Guest Editors’ Introduction:  
Technological disruption and the future of employment relations

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A technological paradigm shift is underway. Nearly every day, we learn about another major technological breakthrough that promises to have life-changing effects. Driverless vehicles are taking to our roads. Drones are appearing in the sky. Surgeries are conducted by robots with little human assistance. And sophisticated predictive algorithms are ‘optimising’ what we see, mediating our contact with information and people in increasingly important ways.

These developments are at the frontiers of what is variously known as ‘the second machine age’ (Brynjolfsson and McAfee, 2014) or ‘the fourth industrial revolution’ (Schwab, 2016). They represent a potentially transformative convergence of new and improved technological capabilities in a range of areas, including digitisation, data capture and storage, robotics, and artificial intelligence (AI). Progress in each of these areas has lately started to combine and ‘cross-over’ in ways that enable larger, and frequently unexpected, leaps in capability. Most notably, there has been striking recent progress in ‘machine learning’ – a form of AI in which machines are ‘trained’ to perform specific tasks using vast data troves. With greater access to ‘big data’ sources, such machines have acquired super-human proficiency in limited domains, including the ability to play sophisticated strategy games, recognise and translate speech, and accurately identify faces in photographs (Trounson, 2017; Walsh, 2017).

In watching the labour market developments of recent decades, we have become accustomed to automation that displaces human workers in routine manual jobs, on farms and ports, or in factories. But newer forms of automation, driven by machine-learning technologies, are now beginning to encroach on more highly-skilled ‘cognitive’ and ‘non-routine’ occupations, such as in accounting, medicine and the law. With accuracy that matches or betters human experts
– and usually in much less time – machines can now comb through case files to identify legal precedents, or diagnose diseases in patients’ medical scans.

Even these highly impressive technologies possess severely restricted capabilities. They can perform narrow, tightly-defined tasks well, but can do nothing else (Brooks, 2017). We are a long way from developing an all-purpose ‘artificial general intelligence’ (Walsh, 2017). Nevertheless, even in its more limited current forms, AI is dissolving some long-standing boundaries of human expertise and endeavour. It is demonstrating that many capacities are not the ‘uniquely human’ domains that we might have imagined them to be. These advances have led some scholars to anticipate drastic changes in the nature of professional work, as ever more complex tasks are given over to ‘smart’ machines (Susskind and Susskind, 2015).

This in turn raises many questions about how far the automation of work is permitted to go, what the responsibilities of technology developers should be, and how the many people who are not involved in developing technology can participate meaningfully in decisions about its uses.

Emerging technologies are widely expected to have disruptive consequences for workers and workplaces. According to one account, ‘(t)echnology will up-end countless careers, workers across fields will be displaced, and it’s not entirely clear how many jobs will be replaced’ (Illing, 2016: 1). Many authors warn about a looming threat of technological unemployment (Durrant-Whyte et al., 2015; Thompson, 2015). While some assessments are more cautious (Borland and Coelli, 2017), the pessimistic view of technology has been highly influential. A popular sub-genre predicts a gloomy future for human workers; prominent recent examples include Rise of the Robots (Ford, 2015), Humans Need Not Apply (Kaplan, 2015) and Why the Future is Workless (Dunlop, 2016).

Of course, such concerns have been raised before. Two decades ago, major books heralded The Jobless Future (Aronowitz and DiFazio, 1994) and The End of Work (Rifkin, 1995). Concerns about job losses induced by automation date back to at least the mid-20th century, and arguably to the start of the Industrial Revolution (Autor, 2015). Yet a recurring message today is that the nature and pace of technological change are qualitatively different from past phases, because of the reinforcing effects of convergence. We frequently hear that ‘this time is different’, the implication being that we cannot expect an easy repeat of past trends that saw aggregate employment rates recover from dramatic episodes of technological progress (Wajcman, 2017).
Attempts to project future patterns of employment have yielded widely-divergent results, and this presents fertile ground for further research. The seminal study by Frey and Osborne (2013) found that nearly half (47%) of all jobs in the United States were highly susceptible to automation over ‘the next decade or two’. Although these authors were careful to emphasise that their estimate was not a prediction about actual future job losses, it has nonetheless been widely (mis-)interpreted as such. At the other end of the spectrum, an important OECD study (Arntz et al., 2016) concluded that a much smaller share of jobs (nine percent) was likely to be under immediate threat from automation. The discrepancy reflects different assumptions about how tasks are combined into jobs. The OECD authors contend that, even though many jobs contain tasks that will become ‘automatable’, it does not follow that those entire jobs will disappear. Demand for the job (and, by extension, the worker) may continue, but with a modified set of task responsibilities, reflecting the higher importance of automated processes augmenting human activities in the role.

The crucial distinction here is between job destruction and job transformation. It seems likely to us that many jobs and workers will be affected by advancing machine technologies in the decades ahead. This will mean more opportunities for businesses to reshape their production processes, conserve labour and, in some cases (discussed further below), adopt new business models. Yet, for most workers, the consequences of these developments may be less perilous than retrenchment. Many more workers will find that their roles (and skill-sets) have to be adapted to working alongside increasingly capable machines. If this proves to be right, then for employment relations scholars it opens up new and interesting questions about how job transformation – or ‘redesign’ – is being negotiated and accomplished. Who decides when a task should be done by a machine instead of a human? What conditions must be satisfied for this to occur? What opportunities are there for workers (or unions) to voice objections, resist, and recommend modifications in this decision-making process? Are new and different forms of regulation needed?

Technological developments also dovetail with a broader set of concerns about how labour markets operate and how the boundaries of ‘work’ are defined. Technology not only affects the processes of job creation, destruction and transformation, but also business models and organisational structures. A rich variety of new business models is appearing that has been enabled by technology, and these are altering aspects of the labour exchange (Gahan et al., 2017). Uber, Airtasker and Deliveroo are among the prominent platforms operating in what has become widely known as the ‘gig economy’ – a branch of the mainstream labour market in which work is episodic and the obligations on both sides of the labour exchange are much weaker than in a conventional employment relationship (Stewart and Stanford, 2017). While
gig-based working arrangements have the potential to expand working opportunities for those on the margins of the labour force (Minifie and Wiltshire, 2016), they also present abundant new threats, including fragmented job tasks, ambiguous employment entitlements, pressures on minimum labour standards, and safety concerns (Bornstein, 2015; Mishel, 2015). The gig economy is likely to attract further interest from scholars if, like the new forms of automation aided by machine learning, its influence and reach begin to extend higher up the skills ladder.

Further interest relates to how technological developments are meeting and compounding (or being compounded by) other prevailing economic and social trends. In developed countries, these trends include population ageing, wage stagnation, rising inequality (including a fall in labour’s income share), and declining labour force participation rates, especially among men. Ford (2015) refers to these and other related developments as ‘seven deadly trends’ that stem from and amplify the effects of technological change. In developing countries, greater use of technology and the globalisation of supply chains have led to extraordinary economic growth (Baldwin, 2016). Yet, technological improvements now threaten to deny the least-developed countries an opportunity to capitalise on their one comparative advantage – cheap labour – as production is returning to the rich world (‘re-shoring’) before average living standards have risen to anywhere near developed levels (Avent, 2016). The link between technological and other factors affects workers in all countries, but many of these relationships remain under-studied and -theorised. Employment relations has much to offer in advancing understanding, by looking beyond the standard economic concerns with efficiency and the gains from trade.

The contributions to this Special Issue of Labour and Industry aim to broach and encourage further analysis of the many challenges posed by technology and its effects on contemporary working life. While keeping ‘technology’ as the focus of inquiry, we have sought to remain cognisant of the broader economic, social, and institutional contexts in which technological changes occur. Technology is too often viewed as something ‘happening to us’ and outside our control. We must reclaim technology as a product of human ingenuity, and a tool for the betterment of human welfare, with outcomes that depend on our choices and organisations.

Our opening article by Göran Roos and Zara Shroff provides a sweeping canvas of the accelerating pace of technological development and implementation, suggesting that we over-estimate the short-term impact of new technologies and under-estimate their longer-term influence. As they observe, irrespective of the precise character of the impacts of each wave of technology development, any such development ‘will lead to structural adjustment of the economy, with consequences for employment and social cohesion during the transition phase.’ Technology-induced structural adjustment is said to involve three overlapping phases:
i) the initial deployment of the new technology; ii) the dissemination and uptake of the new technology; and iii) falling profits that change investment patterns, laying the groundwork for the next phase of technology development. Roos and Shroff’s article draws on historical patterns and behaviours examined in the literatures on technology-driven shifts in employment and on the capabilities of emerging digital technologies so as to deduce the likely impact on jobs. Significantly, they predict a dramatic change in the internal structure and interactions between institutions that make up an economy on account of technological changes. They argue that technology-induced change in the business model of some firms will eliminate the need for certain categories of job. Most job losses – albeit a more conservative number than that suggested by Frey and Osborne (2013; 2017) – will result from ‘routine-biased technological change’, meaning that, despite an increase in the demand for routine tasks, there will be a decline in the demand for human labour required to execute them. Some existing jobs will be supplied directly or from locations outside the economy, generating skill-based technological unemployment and challenging organisations to ‘reassemble the non-automated component activities into something that makes both organisational sense and sense for those who are to execute those activities.’ Roos and Shroff also note that net job creation or destruction will vary over time and space, and be positively linked to the complexity of the economy and its specialisation in digitally-relevant sectors. Most fundamentally, these authors conclude that whether technology development yields job scarcity/precarisation or job abundance/wealth, as Perez (2015) argues, cannot be left to the market. Rather, it must be ‘a function of the socio-political choices’ that we and our policy-makers make so as to yield more desirable outcomes.

In our second article, the analytical lens shifts to focus on the drivers of change in work and employment in the construction industry in Victoria, Australia. As Alex Veen, Julian Teicher and Peter Holland observe, organisations are functioning in an increasingly complex environment. And the responses to this complexity in the construction industry – which contains the largest number of businesses of any Australian industry – may have ‘profound consequences’ for existing forms of work and employment. The authors use two strands of literature from the employment relations and organisational theory disciplines to frame their analysis. They interpret the characteristics of technological developments in terms of the nature, direction and extent of change to work, employment and skill requirements against: i) the existing structures and competitive backdrop of the industry (Tushman and Anderson, 1986) and ii) the extent to which emerging changes are affecting the ‘deep structure’ – ‘the underlying networks of basic principles, interdependent choices and configurations which maintain the structure and activities of the construction industry’ (see
Erickson and Kuruvilla, 1998), enabling them to differentiate between evolutionary and ‘discontinuous’ forms of change.

Using an exploratory, qualitative case study approach, the researchers conducted semi-structured interviews with 15 senior managers from organisations, relevant government officials and other institutional stakeholders (e.g. employer association representatives) to explore contemporary changes to blue-collar work and employment in the commercial and residential segments of Victoria’s construction industry. From the evidence of their interview material and an analysis of related documents, Veen and colleagues conclude that, while technology is a dominant influence in reshaping existing forms of work, it is not the sole driver of change. Other key factors are the dynamic competitive environment and an array of labour issues. Furthermore, the emerging patterns reflect evolutionary change rather than a disruptive disjuncture from previous episodes of innovation in the industry. They also observe that technology developments and other factors do not appear to fundamentally disrupt the deep structure of the industry in the short-term, echoing Roos and Shroff’s point about over- and under-estimations of the impact of technological change across different timeframes. As Veen et al. note, future research might include longitudinal survey data to help understand the nature and spread of new building methods in the industry, along with an evaluation of the changing nature of the industry’s institutional environment to throw more light on its capacity to respond to technology-induced skill challenges.

We cross to New Zealand in the third article of this special issue, to examine perceptions of jobs and careers amidst an era of rapid advancements in what David Brougham and Jarrod Haar term Smart Technology, Artificial Intelligence, Automation, Robotics and Algorithms (STAARA). Unlike Veen and colleagues, Brougham and Haar study the views of employees, particularly in relation to job control, job complexity, job repetition and STAARA awareness. Using these employee-rated variables to predict STAARA redundancy, as estimated by Frey and Osborne (2013), Brougham and Haar apply structural equation modelling to survey data from 196 respondents with a diverse array of personal and work-related characteristics and job roles (excluding the self-employed) in the main centres of New Zealand’s North Island. Their research targets the service sector, in which technology-driven changes to work were considered likely to be most pronounced.

As one of only a few studies looking at employee perceptions of changes to their work in the future, the authors found that each of their constructs was important for predicting STAARA redundancy. Job control emerges in their study as particularly important for predicting this probability. Unexpectedly, however, STAARA awareness is not found to be a good predictor
of the probability of STAARA redundancy. This may suggest that employees are not the best judges of technology’s potential to replace their jobs, with implications for how employees assess their job and long-term career prospects in relation to STAARA. Brougham and Haar conclude that more research is needed, especially because we can expect STAARA impacts to be significant over the next decade; to ensure that employees can be well positioned in the labour market for technology-related changes and ready to re-think what constitutes a career (see also Ivanov et al., 2018); and to encourage or enable employers to manage these changes in positive ways.

The final article by Joshua Healy, Daniel Nicholson and Andreas Pekarek continues our preoccupation with the future of work by turning attention to the ‘gig economy’, a form of service delivery that ‘challenges existing business models, labour-management practices, and regulations.’ Their conceptual piece asks whether the gig economy should be the subject of employment relations scholarship, given its current dimensions and likely future. Healy et al. outline what we know so far about the gig economy, particularly in relation to the parts played by the key employment relations actors and institutions, before turning their gaze to where it is heading. Observing its relative newness as a phenomenon, Healy and colleagues’ reading of the literature leads them to suggest five main paths that the gig economy might take in relation to: the business cycle; new and expanded regulation; the notion of gig work as a ‘bridge’ or a ‘trap’ for workers over time; the potential for more ‘up-market’ forms of gig work to emerge; and the possibility of a shift away from current ownership models toward more worker-led, ‘co-operative’ models. As they note, these directions represent a mixture of opportunities, inherent limitations and threats for the gig economy.

Healy et al. discern that many questions remain unanswered about gig work and that closer attention is needed from employment relations scholars, to better understand how its power dynamics are testing existing norms and institutions. Encouragingly, they conclude that ‘(a)s well as providing employment relations scholars with a new research focus, the gig economy suggests promising directions for theoretical dialogue and exchange with cognate literatures and fields.’ The authors highlight and rationalise the usage of two possible research areas for such interdisciplinary engagement: i) institutional analysis, including less widely used strands of institutional theorising, such as organisational institutionalism; and ii) social movement theory. Whilst acknowledging key factors that threaten to slow or halt the gig economy’s development, they conclude with a useful series of indicative questions that might be addressed to advance understanding of ‘gig work relations’, particularly around the crucial concerns of worker voice and representation, and strategic organisational responses in the
context of gig-based labour markets and particular regulatory modes. As they note, ‘(a)cademic study of the gig economy is just beginning.’

Our collection concludes with two book reviews. **Rebecca Downes** reviews Briken, Chillas, Krzywdziński’s and Marks (2017) book, *The New Digital Workplace: How New Technologies Revolutionise Work* (Palgrave), which emphasises technology’s role in facilitating the shift from material production as the key site of tension between capital and workers to what the authors refer to as ‘cognitive capitalism’ where the basic source of value is worker knowledge. In the context of ongoing technological change, and as shown by the scholarship in this issue, the parameters for employment relations are thereby contested, with the authors stressing the need for discussions of technology-driven change to stay “connected to real work experiences” (*ibid.*: 258). The second book review, by **Christian Yao**, examines Nigel Cameron’s work, *Will Robots Take Your Job?: A Plea for Consensus* (Polity Press). This book considers the main drivers of technological disruption and its impact on jobs, people and societies. Crucially, it asks how we are preparing for the eventualities of technological revolution from historical, economic, employment, political and social perspectives. As Yao observes, the book ‘fulfils its promise of helping policy-makers and the public at large to frame and organise their thoughts about this important topic.’

This special issue thus traverses a wide array of employment relations contexts and themes with respect to technological transformation in the workplace. It calls attention to various complexities, opportunities and challenges that technological change or a ‘fourth industrial revolution’ has had and may go on to present to current institutional, relationship and power configurations in the world of work and beyond. It also underscores the greenfield nature of many potential areas of employment relations scholarship relating to technologically-induced change. We hope that it sparks and provides a point of reference for further critical discussion and debate about theoretical, empirical and practical developments.

**References**


Thompson, D. 2015. ‘A world without work.’ The Atlantic, July/August 2015.


