AUSTRALIA'S FUTURE LABOUR MARKET
MYTHS AND REALITIES

FACTSHEET
WILL TECHNOLOGY DESTROY JOBS?

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WILL TECHNOLOGY DESTROY JOBS?

KEY POINTS

■ Over the past five years, a number of reports have predicted that automation could lead to large-scale destruction of jobs, with estimates reaching as high as more than 40 per cent of Australian jobs over the next decade.

■ No one can predict the future with certainty, but these estimates appear overblown. They seem to overstate possible job losses and do not capture the full range of impacts of technology:

– The greatest impact of technology will be task change within existing jobs.

  Every single job can expect some change in its tasks over the next decade. Research by AlphaBeta suggests that, on average, 9.3 per cent of tasks changed in occupations over the last five years.

  Task change is an essential part of adapting to change. Our research suggests jobs that experience more task change have less incidence of job loss.

– A small number of jobs will be entirely substituted. The most credible estimates suggest 5 to 10 per cent of jobs could be entirely substituted by technology over the next decade.

  The loss of any job has a personal, emotional and financial cost for the individual involved. Even if future job losses are much smaller than estimated, there is still an overwhelming imperative to assist those individuals to get back into work.

– Technology will also create jobs. Technology can create jobs directly by generating the creation of new roles needed to develop or maintain the technology, or indirectly by enabling productivity improvements that enable jobs growth in other areas.

■ However, the rate of change will vary across different sectors, and it is possible that some change may be more severe in some sectors and occupations that have been relatively immune in the past.

■ Australia has been adapting to technology change relatively well for decades. Rather than stoking fear about the impact of technology, we should:

– support all workers to update their skills in the face of task change; and

– provide more intensive support to individuals who may lose their job.

DISCUSSION

More Australians today have a job than at any other time in history (12.6 million working Australians).

The current wave of emerging technologies (like artificial intelligence, robotics and automation[1]) produces a number of new policy challenges, including the impact on Australian workers.

Technological change has been occurring in Australia for decades. Many technologies have taken over tasks that were previously done by people: from the loom and the harvester, to mass textile production and automatic supermarket checkouts.

The introduction and adoption of information and communication technologies over the last three decades is a good example. The computer and the internet have fundamentally changed the nature of work, jobs and workplaces. However, following the widespread adoption of information and communication technologies, there was no discernible negative impact on employment across

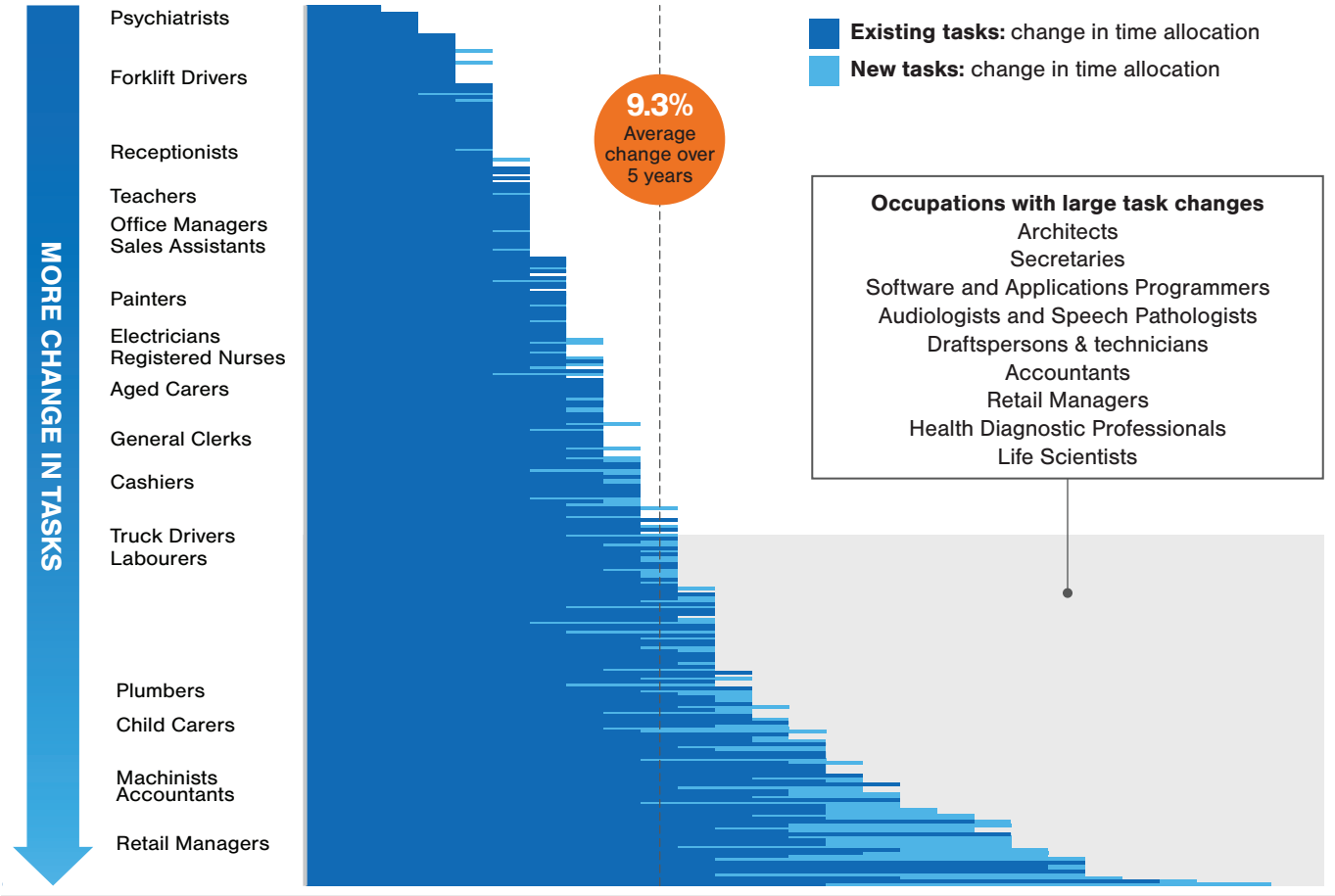
[1] Refer to the glossary at the back of this fact sheet for more detail on these technologies.

G20 countries.[2] Dynamic labour markets help organisations and individuals to gradually adjust, and incrementally move the allocation of people and resources to more productive uses.

The cumulative weight of evidence demonstrates that, when labour-saving technology is adopted, labour is re-directed to other areas of demand. In this way, Australia's labour markets are reasonably effective at accommodating change.

Some commentators suggest that improvements in technology will mean swathes of work can be delegated entirely to technology, leading to a massive surplus of labour and potential re-imagining of how people will allocate their time to work or leisure.[3] But, based on historical evidence, large surpluses of workers seem unlikely. In spite of the transformative impact of information and communications technologies, hours worked per capita in Australia has stayed fairly stable (outside of economic downturns) since the 1960s.[4] Treasury projects that hours worked per person will remain essentially stable over the coming decades and, if anything, an ageing population is more likely to reduce the proportion of traditional working age Australians and the participation rate.[5]

Figure 1
Task change by occupation, % change in tasks over 5 years



Source: *O*Net, AlphaBeta analysis*

[2] Organisation for Economic Cooperation and Development, *Future of work and skills*, February 2017, ***https://www.oecd.org/els/emp/wcms_556984.pdf***
[3] See, for example, R Avent, *The Wealth of Humans: Work and its Absence in the Twenty-first Century*, 2016, Penguin Books, Great Britain, or M Ford, *The Rise of the Robots*, 2015, Oneworld Publications, Great Britain.
[4] J Borland and M Coelli, 'Are robots taking our jobs?' *Australian Economic Review*, vol 50, issue 4, pp 377 – 397, 2017.
[5] The Treasury, 2015 *Intergenerational Report*, March 2015, ***https://treasury.gov.au/publication/2015-intergenerational-report/***

Although the overall, aggregate amount of work is unlikely to change, selected cohorts of workers may be disadvantaged by developments in technology. To understand the full impact of technological change, we need to consider:

1 jobs that will remain but will change;

2 jobs that will be entirely substituted by technology; and

3 new jobs that will be created by technology.

TECHNOLOGY WILL RESULT IN CHANGES IN TASKS

Every single job in Australia will likely experience some change in tasks over the next decade.

This is not a new phenomenon. Almost every working Australian gradually adapts to change in their job as a matter of course. It is very difficult to imagine any job in Australia that does not involve a computer, a smartphone, the internet or some form of software at some stage.

Analysis by AlphaBeta suggests that, between 2011 and 2016, the average level of task change within occupations was around 9.3 per cent *(Figure 1, previous page)*. In other words, Australian workers now spend about half a day a week doing tasks that people in the same job were not doing five years ago.

Here are some examples of the task changes that have already occurred:

- **Accountants** are spending less time computing data and more time resolving clients' problems.
- **Registered nurses** are spending less time recording patient histories, and more time monitoring patients.
- **Product assemblers** are spending less time assembling machinery and more time reviewing and learning.

Many of the tasks that shift from being performed by people to technology will be risky, routine or repetitive. Workers currently performing these tasks have the lowest reported levels of job satisfaction.[6]

The remaining tasks that will experience greater demand are likely to be tasks that are not well performed by technology, such as solving problems, generating creative ideas and uniquely human interactions. Tasks less likely to be automated and therefore may experience higher demand include:

- **perception and manipulation tasks** (such as identifying objects and moving them in an unstructured or cluttered working space, or personal services like beauty therapy, or fine motor functions that require detail [like the work of an electrician])
- **creative intelligence tasks** (such as artistic design, musical composition and cheffing)
- **social intelligence tasks** (such as negotiation, persuasion and care), and
- **problem solving tasks**.[7]

Considering the significant impact technology could have on every single job, an ability to adapt to changing tasks will be essential for every working Australian.

There are many benefits to Australians from adapting to task change: AlphaBeta's research finds that jobs that experience more task change have less incidence of job losses.

But, we also need to be alert to jobs where the task change may be so great that existing workers are at risk of involuntary transition (job loss).

The education and training system has an important role to play (especially when tasks are changing more rapidly), but the incremental change in tasks also highlights the critical importance of on-the-job learning.

[6] AlphaBeta, *The Automation Advantage*, August 2017, ***http://www.alphabeta.com/wp-content/uploads/2017/08-/The-Automation-Advantage.pdf***

[7] C Frey and M Osborne, *The future of employment: How susceptible are jobs to computerization?*, working paper, September 2013.

A SMALL NUMBER OF JOBS WILL BE ENTIRELY SUBSTITUTED BY TECHNOLOGY

In a small number of instances, it is possible that technology will substitute sufficient tasks to make an entire job obsolete. This has previously occurred with jobs like typists or photo developers.

If the adjustment occurs quickly, some individuals could find themselves out of work in the short term.

The loss of any job has a personal, emotional and financial cost for the individual involved.

Over the long term, jobs that are routine (whether cognitive or manual) are particularly at risk.[8] In fact, they already have been declining for some time:

- In the last 30 years, routine manual jobs (eg. machinery operators) have fallen from 40 to 30 per cent of the labour market, while the proportion of routine cognitive jobs (eg. clerical workers) has fallen from 27 to 23 per cent.
- At the same time, the number of non-routine manual jobs (eg. hospitality workers) has risen from 6 to 11 per cent, as have non-routine cognitive jobs (eg. professional occupations) rising from 27 to 36 per cent.[9]

There have been many high-profile estimates of gross job losses, that range from the very small to the very large. A summary of the estimates is provided. *(See Figure 2, below)*

Figure 2
Selected estimates of jobs lost to automation

Author	Impact	Where?	When?
McKinsey (2017) [10]	<5% of jobs lost Almost 50% are automatable	46 countries	–
OECD (2016) [11]	9% of jobs are automatable	21 OECD countries	–
Borland and Coelli (2017) [12]	9% of jobs are automatable	Australia	–
OECD (2018) [13]	14% of jobs are automatable 32% of jobs significantly changed	OECD countries	–
PwC (2018) [14]	Almost 20% of jobs at high risk of loss from automation	Developed countries	Late 2020s
CEDA (2015) [15]	40% of jobs with high probability of loss	Australia	Within 10–20 years
Frey and Osborne (2013) [16]	47% of jobs at high risk of loss from automation	US	Over the next decade or two

8&9 A Heath for the Reserve Bank of Australia, *The changing nature of the Australian workforce*, speech delivered September 2016, ***https://www.rba.gov.au/speeches/2016/sp-so-2016-09-21***

10 McKinsey Global Institute, *A future that works: automation, employment and productivity*, January 2017.

11 Arntz, M., T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", OECD Social, Employment and Migration Working Papers, No. 189, OECD Publishing, Paris. ***http://dx.doi.org/10.1787/5jlz9h56dvq7-en***

12 J Borland and M Coelli, 'Are robots taking our jobs?' *Australian Economic Review*, vol 50, issue 4, pp 377 – 397, 2017.

13 L Nedelkoska and G Quintini, 'Automation, skills use, and training', *OECD Social, Employment and Migration Working Papers*, No. 202, April 2018. ***http://dx.doi.org/10.1787/2e2f4eea-en***

14 PwC, *Will robots really steal our jobs? An international analysis of the potential long term impact of automation*, February 2018, ***https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/impact_of_automation_on_jobs.pdf***

15 Committee for Economic Development of Australia (CEDA), *Australia's future workforce*, June 2015, ***http://ceda.com.au/CEDA/media/ResearchCatalogueDocuments/Research%20and%20Policy/PDF/26792-Futureworkforce_June2015.pdf***

16 C Frey and M Osborne, 'The future of employment: how susceptible are jobs to computerisation?', *University of Oxford papers*, June 2013, ***https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf***

Some of these estimates overstate the potential job losses. For example, one critique suggests the methodology in Frey and Osborne (2013) – among other things – assumes that, if one task in a job can be automated, the entire job will be substituted.[17] We believe it is much more credible to expect that, if one task within a job is automated, the job will likely remain and the worker's time will be devoted to a different, more productive task.

For this reason, the most credible estimates seem to suggest the job displacement will be at the smaller end (between 5 and 10 per cent over the next decade).

Even if future job losses are much smaller than estimated, this does not diminish the need for a proper discussion on what we need to do to prepare. There is still an overwhelming imperative to assist those individuals to get back into work. The personal, emotional and financial cost for the individual can be so significant that, even if the aggregate numbers are smaller than expected, there is still more that can be done to assist those individuals.

The timing and location of job substitution can be difficult to predict. The speed at which labour-saving technology is adopted will depend on a range of factors (including cost, social acceptance and regulatory requirements) – not just the availability of the technology. The rate of change will differ across different sectors, and it is possible that some change may be more severe in some sectors and occupations that have been relatively immune in the past.

TECHNOLOGY WILL ALSO CREATE JOBS

We can also expect that technology will directly and indirectly create jobs.

Some of the jobs that would be directly created would likely include those that:

- develop, maintain and propagate the technology. For example, greater use of artificial intelligence will necessitate jobs for people who are 'trainers' (who teach artificial intelligence systems how to act), 'explainers' (who translate artificial intelligence results into language for people to understand) and 'sustainers' (who maintain artificial intelligence systems and ensure ethical use)[18], and
- use or complement the technology: for example, in Australia, there has been a rise in demand for photographers at the same time there has been a decline in photo developers and printers.[19]

Technology also indirectly creates jobs, primarily through improving productivity. Productivity is important because it is the key determinant of Australia's long-run living standards. Increasing productivity is critical to increasing real incomes over time.

As technology improves productivity, the resulting higher incomes create new or increased demand for goods and services generally, and free up resources to be used for more productive purposes.

The displacement effect from technology in the past has been offset by improvements in productivity.[20]

There are many estimates about the potentially large productivity benefits to be gained from deployment of technology. For example, McKinsey embracing digital technologies could add between $140 billion and $250 billion to the Australian economy by 2025.[21]

The direct and indirect creation of jobs by technology is likely to lead to net jobs growth, even as jobs may be displaced by technology over the long term. *(Figure 3, 'Glossary' overleaf)*

17 J Borland and M Coelli, 'Are robots taking our jobs?' *Australian Economic Review*, vol 50, issue 4, pp 377–397, 2017.
18 H Wilson, P Daugherty and N Morini-Bianzano, 'The jobs that artificial intelligence will create', *MIT Management Review*, March 2017.
19 CSIRO, *Tomorrow's Digitally Enabled Workforce*, January 2016.
20 D Acemoglu and P Restrepo, 'Artificial Intelligence, Automation and Work', *Economics of Artificial Intelligence*, December 2017.
21 McKinsey, *Digital Australia: Seizing the opportunity from the Fourth Industrial Revolution*, May 2017.

Figure 3
Glossary

Term	Meaning
Artificial intelligence	Technologies that analyse data and language in new ways to recognise complex patterns and improve their own analysis.
Automation	Automation could extend to any technology that allows a task to be completed without a human performing it. ***Robotic process automation*** is a type of software that can complete a task without a human performing it.
Internet of Things	The connection of physical objects to the Internet (potentially through sensors or other technologies), allowing objects to communicate data, and be controlled remotely.
Robotics	The development of physical machines that can replicate human actions.