



FUTURE FRONTIERS ANALYTICAL REPORT



# The Future of Work in Australia: Anticipating how new technologies will reshape labour markets, occupations and skill requirements

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### ABOUT THE AUTHORS

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### ABOUT THE CENTRE FOR WORKPLACE LEADERSHIP

The Centre for Workplace Leadership was founded in 2013 as a partnership between the University of Melbourne and the Commonwealth Department of Employment. Its mission is to develop world-class leadership capability in Australian organisations, by bridging the gap between research insights and leadership practice. The Centre is committed to building the capabilities of current and aspiring leaders, sustaining high-performance workplace cultures, transforming workplaces through technology and innovation, and developing the new types of skills that will be needed to lead the organisations and workforces of the future.



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**EDUCATION: FUTURE FRONTIERS** is an initiative of the NSW Department of Education exploring the implications of developments in AI and automation for education. As part of this initiative, the Department has commissioned background reports on future skills needs. The views expressed are solely those of the authors.

This report uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported here, however, are those of the authors and should not be attributed to either DSS or the Melbourne Institute.

## Executive Summary

Recent technological advances – in automation, robotics, artificial intelligence, and other areas – have provoked intense concern about the future of work. Perspectives range widely, from more enticing views of abundant leisure, to more disturbing visions of widespread unemployment and deepening social divisions. Almost daily, machines seem to acquire new capacities that again prompt speculation about where the jobs of the future will come from, whether they will be of good quality and fulfilling, and how future workers can best prepare to do them.

Our report offers a detailed Australian perspective on these issues. It reviews a large body of evidence about technological changes, and attempts to assess their likely implications for the Australian workforce and skill requirements in the coming decades. As an industrialised nation with strong international trade links, Australia's economy is shaped by global forces of technological change. This does not mean, however, that these forces have inevitable or identical effects in every location. Australia's particular context – its distinctive institutions and policy settings – will ultimately shape how common technological forces are manifest.

A central and recurring theme of our report is that Australian policy makers have choices about how, and how quickly, technology's effects are felt. While the pace of change can be confronting, technological progress is not something 'happening to us', but a process under our control. The challenging task for governments, social actors and the wider population is to gain some understanding of the forces at work, in order to harness the potential for good and, if possible, minimise the harmful consequences. This report contributes to building the knowledge base that is needed for informed choice and action.

Our analysis is presented in five main sections, each of which is briefly summarised below. The report's structure moves from more general, international content in early sections to more specific, Australian-focused conclusions in its later sections.

Section 1, 'Frontier Technologies', reviews the main current and emerging technologies that are having the most disruptive effects internationally on labour markets, jobs, and workers. We show that the pace and pervasiveness of technological change has increased, due to the convergence of several mutually enabling innovations, which together have brought about a 'paradigm shift' in how technology is applied in business and the labour market. While the displacement of some human workers is familiar in older industries such as agriculture and manufacturing, newer technologies also appear to be acquiring proficiency in more complex tasks that were previously thought to be 'safer' from similar effects.

Section 2, 'Employment Effects of New Technologies', examines how technological change is likely to impact on two distinct aspects of work in the future: first, the total quantity of work available for humans and, second, how that work is distributed. On the first point, we find no convincing evidence that work on the whole is disappearing, despite many new and old predictions that the 'end of work' is imminent. Most such accounts overemphasise the job destruction effects of technology, while ignoring or understating its equally important role in job creation. While today's advancing technological frontier may accelerate the rate at which old jobs are lost, it will also have offsetting effects that are difficult to predict, but that could conceivably equal or exceed the numbers lost. Historical evidence suggests that the process of economic development is surprisingly effective at generating sufficient new jobs, in unfamiliar fields, to maintain high levels of aggregate employment in the long term.

On the second point, however, there is strong evidence to suggest that the distribution of work is changing – and will in all probability continue to change – as technological progress gathers speed. Machines appear increasingly likely and able to substitute for humans in the performance of routine

tasks, while complementing us in the performance of non-routine tasks. This ‘routinisation’ hypothesis is supported by empirical evidence from studies in a variety of developed countries, including Australia. The demand for humans to undertake abstract, cognitive tasks has increased strongly (and has been supported by a rapid rise in the proportion of workers with post-school qualifications), while the demand for workers to do routine tasks has fallen and is threatened further by technological progress. Importantly, this bias towards non-routine tasks is influencing the structure of employment both within and across occupations. Even in jobs that are not forecast to disappear, there is likely to be some transformation in job content, associated with a higher intensity of non-routine tasks.

Section 3, ‘The Australian Context’, examines specificities in the Australian economy, labour market and workforce that affect how the global technological paradigm shift will play out here. We see several grounds for optimism about the future when looking at how Australia has weathered the impacts of technological disruption to date. Compared with the United States, Australia’s labour force participation rate has proven more resilient (for both sexes) and we have not experienced nearly the same extent of widening in earnings inequality (or, by some measures, in broader indicators of household income inequality). While there has been a progressive change in the underlying occupational structure towards jobs entailing more abstract task requirements, this shift in skill demand has not been accompanied by any substantial worsening in participation or inequality. These achievements are laudable, and suggest that Australia’s institutions and policy settings continue to exert an important influence over how global technological and demand shifts are translated into outcomes.

We are sceptical of claims that Australia will lose 40 per cent of its workforce to automation. Our assessment, based on a careful reading of the evidence, is that this represents an upper limit to the

likely changes we will see. While many Australian workers will be affected by impending technological change, for most the impact will be less dramatic than the loss of their entire job and livelihood. As in other developed economies, more Australians will be forced to alter how they spend their working hours, as machines become more proficient (and cost-effective) at a wider range of today’s human tasks. We cannot anticipate exactly how far or how quickly this process will run, but on the best evidence it seems likely that competence in performing unstructured job tasks, especially those of a cognitive variety, will best serve the needs of the future labour market and provide workers with the greatest possible protection against job loss and redundancy.

It is encouraging to see the strong investments that have been made in recent decades to ‘upskill’ the Australian workforce and broaden access to formal post-school qualifications. Further investments of this kind are needed, and as far as possible this access to education should be extended equitably, to avoid exacerbating the tendency of technological changes to be polarising in their effects. Investments in technical skills should also be augmented by an increased commitment to providing future workers with a broader set of competencies – in areas such as communication, teamwork, and empathy – which remain uniquely human skills, and the foundation for our advantage over even the most sophisticated of machines.

Section 4, ‘Possible Futures for Work and Skills in Australia’, looks ahead and offers a fuller assessment of the likely future trends. We describe the main methods used to predict the labour market impacts of technological change, and evaluate the most prominent recent reports deploying these methods. The best evidence suggests that automation and artificial intelligence are having modest impacts on job destruction at the moment, and that this is unlikely to change dramatically in the near future. Predicting future employment growth is more

difficult, but Australian projections point to the likelihood of further strong growth in industries like health and human services, professional, scientific and technical services, and education and training.

Scenario planning offers another useful tool for anticipating possible futures and can help policy makers both to envision and then to steer toward (or away from) certain directions. We examine four major recent scenario-based reports from Australia and other developed countries, and attempt to draw out their similarities and differences. Optimistic scenarios generally see a future of secure, meaningful work, with an emphasis on minimising drudgery and alienation. Australia is arguably well-placed to move in this direction, but will have to do much more to limit the negative individual and community effects of continuing routine job losses. Scenarios with a mixed outlook anticipate increased levels of labour market polarisation, and there are strong indications that Australia's future labour market will move further in this direction. Finally, pessimistic scenarios are consistent in predicting deepening social and economic inequalities, reduced labour protections, and fundamental weakness in the future labour market. Australia has not drifted far in this pessimistic direction, but there are signs of significant problems emerging, with persistent low wage growth, destruction of routine occupations, and extensive casualisation of the youth workforce. Policy intervention in these areas would help to avert the risk of Australia's future labour market moving closer to the more pessimistic scenarios.

Section 5, 'Conclusion', summarises our assessment of the available evidence, the nature of the policy challenge, and our views about the likely future course for labour market and job changes in Australia over the coming years.

