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Australia's automation opportunity

Reigniting productivity and inclusive income growth

Australia's automation opportunity: Reigniting productivity and inclusive income growth

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In brief

Powerful new automation technologies such as machine learning, artificial intelligence (AI) and advanced robotics have already started to transform the Australian economy and are set to reach scale in the decades ahead. These technologies present an enormous opportunity to restore momentum to the Australian economy and extend its 30-year boom in an inclusive way. However, the potential scale and distributional impacts of this disruption need to be carefully managed. This research examines how automation may affect Australia's economy (under slow, mid-point and fast rates of adoption), and what policymakers and business leaders can do to both secure the benefits and navigate the challenges. The key findings are summarised below.

— Automation technologies offer the promise of better customer and citizen outcomes, new business ventures and more efficient operations. We estimate that between 25 and 46 percent of current work activities in Australia could be automated by 2030, helping to drive a renaissance in productivity, income and economic growth. If seized, this opportunity could add $1.1 trillion to $4 trillion to the economy over the next 15 years, providing every Australian with $4,000 to $15,000 in additional income per year by 2030. Achieving these benefits depends on ensuring displaced workers can get new jobs.

— Automation technologies will disrupt workforces across the economy. We estimate that 3.5 million to 6.5 million full-time equivalent positions could be affected, with 1.8 million to 5.0 million workers needing to change professions. At a mid-point pace of adoption, disruption by industry could range from 16 percent of jobs in the education sector up to 33 percent of jobs in transport. Across regions, the impact could vary from 21 percent in city centres dominated by professional services to over 30 percent in mining regions like the Pilbara. The economy will adjust, however, and new jobs will flow from the higher productivity that automation generates, as well as other trends including rising consumer incomes, greater health spending on ageing and infrastructure investment.

— While some jobs will be lost, and others created, all jobs will change. As automation technologies take over more routine, predictable and physical activities, the mix of skills required in all jobs will shift, and there may be more opportunities for women with children, older workers and people with a disability. People at work will spend over 60 percent more time using technological skills and over 40 percent more time using social and emotional skills. Demand will increase for workers in unpredictable and interactive roles such as nurses, care workers and salespeople, but will fall for workers doing more automatable activities such as radiologists, mechanics, legal research assistants and those in accounts processing.

— Left to its own devices, automation could have significant distribution impacts. During the peak of the transition, increased job churn could see Australia's unemployment rate temporarily spike by up to 2.5 percent (for example, from 5 to 7.5 percent). Without retraining for vulnerable workers, especially administrative and manual workers and those in vulnerable regions, income inequality could widen by up to 30 percent.

— With foresight and a commitment to act, Australia can capture the opportunity offered by automation, manage the risks and ensure the gains are broadly shared. The national effort could include essential competition reform and strong mechanisms to coordinate action. Companies and public agencies could refresh their strategies with ambitious customer- and citizen-centric targets that could only be achieved with automation, then build the skills and culture they need to meet them. Educators can lead efforts to foster lifelong learning of relevant skills through accessible, modular courses. Finally, companies could benefit from taking farsighted steps to assist displaced workers, complementing renewed government efforts to protect the most vulnerable and promote inclusive income growth.

Australia's automation opportunity

Our scenarios for midpoint to rapid automation adoption highlight significant upsides

50-150%

Increase in average annual productivity growth compared to baseline

$4,000-$15,000

Additional annual income per Australian by 2030

$170-$600 billion

Additional annual GDP by 2030

Potential workforce displacement and transitional risks

25-46%

Share of existing workforce activities that could be automated by 2030, under our midpoint to rapid automation adoption scenarios

+27%

Increase in income inequality without additional retraining programs, under our midpoint automation adoption scenario

+0.3-1.2 ppt

Increase in unemployment rate without additional transitional support programs, under our midpoint automation adoption scenario
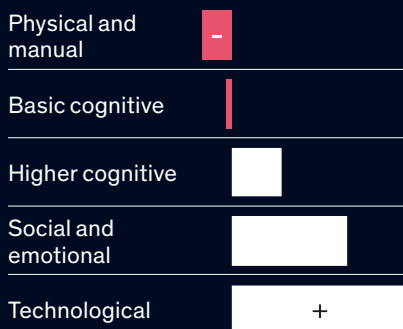
Workforce transitions

Our scenarios for automation and labour demand also highlight challenges for workers

Switching occupations...

1.8-5 million

Number of people who may need to switch occupational categories by 2030, under our midpoint to rapid automation adoption scenarios

Demanding new skills...

Physical and manual   −

Basic cognitive

Higher cognitive

Social and emotional

Technological   +

Changing education requirements...

High school or less ▼

Certificate/ Diploma =

University or advanced ▲

Ten ideas for policy makers, employers and educators

A. Governments and employers should accelerate automation both nationally and at the organisational level

1. Jump-starting national competition agenda

2. Create national mechanisms to coordinate change

3. Accelerate automation at the organisational level

4. Build the organisation of the future
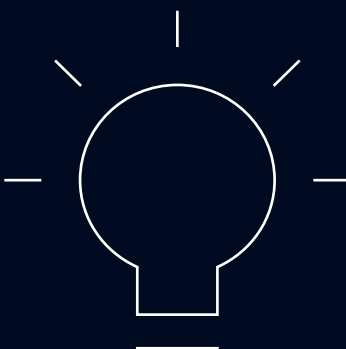
B. Governments, employers and educators should promote inclusion by supporting workers through job and skill transitions

5. Invest in worker retraining

6. Support displaced workers prepare for new roles

7. Better align course offerings with needs

8. Establish 'lifetime learning accounts'

9. Invest in individual transitional support

10. Optimise re-employment services

Executive summary

A century ago, few things said 'the world is changing' louder than a horseless buggy. Today's horseless buggy is a driverless car, but robo-taxis are just one of infinite automations that will change people's lives, combining robotics, machine learning and artificial intelligence (AI). That prospect may seem both exciting and terrifying, but it is fast becoming a reality in Australia and elsewhere.

Automation is coming at an interesting time for Australia, which is now approaching three decades of uninterrupted economic growth. While the benefits have been shared relatively widely and there has been a lot to celebrate, many Australians have recently started to feel that they are missing out. In some ways, they are right: the last decade has not been as impressive as the first two decades of the boom, delivering both lower economic and income growth, and fewer benefits to Australian households.

It is perhaps natural that people who are feeling anxious about their economic futures are not thrilled about the prospect of another wave of technological change. However, automation is not the harbinger of robot armies and mass unemployment. While it may seem counter intuitive, automation holds great promise for Australia and could help to rekindle the kind of economic growth that delivers higher living standards and more choices for everyone. Of course, automation will inevitably create challenges, but Australia has in the past confronted similar challenges head on and found ways to maximise opportunities to build sustainable and inclusive growth for all.
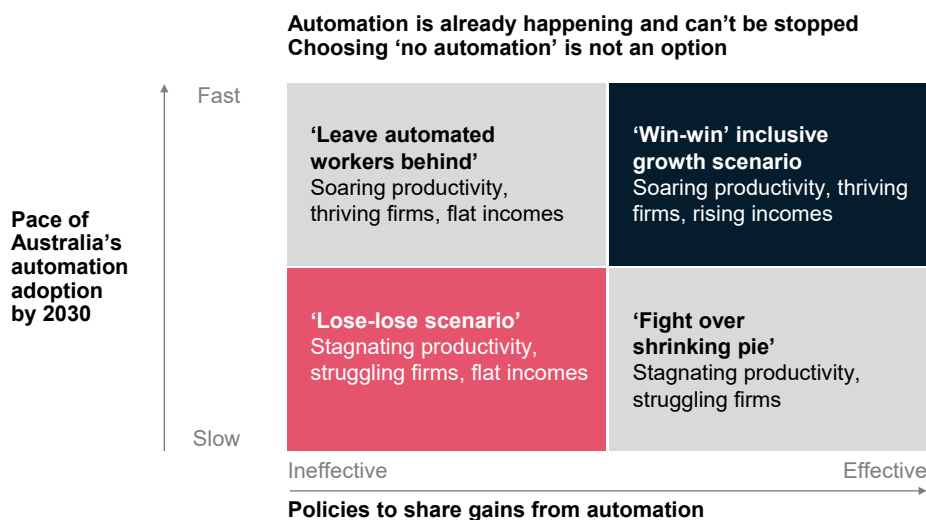
This report sets out why and how Australia must push for the win-win scenario of inclusive growth (top-right scenario, Exhibit 1) by pursuing actions that both accelerate automation adoption *and* share its benefits:

— Australia needs to boost productivity to rekindle the kind of sustainable economic growth that spreads income growth across the population, especially given the long-term headwinds of an ageing population. Without a renaissance in productivity, Australia risks a permanent future of lower growth, and reduced resources to invest in creating more opportunities for all its citizens.

— Automation could provide just the fuel Australia needs to turbocharge productivity, with the potential to boost productivity growth by 50 to 155 percent relative to a base scenario, depending on pace of adoption. This could result in a 20 to 70 percent increase in gross domestic product (GDP) growth, and a 60 to 190 percent increase in per capita growth.

— The scale of this opportunity is considerable: automation could add around $1.2 trillion to the Australian economy by 2030 and give each Australian additional income of $4,000 per year. A bold push to rapidly automate could more than triple these benefits to $4 trillion and $15,000 respectively.[1]

— However, automation will change the nature and mix of Australia's jobs, posing skills and equity challenges across sectors, occupations and regions. Without a concerted effort to support displaced workers to retrain and re-enter the workforce, unemployment could rise by up to 2.5 percent and income inequality could widen by up to 30 percent.

— Capturing the potential upside of automation and positive outcomes for workers will not magically happen on its own. To overcome the risks and benefit from the opportunities, Australia needs the twin national efforts of accelerating automation while ensuring social inclusion, with national mechanisms for policy and coordination.

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[1] Assumes that all displaced workers re-join labour market at productivity levels equal to or higher than previous job.

Exhibit 1
Pick a box

Scenarios for potential outcomes of automation, by pace of adoption and effectiveness of policies to share gains

Automation is already happening and can't be stopped
Choosing 'no automation' is not an option

	Ineffective ←	→ Effective
Fast	**'Leave automated workers behind'** Soaring productivity, thriving firms, flat incomes	**'Win-win' inclusive growth scenario** Soaring productivity, thriving firms, rising incomes
Slow	**'Lose-lose scenario'** Stagnating productivity, struggling firms, flat incomes	**'Fight over shrinking pie'** Stagnating productivity, struggling firms

Pace of Australia's automation adoption by 2030

Policies to share gains from automation

The alternatives are not appealing: either firms race ahead and automate, leaving workers behind (top-left scenario); or Australia tries—in vain—to hold back the unstoppable tide of automation (bottom-left scenario), potentially while also fighting over a shrinking pie (bottom-right scenario).

Faced with these alternatives, it is imperative that Australia taps into the collaborative, bipartisan and reformist spirit that launched its economic boom, so that it can continue to reap the rewards. Society must recognise that automation is inevitable and actively steer its course, rather than choosing fear and resistance.

To help prepare Australia for the next wave of change, McKinsey Australia has looked at what the country has done to successfully navigate past structural changes and to ensure that benefits were fairly shared (Chapter 1); how automation could positively impact Australia (Chapter 2), as well as the potential challenges (Chapter 3); and finally, what the country could do to prosper in the age of automation (Chapter 4). The key findings from these chapters are summarised below.

1. Australia needs to boost productivity to extend its boom

Australia won't generate the widespread benefits and rising incomes that it enjoyed from 1992 to 2007 unless it can accelerate its flagging productivity growth.

Australia's impressive economic boom delivered widespread benefits
Australia has enjoyed a 27-year streak of uninterrupted economic growth, skilfully navigating a series of global crises while undertaking significant structural reforms: opening up its economy, increasing labour market flexibility, transitioning to a service-based economy and embracing the digital revolution. The results have been the envy of the world, prompting *The Economist* magazine to proclaim Australia the world's 'most successful rich economy' in 2018.[2] Australia now boasts the highest median income and wealth in the G20 (a group of the world's major industrialised economies) and the highest human development levels, and it is home to three of the world's ten most liveable cities.[3]

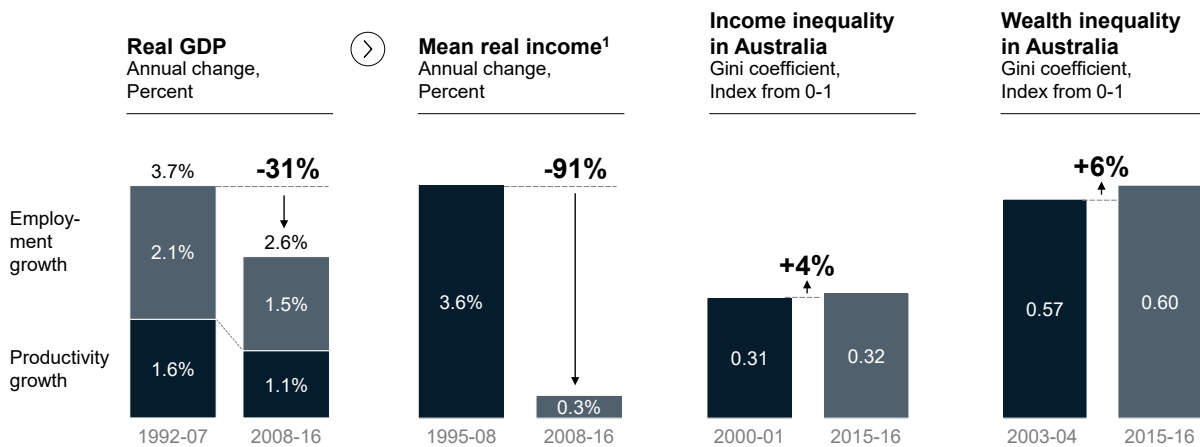
[2] *Aussie rules,* The Economist, October 27, 2018.
[3] *The Global Liveability Index 2018*, The Economist.

For most of Australia's boom, the benefits of economic success were distributed relatively widely. Between 1995 and 2016, the great majority of Australians—regardless of income quintile—enjoyed an average annual rise in income of around 2.4 percent, resulting in an extraordinary two-thirds increase in income levels over that two-decade period. This income growth, combined with progressive government policies, allowed Australia to avoid the sharpest gaps between 'haves' and 'have-nots' that have plagued many other advanced economies in recent decades. Despite a recent slight uptick, both income and wealth inequality in Australia are at or below the average for advanced economies, and well below levels in the United States.

However, as the boom weakened, growth became slower and less inclusive
While the macro story of the last three decades is overwhelmingly positive, the most recent decade has been less impressive, with slower growth fuelled by less inclusive drivers. This shift in gears has produced smaller and less equitable gains. Since the Global Financial Crisis (GFC), GDP and productivity growth have fallen by a third to 2.6 percent and 1.1 percent per year, respectively (Exhibit 2). This slowdown occurred across nearly every industry, and sectors employing around half of all Australian workers saw little or no productivity growth at all. With productivity on the wane, the engines of growth have tilted to less sustainable drivers such as the terms of trade boom (fuelled by China), rising household debt and strong population growth.

Exhibit 2
Shifting down a gear

Real GDP Annual change, Percent		**Mean real income[1]** Annual change, Percent		**Income inequality in Australia** Gini coefficient, Index from 0-1		**Wealth inequality in Australia** Gini coefficient, Index from 0-1	
3.7%	**-31%**	**-91%**			**+4%**	**+6%**	
2.1%	2.6%	3.6%					
(Employment growth)	1.5%				0.32	0.57	0.60
(Productivity growth) 1.6%	1.1%		0.3%	0.31			
1992-07	2008-16	1995-08	2008-16	2000-01	2015-16	2003-04	2015-16

1 Equivalised disposable household income; data only available from the 1994-95 financial year. Not available for the 2016-17 financial year
Note: All growth rates are compound average growth rates (CAGR)

Source: ABS National Accounts (Catalogue 5206) and Household Income and Wealth (Catalogue 6523)

The impact on Australians has been painful, with almost no meaningful increase in average real incomes in almost a decade. Income growth has essentially collapsed, inching ahead at just 0.3 percent a year (Exhibit 2). This sharp slowdown has coincided with a slight uptick in income inequality. Wealth inequality has increased too, driven by the long housing boom (notwithstanding the recent cooling in prices), exacerbating inequalities between existing homeowners and those who are increasingly priced out of the housing market. These trends have left many Australians feeling like they have missed out on the boom years.

To reignite inclusive growth, Australia needs to accelerate productivity

Productivity and wages have historically moved in tandem with one another in Australia (Exhibit 3). Worryingly, both have declined and the two are now diverging, raising concerns about the fairness of how benefits from growth are being shared. Since 2008, productivity growth has run at three to four times the rate of wage growth, suggesting that businesses have invested their smaller productivity gains elsewhere. This decoupling has occurred in the past and eventually readjusted, so it isn't yet clear whether the current break is a structural shift or simply a short-term phenomenon. However, the closer these two measures track, the more inclusive and sustainable a nation's economic growth.

Exhibit 3

Separation or divorce?

Historical correlation of productivity and wage indicators in Australia[1]
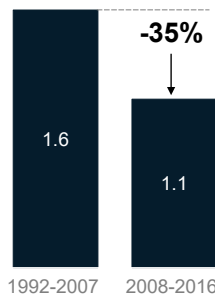Index, 1992=100
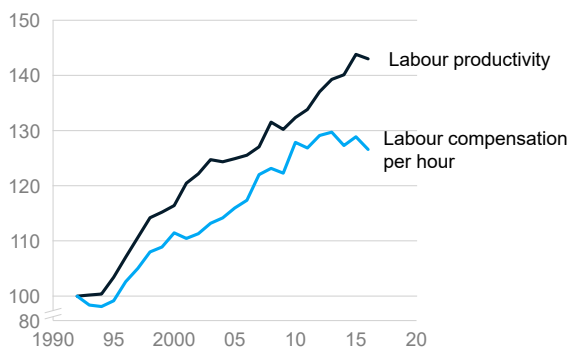
Note: Numbers may not sum due to rounding
1 Real compensation per hour calculated using CPI
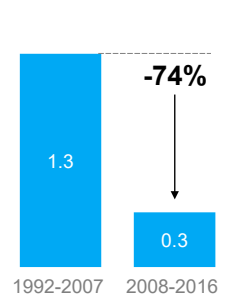
Source: OECD

Growth in indicators
Annual change (CAGR), Percent

To reignite income growth for Australian households, the country must re-fire its productivity engine *and* ensure that any gains translate into wage gains. If it fails in this task, we estimate that Australia's economic growth could decline to an average of just 2.4 percent through to 2030, and that per capita GDP growth could stagnate at the current low of 0.9 percent.

2. The automation opportunity

Automation is an inevitability that holds enormous promise for Australia. But that does not mean that its benefits are inevitable. The extent to which it can boost productivity and incomes depends on how fast Australia chooses to enter the automation age.

The automation wave is on its way, with enormous promise

Automation technologies—advanced robotics, machine learning and AI—have the potential to make revolutionary changes to the workplace. For example, AI-driven algorithms can already recognise faces, personalise product recommendations, automate customer service, coordinate supply chains, detect fraud, schedule asset maintenance, make hiring decisions, analyse financial risk, create online content and interpret X-rays. Much more growth and competitive reshuffling is still to come. Globally, the McKinsey Global Institute has found that AI alone may deliver US$13 trillion in additional economic activity by 2030—about 16 percent more than it would achieve otherwise.

A significant share of workplace activity could be automated

The McKinsey Global Institute has mapped automation technologies against more than 2,000 specific work activities across 800 occupations and examined the global implications. This research also examined multiple factors that would affect the pace and extent of automation, resulting in three scenarios for automation potential (i.e. what can technically be automated, because the technology exists) and automation adoption (i.e. what we believe will be automated, taking into consideration financial, regulatory, and political and social constraints). These three scenarios are: (1) a late (or slow) scenario; (2) an early (or fast) scenario; and (3) a mid-point scenario, which is the average of the late and early scenarios. For early adoption to happen, technologies and solutions would need to be developed at an accelerated speed, requiring both the public and private sectors to invest significantly in research and development (R&D), technology development and technology deployment. That would require investment in developing the technologies themselves, and in digitally enabled infrastructure. Likely barriers to adoption would also need to be overcome quickly, requiring a high degree of support and consensus across society.

McKinsey Australia has applied these methodologies to examine the impact for Australia. We found that 63 percent of work activities have the potential to be automated by 2030 in the mid-point scenario, and 81 percent in the early scenario. Factoring in potential barriers to adoption, we estimate that 25 percent of work activities will be automated by 2030 in the mid-point scenario (about 40 percent of the total potential) and 46 percent in the early scenario (about 60 percent of the potential).
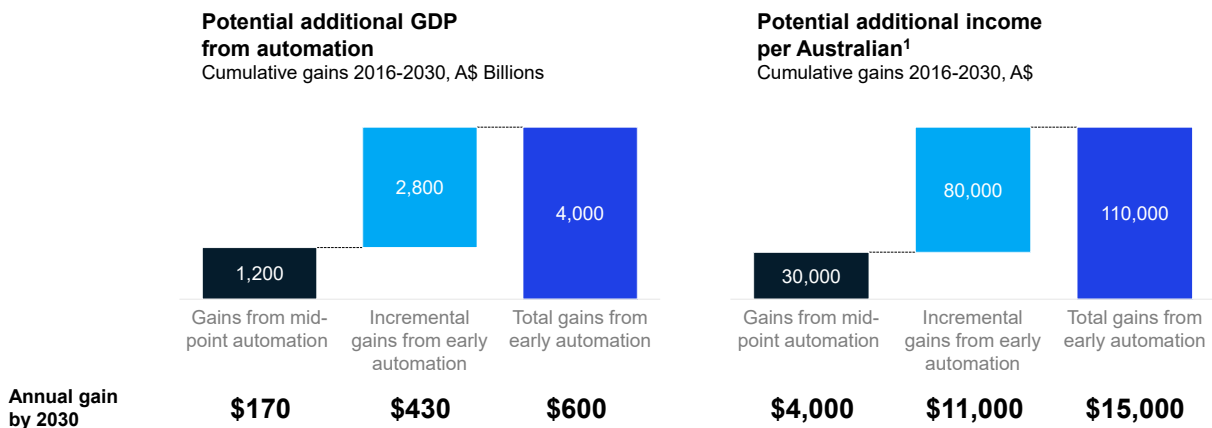
Three-quarters of Australia's automation opportunity will be found in nine sectors. Six are among the largest employers in the economy and have highly automatable activities: retail, administrative and government, construction, manufacturing, accommodation and food services, and transport and warehousing. Three more sectors—healthcare, professional services and education—will experience significant automation simply due to their size and diversity of work activities. Notably, three of the nine sectors—administration and government, healthcare and education—are heavily dominated by the public sector, making public agencies critical players in capturing automation opportunities.

Automation can help reignite income growth by boosting productivity

By lifting productivity and incomes, mid-point automation could add around $1.2 trillion to the Australian economy by 2030 and give each Australian additional income of $30,000 over that period (Exhibit 4). A bold push to rapidly automate could more than triple the benefits to $4 trillion and $110,000 respectively. In annual terms, this could increase incomes for Australians by $4,000 to $15,000 per year by 2030 (7 to 26 percent more than otherwise).

Exhibit 4

The automation opportunity

Potential additional GDP from automation
Cumulative gains 2016-2030, A$ Billions

Potential additional income per Australian[1]
Cumulative gains 2016-2030, A$

	Potential additional GDP from automation			Potential additional income per Australian[1]		
	Gains from mid-point automation	Incremental gains from early automation	Total gains from early automation	Gains from mid-point automation	Incremental gains from early automation	Total gains from early automation
Cumulative	1,200	2,800	4,000	30,000	80,000	110,000
Annual gain by 2030	**$170**	**$430**	**$600**	**$4,000**	**$11,000**	**$15,000**

Note: Numbers may not sum due to rounding
1 Equalised disposable household income

Source: ABS National Accounts (Catalogue 5206) and Household Income and Wealth (Catalogue 6523) data, McKinsey Global Institute analysis

By adopting automation at the mid-point rate, Australia could boost annual productivity growth to around its pre-GFC rate of 1.6 percent; rapid adoption could boost it to 2.7 percent (almost two times the pre-GFC rate). This could increase annual GDP growth to between 2.9 and 4.1 percent (depending on speed of adoption) and accelerate per capita income growth from 0.9 percent to 1.4–2.5 percent. In some tradeable sectors, such as manufacturing, rapid adoption offers the opportunity to increase productivity levels and potentially catch up to competitors. In domestic sectors, such as retail, rapid automation could allow firms to overtake US productivity levels, potentially enabling significant wage increases for workers.

Against the long-term headwinds of an ageing population, the threats of declining growth in China, rising global protectionism and the recent housing market downturn, automation is an opportunity that Australia cannot afford to ignore.

Capturing these benefits of automation will, however, require substantial investment in assets, automation of business processes and workforce capability building by organisations across the private and public sectors. We estimate that it could require additional cumulative investment of around $800 billion by 2030 in the mid-point scenario (in real terms), and around $2.7 trillion in the rapid adoption scenario—about 11 to 39 percent more than would be required otherwise. This equates to additional annual investment of between $60 billion and $300 billion, on average, in the period to 2030 depending on the pace of automation.

3. The challenges to employment, skills and inclusion

Automation does not come without its challenges; there is no denying that it will displace jobs, and disrupt workplaces and some vulnerable communities. However, the extent of this change is neither unprecedented nor unmanageable, and the benefits will be lasting.

Total job demand will be resilient, though with much churn

The 25 and 46 percent automation adoption rates under the mid-point and early scenarios translate to around 3.5 million or 6.5 million full-time equivalent positions displaced over the next decade, respectively. These levels of displacement are not unprecedented: they equate to a simple average annual displacement rate of around 1.8 percent in the mid-point scenario (not dissimilar to recent historical rates of displacement due to technology and economic change) and 3.3 percent in the rapid scenario (roughly 40 percent higher than recent trends). At the same time, moreover, population growth, rising consumer incomes, growing healthcare needs from an ageing population, and higher energy and infrastructure investment will continue to create jobs. Once automation kicks in, it will have second-round positive impacts on income and consumption, creating a virtuous loop. These trends will help to absorb displaced workers and return the economy to close to full employment.

While the very long-term (50- to 100-year) impacts of automation are hard to fathom, the economy should adjust and stabilise over the next decade or so. However, there is no doubt that displaced workers will find this period challenging. Some may be able to find similar jobs, but between half and 80 percent may need to retrain and transition to completely new occupations in order to find work, depending on the pace of automation.

The immediate challenge is to minimise long-term unemployment for individuals transitioning between jobs and occupations by maintaining labour market flexibility and stepping up support for displaced workers. If Australia's historically high re-employment rate for unemployed people holds, automation may have a relatively small impact on the unemployment rate, causing a temporary rise to between 5.3 and 5.7 percent (Exhibit 5). However, if the re-employment rate falls, the overall unemployment rate could rise as high as 6.2 percent in the mid-point scenario (1.2 percent higher than otherwise) and 7.3 percent in the rapid adoption scenario (2.2 percent higher than otherwise).
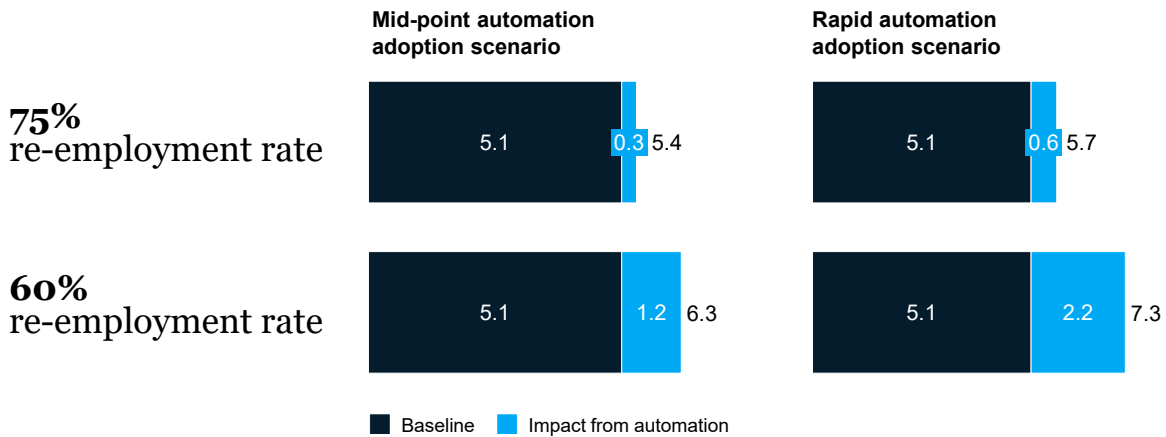
Job demand will vary by sector, occupation and region

Existing jobs will see varying shifts in supply and demand. While across the nation about 25 percent of jobs will be affected in the mid-point scenario, this could range from lows of 16 percent in the education sector to highs of 29 percent in manufacturing. Even within sectors, there will be variation across occupations. In the health sector, for example, there will be more demand for doctors and nurses but lower demand for radiologists. In the retail sector, there may be greater demand for customer service staff but lower demand for checkout staff.

Exhibit 5

Peak unemployment

Scenarios for peak impact on unemployment by automation adoption and re-employment rate[1] within one year
Percent in 2025

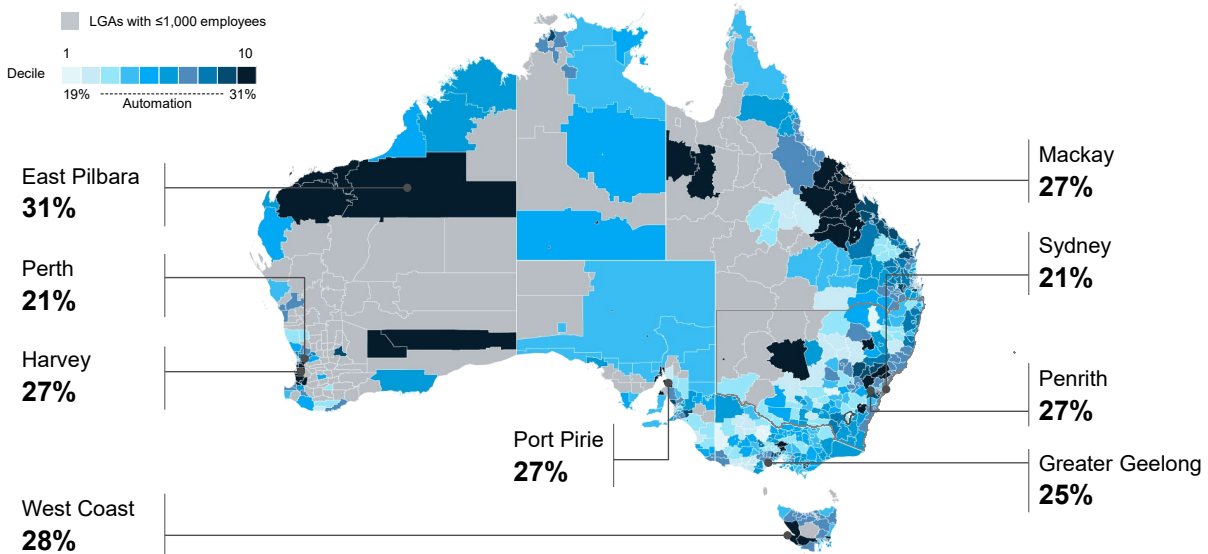|	Mid-point automation adoption scenario	Rapid automation adoption scenario
75% re-employment rate	5.1 · 0.3 · 5.4	5.1 · 0.6 · 5.7
60% re-employment rate	5.1 · 1.2 · 6.3	5.1 · 2.2 · 7.3

■ Baseline ■ Impact from automation

1 Over long term, 75% of unemployed persons in Australia have been re-employed within one year. The lowest rates recorded are around 60% during the recessions of the early 1980s and 1990s

Source: ABS Labour Force (Catalogue 6202), December 2018; McKinsey Global Institute Global Growth Model

Exhibit 6

Regional blues

Mid-point automation adoption by 2030, by local government area (LGA)

LGAs with ≤1,000 employees
Decile 1 ——— 10
19% -------------------------- 31%
Automation

East Pilbara **31%**
Perth **21%**
Harvey **27%**
West Coast **28%**
Port Pirie **27%**
Mackay **27%**
Sydney **21%**
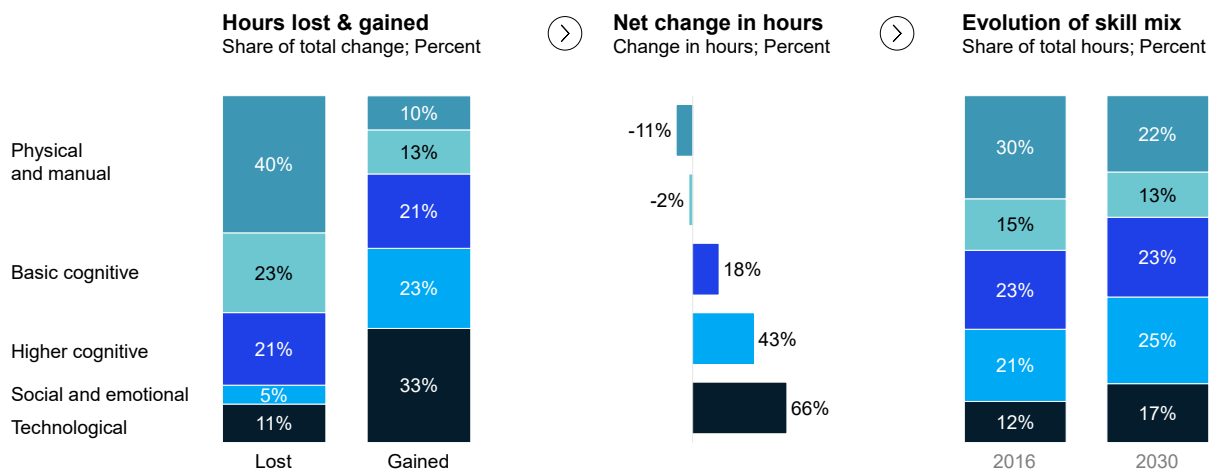Penrith **27%**
Greater Geelong **25%**

In addition, while our modelling predicts that the rate of automation will be relatively uniform across Australian states and territories, there will be significant variation across local areas and communities (Exhibit 6). Job displacement could range from lows of about 21 percent in the inner cities to highs of about 31 percent in some outer suburban and remote areas, where jobs are concentrated in vulnerable sectors like mining, transport and construction.

Different skills will be needed, and at a higher level

Automation will also lead to a shift in the demand for skills across the economy, requiring everyone to upskill and retrain (Exhibit 7). Four types of work activities will see an increase in demand: working with machines (technology skills), applying specialised expertise (higher cognitive skills), interacting with stakeholders (social skills), and managing, teaching and developing people (emotional skills). In our mid-point scenario, workers will spend 66 percent more time using technology, and 43 percent more time in personal interactions that require social and emotional skills. In contrast, the need for people to perform physical and routine

Exhibit 7
Skills evolution

Change in hours worked by skill category, 2016-30 (step-up labour demand, mid-point automation)

Hours lost & gained
Share of total change; Percent

Net change in hours
Change in hours; Percent

Evolution of skill mix
Share of total hours; Percent

	Lost	Gained
Physical and manual	40%	10%
		13%
Basic cognitive	23%	21%
Higher cognitive	21%	23%
Social and emotional	5%	33%
Technological	11%	

Net change in hours:
- -11%
- -2%
- 18%
- 43%
- 66%

	2016	2030
	30%	22%
	15%	13%
	23%	23%
	21%	25%
	12%	17%

Note: Based on difference between hours worked per skill in 2016 and modelled hours worked in 2030 in step-up scenario and mid-point automation adoption

Source: McKinsey Global Institute workforce skills model, McKinsey Global Institute analysis

tasks will shrink. Again, the skills shift will vary by industry. In transport, for example, demand for vehicle drivers will fall sharply, but automated fleets will be directed by people who can engage with monitoring technology, recognise issues, and work with stakeholders and their teams to resolve them.

Over time, automation could exacerbate current mismatches between future graduates' skills and labour market needs. For example, there may be an oversupply of vocational education and training (VET) graduates with entry-grade engineering or business skills (which are highly susceptible to automation). At the same time, Australia could face a shortage of 600,000 university graduates by 2030 in health, education and information technology (IT), including highly trained postgraduate engineers who know how to develop and work with new technology. Within the graduate body, students are already moving towards the health, science and education disciplines, all of which are areas of need. Accelerating these trends could minimise future labour market mismatches.

Without a strong societal response, automation could widen inequality
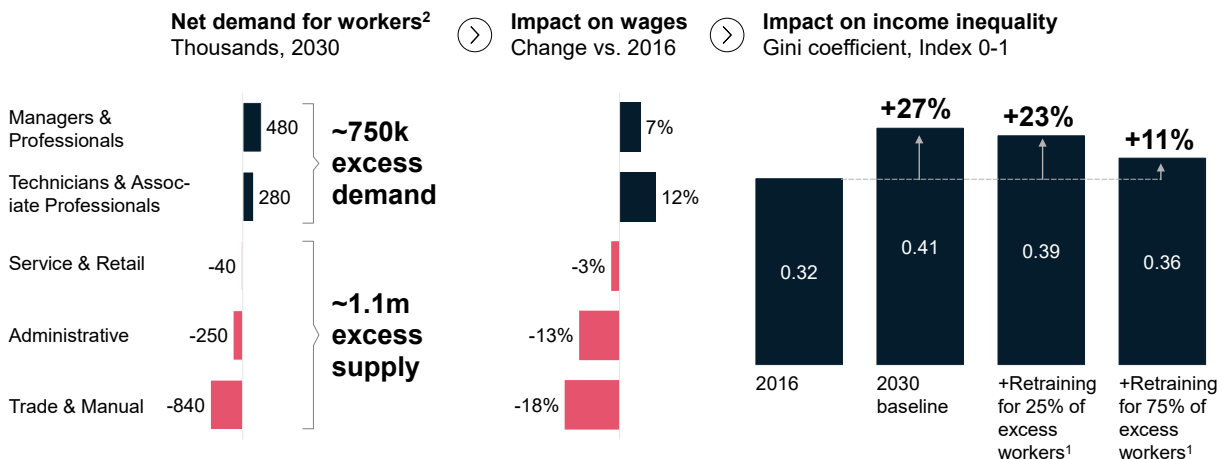
By global standards, Australia has moderate levels of income inequality. However, there are legitimate concerns that automation may increase those levels, as wages will tend to favour the more skilled. Subject to retraining efforts, the economy may need about 750,000 more professionals, managers, technicians and associate professionals by 2030, and may have a surplus of around 1.1 million trade, manual and administrative workers (Exhibit 8). These supply-and-demand forces could lead to a divergence in pay cheques, potentially leading to a 7–12 percent increase in wages for those with in-demand skills, and a 13–18 percent decline for those with over-supplied skills.

The extent to which these market forces result in higher income inequality will depend upon how much Australia steps up its efforts to retrain and redeploy its surplus service, administrative and manual workers. Without retraining, Australia's Gini coefficient of income inequality may rise by as much as 27 percent to 0.41, on par with the United States today. If three-quarters of surplus workers were retrained, the Gini coefficient would rise to just 0.36 (11 percent); if they were all upskilled, the co-efficient would not change at all.

The need for retraining underscores the risks for older workers, who may not be prepared, willing or able to upskill. Perhaps the greatest risk lies in outer suburban and regional communities, where sectors with greater potential for automation are concentrated. People living in these areas may have fewer local employment options and face a number of barriers to re-employment, particularly if they have already experienced waves of layoffs.

Exhibit 8

Divergence or convergence?

Scenarios for impact of automation on income inequality, by retraining scenario for workers in excess supply,[1]
2016-30 (mid-point adoption scenario, step-up labour demand)

| Net demand for workers[2] | Impact on wages | Impact on income inequality |
| Thousands, 2030 | Change vs. 2016 | Gini coefficient, Index 0-1 |

Managers & Professionals: 480
Technicians & Associate Professionals: 280
~750k excess demand

Service & Retail: -40
Administrative: -250
Trade & Manual: -840
~1.1m excess supply

Managers & Professionals: 7%
Technicians & Associate Professionals: 12%
Service & Retail: -3%
Administrative: -13%
Trade & Manual: -18%

+27%
+23%
+11%

2016: 0.32
2030 baseline: 0.41
+Retraining for 25% of excess workers[1]: 0.39
+Retraining for 75% of excess workers[1]: 0.36

1 Workers in excess supply (e.g. trade and manual workers) are retrained to fill vacancies in technician and associate professional jobs, while technicians and associate professionals are retrained to fill vacancies in manager and professional jobs
2 Demand for workers minus supply of workers

Source: MGI Global Trade Analysis Project (GTAP) general equilibrium model

4. A national agenda for automation and inclusion

Automation could provide a major boost to Australia's productivity and national prosperity. While the country has the necessary foundations to seize this opportunity, the challenge lies in accelerating the pace of automation adoption while simultaneously working to ensure inclusive growth. Australia's successful history of structural reform should help in managing this transition, but it will require collaboration across the Australian economy by governments, employers and education providers. We offer ten ideas for navigating the twin challenges of accelerating automation and ensuring inclusive income growth for consideration as part of this collaborative national effort.

A. Accelerate automation both nationally and at the organisational level
Governments

1. **Incentivise automation adoption in the private sector by jump-starting the national competition agenda.** The 2015 Harper Review and the Productivity Commission have made recommendations for improving Australia's competition policies and institutions to reverse its stalled reform momentum. Bold political leadership and a broad public mandate will be critical to implementing these recommendations and accelerating the pace of reform.

2. **Create national and regional coordination mechanisms to drive reform and maximise the productivity and inclusion benefits of automation.** The automation challenge needs systematic and wide-reaching engagement, and only the government has the resources and political mandate to coordinate across the economy. New mechanisms may be needed to provide a credible fact base on automation, forge consensus, and integrate implementation across government. There is also a place for regional mechanisms to coordinate national strategies at that level.

Private and public employers

3. **Accelerate automation at the organisational level as part of a long-term strategy, with ambitious targets that only the latest technologies can deliver.** The opportunities of automation apply equally to the private and public sectors. Organisations in both sectors could accelerate investments in automation technology, setting ambitious targets anchored in long-term strategies.

4. **Build the organisation of the future with the right size, shape and skills to deliver an automation strategy.** Private companies and public agencies will need to build organisations with the right size, shape and skills to deliver their automation strategies. This requires a gap analysis of current and future skill needs, and a comprehensive and well-executed strategic workforce plan to close those gaps.

B. Promote inclusion by supporting workers through job and skill transitions
Private and public employers

5. **Mitigate the impact of automation on the workforce by investing significantly in worker retraining and building an agile and resilient culture.** Organisations will not be able to hire all the skills they will need in the future. Instead, they will need to equip existing staff with the skills they need for new roles—for example, by investing significantly in worker retraining and upskilling, and creating an agile organisational culture that can adopt and adapt to technology.

6. **Support displaced workers beyond the organisation.** Employers could take steps to prepare workers for new careers, improving morale among continuing staff and attracting new staff with in-demand skills, funding and partnerships.

Education providers and governments

7. **Better align course offerings to student and employer needs.** Courses offered for working students could benefit from two changes: greater flexibility in the structure and timing of courses, and closer alignment with the mix of skills that workers at all levels will need. For these changes to happen, new funding models would need to link funding to student outcomes rather than intentions.

8. **Establish 'lifetime learning accounts' for adults of all ages.** Such accounts—active in Singapore and France, and under consideration in the United States—could support agile reskilling for adults.

Governments

9. **Invest in individual support rather than regional or sectoral plans.** It will be tempting to pursue sectoral or regional plans. A better use of public funds may be to offer targeted assistance that matches workers' individual profiles.

10. **Optimise re-employment incentives and capacity, and pilot social welfare innovations as needed.** Tweaks can always be made to ensure that existing unemployment and welfare systems provide appropriate incentives and capacity for workers to reskill and find better jobs. Governments may also consider piloting new ideas such as wage insurance to determine their effect in Australian conditions.

Automation is coming. The question is, what can Australia do to get the best possible outcomes for everyone?

Australia has managed this type of transition before, and it can do it again. When its economy has been under stress in the past, Australia has impressed the world with its will and capacity for effective solutions. However, the opportunities and challenges of automation are not something that a government, a single firm or a single individual can navigate alone. Australia needs a clear national strategy, the right skills and effective collaboration at all levels, as well as the determination to take action when needed.

The challenge is clear, but so is the prize. The timely and rapid adoption of automation can restore Australia's economic lustre, make its economy and workplaces more inclusive, create the necessary wealth for higher income growth—and perhaps even usher in a new and even brighter era of inclusive Australian prosperity.