Centre for WHS

Understanding the changing world of work

Horizon Scan

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Introduction

The world of work is undergoing dramatic and widespread change. New technologies and atypical working arrangements are changing the way that work is organised and distributed across society. Simultaneously, societal norms and expectations around work are changing as a result of shifting understandings in how work is defined and structured.

To support the functions of an effective regulator and enable appropriate planning, the Centre for WHS aims to study the effect of these new patterns of behaviour on work-life balance, health, safety and wellbeing.

This preliminary horizon scan analyses some of the factors that might shape the future workforce, and impact the way that society is structured and organised from an occupational perspective. This horizon scan is not intended to present an exhaustive analysis of the literature, but rather to contextualise some themes and provide stimulus for further exploration and research.

Discussion

Technology and capability

The use of robotics, Artificial Intelligence (AI), machine learning and other automated tools could be a catalyst to increased organisational productivity and economic growth in the future. Indeed, these tools are already becoming commonplace in both the government and private sectors, and will probably increase in prevalence and capability as technology evolves.

A natural consequence of this technological advancement is that some of the tasks performed today by humans may be susceptible to automation in the near future. This is likely to displace a proportion of the labour market (Brown, et al., 2018). Such displacement is not without historical precedence: the long list of technologically superseded occupations includes lamplighters, switchboard operators, chimney-sweeps and (human) computers. However, the rapid acceleration and implementation of computer automation could yield new challenges for future society, because these technologies are ubiquitous and not isolated to a specific industry or occupation.

At the macro level, a mismatch between the skills needed by society and the skill mix of the working population is an important issue for policymakers, because such imbalances that can be deleterious to the economy and impact on the provision of the goods and services that society demands (Rumbens, Richardson, Lee, Mizrahi, & Roche, 2019). Australia currently has significant skills gaps, particularly amongst the so-called 'skills of the heart', such as customer service, innovative thinking, conflict resolution, leadership and teaching (Rumbens, Richardson, Lee, Mizrahi, & Roche, 2019). By 2030, Rumbens et al. (2019) estimate that Australia may have a labour market deficit of 29 million skilled workers. To address this issue, a large proportion of the working population may need to acquire new skills through retraining and upskilling in order to be competitive in the labour market, and to gain and maintain meaningful employment.

At the meso-level, there are a number of strategies that organisations may adopt to manage organisation-level mismatch between business requirements and workforce capability. Such strategies may include reskilling existing employees, contracting out certain business functions and undertaking organisational restructure. While these strategies are likely necessary in order for businesses to remain economically competitive, they may also expose workers to an increasing pace and scale of change, the health and safety effects of which are not known.

Education

As outlined in the previous section, the development and implementation of new technologies, particularly tools for process automation, could lead to a future situation where the mix of skills that society needs are mismatched with the mix of skills held by the working population (or those ready to enter the workforce). One way that future society might address this problem is by ensuring that the education system is designed to give workers the 'global' skills that are translatable to different tasks and work settings.

As the nature of work changes, workers may be required to undertake continued education and training in order to keep pace with the mix of skills required for employment. Future patterns of learning and development may be needed to be better integrated with work, and there may be a need for a shift to the professionalisation of some occupational categories. Some countries, such as France and Singapore, have started to incentivise employee training programs in order to address this issue (World Economic Forum, 2017), and these programs are underpinned by the premise that ongoing training is in the interests of the broader

Agile and flexible working

Flexible working arrangements, including working remotely, telecommuting, job sharing and flexible working hours, are becoming increasingly prevalent amongst certain industry sectors, enabled in part, by the advancement of information and communications technology. In contrast to the historic 'line-of-sight' approach to management, flexible working arrangements require leaders to plan work and evaluate employee performance in a manner that focuses on outcomes, rather than process. This leadership style can enable workers to draw from their strengths, skills and abilities in determining how to approach their work. While flexible working arrangements may offer benefits to both workers and employers, these patterns of work require different skillsets on the part of both workers and managers, and could require substantial adaptation and culture change at both the meso and macro levels as these arrangements expand across occupational categories. There may also be both direct and indirect risks associated with flexible working arrangements that require new methods for formulating effective risk controls.

As task-specific skills are diverse and changing rapidly, businesses may opt to hire temporary contractors for projects and jobs rather than investing in permanent full-time staff (Rumbens, Richardson, Lee, Mizrahi, & Roche, 2019). With an increase in flexibility, a higher number of part-time or casual jobs could be created in the future, and thus workers may be required to seek more than one form of employment to earn adequate income (Letts, 2019). Some of this employment may be from freelance-style or 'gig-economy' work, which provides a fragmented working arrangement that is atypical to historic norms, and contrasts profoundly to the conventional relationship between employer and employee.

A fragmented and highly dynamic workforce of the future could also pose a challenge to the institutions that typically served the collective interests of specific occupational groups (Bakhshi, Downing, Osborne, & Schneider, 2017). Historically, matters such as employment conditions and renumeration were bargained for, and defended by professional associations and trade unions. New mechanisms may be needed in order to represent workers' collective interests in the fragmented workforce of the future, noting that workers may be employed in multiple professions at the same time, and/or shift between occupations more frequently.

Sharing economy and servitisation

The sharing economy can be defined as "a peer-to-peer (P2P) based activity of acquiring, providing, or sharing access to goods and services that is often facilitated by a community-based on-line platform" (Chapellow, 2019). While sharing assets, goods and services is not a new economic concept, the recent proliferation of smartphones and internet-enabled devices has provided a new model over which such sharing can occur. The sharing economy allows the value of otherwise idle physical assets to be 'unlocked' that is, traded through a fee-for service arrangement. Trading the use of physical assets as a product-service system in this way is known as 'servitisation'.

A contemporary example of a shared economy business is the accommodation-sharing platform Airbnb. Through Airbnb, people who own unused dwellings (such as bedrooms, homes, apartments, etc.) can lease these assets to consumers on a short-term, peer-to-peer basis, thereby unlocking the value of these assets.

While there are productivity benefits to maximising the value of idle assets, the sharing economy may pose a threat to established business models and industrial sectors. For example, the expansion of accommodation-sharing platforms such as Airbnb has provided a new source of competition for the hotel industry, requiring hotels to rapidly adapt their business strategies in order to offer a sufficient level of differentiation and remain competitive. This type of business transformation may require workers to rapidly develop new skills and competencies, particularly in the 'heart' skills, as described by Rumbens et al. (2019).

Demographic transition

In 2017, 15% of the Australian population were aged over 65 (n≈3.8 million), and this proportion is expected to increase to 20% by 2037 (n≈8.8 million) (Australian Institute of Health and Welfare, 2018). Older workers may be disadvantaged in terms of employment mobility, and may experience greater challenges in finding and adapting to new employment compared to younger workers (Grant, 2019). This may be due to harmful and sometimes discriminatory stereotypes around the capabilities of elderly workers (Bersin & Chamorro-Premuzic, 2019).

However, although physical strength declines with age, older workers may have an advantage over younger workers, in that they possess a greater degree of 'work wisdom', which is inherently developed over time. As Azoulay et al. (2018, cited in Bersin & Chamorro-Premuzic 2019) points out, "those over the age of 40 are three times more likely to create successful companies as a result of their patient, collaborative natures, and their lack of a "need to prove myself" attitude that tends to accompany youth".

Another consideration for the future of work in relation to Australia's ageing population relates to the provision of health and aged-care services. Demand for health care increases with age (with the exception of newborns), and thus, expenditure on health care is expected to increase from 4.1% to 7.0% of GDP between by 2059-60. Over the same period, aged care is expected to increase from 0.8% to 2.6% of GDP (Bersin & Chamorro-Premuzic, 2019) (Productivity Commission, 2013). To cope with this increased demand, more health and aged care workers will be needed, and the Health Care and Social assistance sector is expected to be the most significant contributor to employment growth in Australia over the next five years (Department of Employment, Skills and Family Business, 2019). Additional health care workers may perhaps be supplemented by technologies and work systems that enable productivity (see section 'health care', below). Naturally, such technology would need to also promote patient and health care worker safety and improve the quality of care provided.

The workforce participation rate of Australian women reached 61.3% in 2019, compared to 71.1% for men (Australian Bureau of Statistics, 2019). The Australian Government has predicted that the employment participation rate of women is expected continue to outpace that of men over the next five years (Department of Employment, Skills and Family Business, 2019) . However, at the population level, gender equality has not been achieved in Australian workplaces, with women earning an average of 14% less than men, representing just 17.1% of Chief Executive Officers and comprising just 29.6% of directors in the ASX 200 (Workplace Gender Equality Agency, 2019) . Achieving gender equality in the workplace is likely to require workplaces to eliminate discrimination on the basis of gender (including caregiving responsibilities), provide men and women equal access to leadership roles and development opportunities (Workplace Gender Equality Agency, 2018).

Environmental Factors

Climate change models predict that temperatures will increase by up to 2.8 - 5.0 degrees in the Eastern part of Australia by the end of the 21st century, with a higher frequency of hot days and longer duration of warm spells expected. The frequency of extreme rainfall and, conversely, time spent in drought is also expected to increase (Commonwealth Scientific and Industrial Research Organisation, 2019). These meteorological conditions can affect the workplace in any industry.

The likely impact of climate change on Australian farming is presented as an example. Australian farmers are either currently facing, or could face in the future, an array of challenges associated with climate change. To overcome threats from extreme climate, some agricultural businesses have made use of technological innovations. The recent emergence of the internet of things, and other cloud computing technologies, have led to the development of 'smart farming', which employs artificial intelligence in farm management and decision making, resulting in greater adaptability to climate change (Hambrett, 2019).

Regulation

A recent report published by Deloitte highlights some of the current and emerging challenges for regulators globally, and these include personnel shortages, work backlogs, licensing and permitting demands, and pressure to reduce compliance costs and rationalise the need for regulation (Eggers, Turley, & Kishnani, 2018). The authors argue these challenges will be accentuated by the acceleration of new technology and new markets, which may require new regulatory strategies. Some of the tools that may assist regulators in meeting future regulatory challenges include crowdsourcing, analytics, artificial intelligence, sandboxes, and compliance 'nudges' built on the behavioural insights model (Eggers, Turley, & Kishnani, 2018).

Industry Snapshot

Construction

The construction industry experiences a higher number of workplace incidents, such as serious incidents and fatalities, and contributing factors are thought to include skills and resource shortages, a diverse workforce, tight profit margins, unrealistic time constraints, and complex work arrangements (Safework NSW, 2018).

Increasingly, construction sites, especially process-industry construction sites, have deployed technology to assist in identifying unsafe practices on the worksite. The future could see the introduction of programs or apps that will enable workers to adhere to safety (Agarwal, Chandrasekaran, & Sridhar, 2016).

The construction industry is adapting to the technological revolution. For example, major construction companies have started to integrate technology into their daily processes to shift away from paper-based planning (Construction Leadership Council, 2019; Brinsmead, et al., 2019; Agarwal, Chandrasekaran, & Sridhar, 2016). Another trend in the construction industry is the usage of prefabrication and offsite construction methods. Here, the building components are created in a factory before assembling them at the site. With advancements in digital tools, it is becoming easier to integrate these offsite components into conventional builds, which leads to more sophisticated and flexible systems of offsite components (Bernstein, 2018). Governments in many countries have started to prioritise offsite construction. As these skills are still in the nascent phase, one of the many challenges in the future could be training programs to cater to the requirement of these new skill sets (de Laubier, Burnfield, Arnold, Witthoft, & Wunder, 2019).

Manufacturing

Robotic automation may play a key role in the future of manufacturing. By exploiting robotic automation, manufacturing companies will be able to produce larger quantities in shorter periods of time, which is more cost-effective (Robotics Online, 2019). With the use of technology such as vision systems and sensors, factories can be converted into 'smart' factories that are able to monitor and automate processes, and rapidly respond to identified issues. Technology can be deployed in improving quality sensing and error detection rates (Wellener, et al., 2019).

Moreover, global sales of industrial robots are estimated to increase by 15% on average per year (RNA Automation, ND). This increase in the use of robotic automation has the potential to significantly change the manufacturing work environment.

Healthcare

Healthcare technologies, when transformed into 'internet of things' devices, may have the potential to transform the way that individuals monitor and track their health. For example, wearable technologies, such smart watches, have increased in prevalence in recent years, and these devices allow individuals to monitor their vital signs, exercise regimes and sleep cycles. Smart algorithms, backed up with human perception tools, can detect facial and vocal indicators of poor mental health (Marvin, 2019). These technologies have revolutionised the personal healthcare model, which earlier depended on visiting and consulting with healthcare and fitness professionals in order to assess and monitor one's health and fitness (Committee for Economic Development of Australia, 2015; Marvin, 2019; Allied Market Research, ND).

The future may also see health systems being able to deploy voice technology for clinical documentation, thereby reducing the administrative burden of clinicians; streamline administrative processes in hospitals, map and treat infectious diseases and personalise medical treatments (Marvin, 2019).

Transportation

Automated driving systems (ADS), including computer-driven cars, trains and heavy vehicles, are the subject of substantial research interest in the automotive industry. Proponents of ADS technology argue that these vehicles will "reduce road fatalities by switching control of safety-critical tasks from humans to machines" (Moddy, Bailey, & Zhao, 2020). The development of ADS may have the capacity to eliminate perceptual errors, decision errors, driver incapacitation. However, the perceptions of ADS safety vary vastly across people that identify with different cultural and demographic groups (Moddy, Bailey, & Zhao, 2020).

Autonomous driving systems may also have a nexus to the shared economy, as individuals transition from owning a car to utilising car services, and could redefine transportation as a service approach. Some of the potential drawbacks could be unemployment of skilled workers (such as taxi and truck drivers), and a reduction in tax and insurance collection (GetSmarter, 2019).

Robotic automation may benefit other industries too. For example, robotic automation in mining industry could improve safety and enhance productivity. The future of mining focusses on increasing mine safety and over-coming skills gaps (Husseini, 2018).

Conclusion

The way work is performed in most industries is expected to change due to transformations in sociotechnical systems and institutions of governance. If current trends continue, a worker's tenure in a role may be shorter, with workers required frequently to move between roles and organisations and to adapt quickly to new working environments. Casualisation of the workforce, contracting out, and servitisation may also increase. To maintain pace with this rapidly changing employment landscape and remain competitive in the workforce, workers may need ongoing training and skills revision.

To enable us to be prepared for the future of work health and safety, we will commission research that considers workplace hazards inherent to the changing world of work. This research will focus on the prevention of harm to workers of the future.

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