'Neill, C. (2016) *Weapons of Maths Destruction: How Big Data Increases Inequality and Threatens Democracy*, Crown Random House, New York.

Office of the Chief Scientist (2016) Australia's STEM Workforce: Science, Technology, Engineering and Mathematics, Australian Government, Canberra.

Pett, H., & Cosier, C. (2017). We're all talking about the Centrelink debt controversy, but what is 'robodebt' anyway? *ABC*. Retrieved from doi:http://www.abc.net.au/news/2017-03-03/centrelink-debt-controversy-what-is-robodebt/8317764

Rubery, J. (2018) Automation has the potential to improve gender equality at work, *The Conversation*, [available online] https://theconversation.com/automation-has-the-potential-to-improve-gender-equality-at-work-96807

Russell, B (1932) In Praise of Ideleness, Harper's Magazine, [available online] https://harpers.org/archive/1932/10/in-praise-of-idleness/

Russell, Stuart, Daniel Dewey and Max Tegmark. 2015. "Research Priorities for Robust and Beneficial Artifcial Intelligence." Retrieved: 26 July 2018 Available at https://futureoflife.org/data/documents/research_priorities.pdf.

SACOSS. (2017). Centrelink Automated Debt Recovery ('Robo-Debt') Program. Retrieved from doi:https://www.sacoss.org.au/sites/default/files/SACOSS Fact Sheet - Centrelink Robo-Debt campaign and background information.pdf

Swanson, J. (2001) *Poor bashing: The Politics of Exclusion*, Toronto: Between the Lines.

Saner, Marc. 2015. "Technological Unemployment, Ai, and Workplace Standardization: The Convergence Argument." *Journal of Evolution & Technology* 25(1):74-80. Retrieved: 28 July 2018 Available at https://jetpress.org/v25.1/sanerwallach.htm.

Schumpeter, Joseph A. 1975. *Capitalism, Socialism, and Democracy*. New York: Harper.

Schwab, K. (2015) The Fourth Industrial Revolution, http://vassp.org.au/webpages/Documents2016/PDevents/The%20Fourth%20Industrial%20Revolution%20by%20Klaus%20Schwab.pdf

Spencer, David A. 2018. "Fear and Hope in an Age of Mass Automation: Debating the Future of Work." *New Technology, Work and Employment* 33(1):1-12.

Srnicek, Nick and Alex Williams. 2016. *Inventing the Future: Postcapitalism and a World without Work*. London: Verso.

Standing, G. (2011) *The Precariat: The New Dangerous Class*, Bloomsbury Academic, London.

Stubbs, Alec. 2017. "Automation, Artificial Intelligence, and the God/Useless Divide." *Perspectives on Global Development and Technology* 16(6):700-16.

Suchman, Lucy. 2011. "Subject Objects." *Feminist Theory* 12(2):119-45.

The Sydney Morning Herald. (2017). Centrelink robo-debt bungle demonises the innocent. Retrieved from doi:http://www.smh.com.au/comment/smh-editorial/centrelink-robodebt-bungle-demonises-the-innocent-20170308-guu3be.html

Tomaszewski W, Perales F, Xiang N (2017) Career guidance, school experiences and the university participation of young people from low socio-economic backgrounds. *International Journal of Educational Research*, 85, 11-23.

Tudge, A. (2016). New technology helps raise $4.5 million in welfare debts a day. *Minister for Human Services*. Retrieved from doi:https://www.mhs.gov.au/media-releases/2016-12-05-new-technology-helps-raise-45-million-welfare-debts-day

Weeks, K. (2011) *The Problem with Work: Feminism, Marxism, Antiwork politics and Postwork Imaginaries*, Duke University press, Durham.

Wilcock, S. (2016). Policing welfare: Risk, gender, and criminality. *International Journal for Crime, Justice and Social Democracy, 5*(1), 113-130.

World Economic Forum. 2016. "The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution." Retrieved: 25 July 2018 Available at http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf.