



REGIONS IN
TRANSITION



FUTURE OF
REGIONAL JOBS



CITIES &
TOWNS

SHARED INQUIRY PROGRAM 2018

JOB VULNERABILITY IN AUSTRALIA

WHERE ARE VULNERABLE JOBS LOCATED?
ARE WE READY FOR THE FUTURE OF WORK?

September 2018



REGIONAL
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KNOWLEDGE POLICY PRACTICE

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Independent and informed by both research and ongoing dialogue with the community, the Regional Australia Institute (RAI) develops policy and advocates for change to build a stronger economy and better quality of life in regional Australia – for the benefit of all Australians. The RAI was established with support from the Australian Government.

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REFERENCE

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www.regionalaustralia.org.au/home/future-regional-jobs

INTRODUCTION

Australia's jobs are being affected by the rapid innovation in digital technologies. Increasing automation and the greater use of technology at work are constantly changing our work landscape. In addition, other factors such as ageing populations, more flexible work, and a focus on work-life balance are also influencing what our current and future jobs look like.

Previous reports examining Australia's labour market at the national level estimated around 40% to 44% of jobs are highly susceptible to automation in the coming years. While it is true that we may lose some jobs to automation, innovations in digital technologies will also bring about new jobs and change the way current jobs are done. In this report we go beyond the national picture to present our take on how jobs in regions could change as a consequence of greater automation.

There has been a great deal of discussion on the type of skills required by workers of the future to ensure employability. Together with NBN Co., RAI launched a report in early 2017 on the Future of Work looking at how jobs will change and the skills necessary to remain competitive in the future labour market. The consensus from the report was that, by 2030, employers will place greater demand on skills that are high tech (i.e. specialist), high touch (i.e. practical), and high care (i.e. personal). This is consistent with literature and employment projections that emphasise the need for workers to have skills that are not easily automated.

In the face of continued technological change, Australia's labour market will have to adapt. To understand how this adaptation needs to occur it is necessary to identify where vulnerable jobs are located.

JOB VULNERABILITY

The RAI has calculated a job vulnerability index to determine the proportion of jobs susceptible to automation in each LGA across Australia. Our index presents a scenario of how automation could impact on regional jobs, based on well accepted international studies. The RAI's modelling is not a prediction of what will happen, but more an assessment of how changes may play out in regions under commonly accepted assumptions of occupational vulnerability to automation.

The RAI index builds on Frey and Osborne's 2013 article, *The future of employment: How susceptible are jobs to computerisation* as a basis, and automation scores from Edmonds and Bradley's 2015 report, *Mechanical boon: will automation advance Australia?* Since Frey and Osborne's calculations have been considered to overstate the vulnerability of jobs to automation, the RAI has taken a more conservative approach which sees fewer jobs categorised as highly vulnerable to automation. Unlike Frey and Osborne, who adopt a '30-70' threshold to classify vulnerability, the RAI uses a '40-80' threshold. This means occupations with automation scores below 40 are classified as having 'low vulnerability', occupations with automation scores at or above 40 and at or below 80 are classified as having

‘moderate vulnerability’, and occupations with automation scores above 80 are classified as having ‘high vulnerability’.¹

This index has been applied to data from the 2011 and 2016 Census of Population and Housing (Census hereafter) to determine the percentage of people with jobs of low, moderate and high vulnerability in each Australian LGA. The number of people is counted by Place of Work according to the Australia New Zealand Standard Classification of Occupations (ANZSCO) 3 digit level divided by total known jobs in each LGA.²

For 2016, most LGAs have around 20-30% of jobs that are considered highly vulnerable to automation. As Figure 1 shows, areas with a larger proportion of jobs highly vulnerable to automation are concentrated around major capital cities and along the coast line. This is indicative of where economic development has been taking place.

Legend

High vulnerability jobs (QGIS file)_2016

LGA_2016_AUST

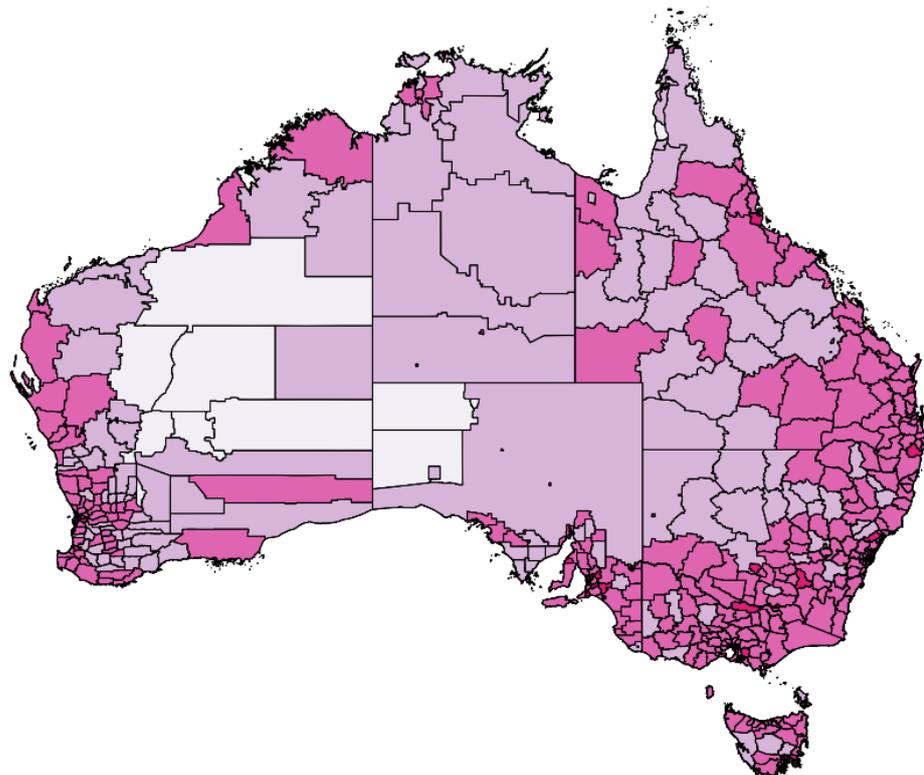
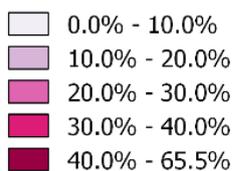


Figure 1: Proportion of high vulnerability jobs in all Local Government Areas across Australia, 2016

In addition to looking at the results at individual LGA levels, the RAI categorises Australia into different regional types: Connected Lifestyle Regions, Heartland Regions, Industry and Service Hubs, Regional Cities and Metropolitan Areas.³ The different regional types have different characteristics, hence they

¹ Further information about the methodology used to calculate the levels of vulnerability can be found in the accompanying document *The RAI's method for assessing regional job vulnerability to automation*

² Note that total known jobs excludes 'inadequately described', 'not stated' and 'not applicable' categories.

³ [Talking Point: The Foundations of Regional Australia](#). Unincorporated areas are identified as Heartland regions.

also have different capacities to cope with future changes in jobs. The proportion of jobs vulnerable to automation by regional type are shown in Figure 2.

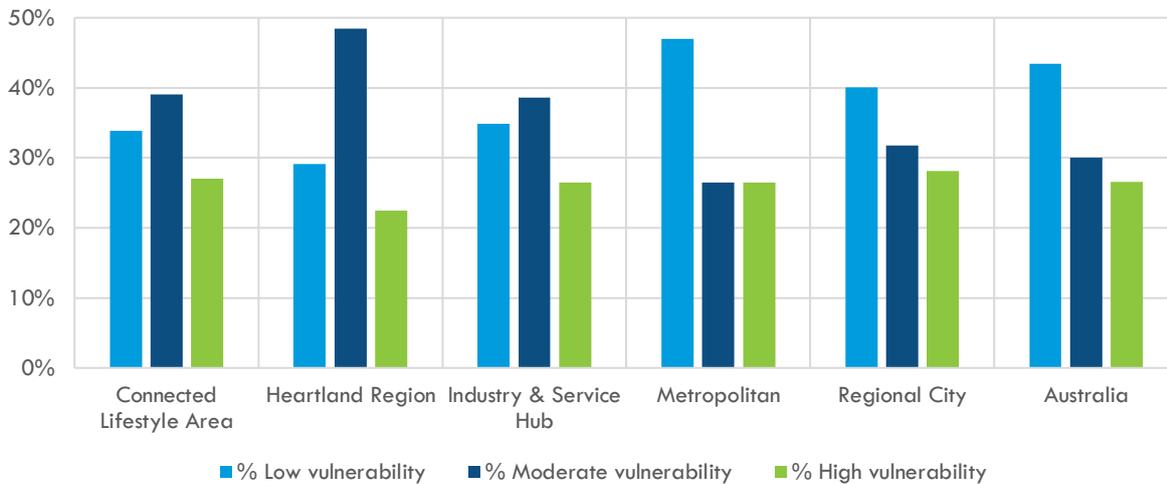


Figure 1: Proportion of jobs vulnerable to automation by regional type and vulnerability classification, 2016

Overall, Regional Cities have the greatest proportion of jobs that are considered highly vulnerable to automation (28.1%), which is more than the Australian average (26.5%).⁴ Regional cities have diverse economies and often provide support services to Metropolitan Areas. As such, there is a large proportion of people working in clerical and administrative jobs, technical and trade jobs, as well as jobs in factory processing, all of which are highly susceptible to automation. Fortunately, Regional Cities have one of the highest innovation index scores on measures like new business start-ups and trademark numbers, according to the RAI's [In]Sight tool.⁵ The strong performance on these innovation measures is important as new job markets will require innovative and entrepreneurial skills. As such, while regional cities have a large proportion of jobs highly vulnerable to automation, they are also positioned to be able to adapt to the changing nature of work and create new job opportunities.

Metropolitan Areas and Industry and Service Hubs have around the same proportion of jobs that are considered highly vulnerable to automation (26.5%). Metropolitan Areas also have more jobs that are of low vulnerability (47%) than any other regional type. This is due to the fact that Metropolitan Areas often have the highest concentration of professionals (e.g. medical, legal, and education), managers, and community and personal service workers (e.g. childcare or health and welfare support). These three occupation groups are some of the least susceptible to automation as they require specific skills expected to be in demand in the future – high tech, high touch, and high care. At the same time, Metropolitan Areas have the least moderately vulnerable jobs compared with the other regional types (around 26.5%). This further emphasises the relatively low overall vulnerability of Metropolitan Areas to the impacts of automation.

Another protective factor for Metropolitan areas is that technological readiness and connectivity will be increasingly important for accessing the future job market. Metropolitan areas are often the best connected, whereas more remote areas have comparatively lower access and use of technology. Therefore, while some remote areas may have a relatively small proportion of jobs that are highly

⁴ The Australia average was calculated based on the sum of LGAs excluding 'no usual address' and 'migratory offshore'.

⁵ [RAI \[In\]Sight Australia's Regional Competitiveness Index](#)

vulnerable to automation, they may have relatively limited connectivity. As such, remote areas may also be less ready to take on future jobs than non-remote areas.

Heartland Regions have around twice the proportion of jobs with moderate vulnerability (48.4%) compared with Metropolitan Areas. This is also significantly greater than the Australian average (31.3%). Although the proportion of Heartland Region jobs considered highly vulnerable to automation is comparatively small (22.6%), Heartland Regions may still be negatively impacted by the general technological disruption facing Australia's workforce because they often do not have the same level of infrastructure and technological readiness (mobile and internet coverage) as other regional types. Consequently, Heartland Regions may not see the same level of growth in digital jobs or be able to react as quickly to changes in the nature of work as other regions.

Importantly, as the list of top 10 LGAs with the greatest proportion of highly vulnerable jobs shows (see Table 1), vulnerability to automation is about the occupation mix in a given LGA; it is not universal to a particular regional type. Moreover, vulnerability to automation is by no means a total 'doom and gloom' scenario. Even the LGAs with the greatest proportions of highly vulnerable jobs have a greater proportion of 'low vulnerability' jobs than they do 'high vulnerability jobs', the exceptions being Sorrell and Griffith. The LGA with the greatest proportion of highly vulnerable jobs is Mount Gambier, which is an Industry and Service Hub that has a diverse economy but a large number of clerical and administrative workers (i.e. people jobs susceptible to automation). Two of the top 10 LGAs in terms of high vulnerability jobs are Metropolitan Areas: Tea Tree Gully and Moonee Valley. In both of these LGAs, the largest employer is retail trade, with many people working as sales assistants and salespersons, both jobs that are highly susceptible to automation.

Table 1: Top 10 LGAs with the greatest proportion of high vulnerability jobs, 2016

LGA Name_2016	Regional Type	% Low vulnerability	% Moderate vulnerability	% High vulnerability
Mount Gambier (C)	Industry & Service Hub	34.64%	31.86%	33.49%
Gawler (T)	Connected Lifestyle Area	38.76%	28.40%	32.84%
Sorell (M)	Connected Lifestyle Area	30.86%	37.08%	32.06%
Griffith (C)	Industry & Service Hub	30.84%	37.15%	32.01%
Warrnambool (C)	Industry & Service Hub	39.49%	28.56%	31.95%
Albury (C)	Regional City	39.35%	28.81%	31.84%
Victor Harbor (C)	Connected Lifestyle Area	36.29%	31.89%	31.82%
Shellharbour (C)	Regional City	38.10%	30.18%	31.72%
Tea Tree Gully (C)	Metropolitan	38.95%	29.39%	31.66%
Moonee Valley (C)	Metropolitan	42.40%	25.97%	31.63%

LGAs with the greatest proportion of low vulnerability jobs are predominantly Metropolitan Areas, which is expected given this is where more specialised and highly skilled jobs that are difficult to automate are located. The highest performing LGA is North Sydney which, apart from having a large number of people working in low vulnerability jobs, also performs well in terms of the number of trademark applications it produces. North Sydney also has a strong presence of Knowledge Intensive

Business Services (KIBS⁶), which require specific and professional knowledge to provide knowledge-intensive support to other organisations' business processes. Overall, this suggests North Sydney has an innovative and skilled workforce able to cope with future changes to the nature of work.

Table 2: Top 10 LGAs with the greatest proportion of low vulnerability jobs, 2016

LGA Name_2016	Regional Type	% Low vulnerability	% Moderate vulnerability	% High vulnerability
North Sydney (A)	Metropolitan	65.71%	14.35%	19.95%
Nedlands (C)	Metropolitan	61.20%	20.93%	17.88%
Subiaco (C)	Metropolitan	60.31%	16.84%	22.85%
Sydney (C)	Metropolitan	59.31%	15.08%	25.61%
Ryde (C)	Metropolitan	58.64%	19.98%	21.38%
Canberra	Metropolitan	58.30%	17.45%	24.25%
Melbourne (C)	Metropolitan	58.21%	16.15%	25.64%
Lane Cove (A)	Metropolitan	57.65%	22.03%	20.31%
Yarra (C)	Metropolitan	57.35%	20.48%	22.16%
Port Phillip (C)	Metropolitan	57.03%	20.29%	22.68%

Because of the existing occupation makeup and technological readiness and connectivity of Metropolitan Areas, they seem less likely to be impacted by the increasing automation of work than other regional types. The most vulnerable areas seem to be Regional Cities, although Connected Lifestyle Regions and Industry and Service Hubs are also quite vulnerable. Industry and Service Hubs in particular tend not to have good connectivity and technological readiness as compared to Metropolitan Areas. Additionally, they also do not perform as well in innovation. As such, they may be well positioned to adapt to future work changes. However, ongoing workforce development will be crucial for ensuring all regions (Metropolitan or otherwise) are able to address both the technical and soft skill needs of future jobs.

COMPARISON WITH 2011

To compare the RAI's regional types across 2011 and 2016 Censuses, the Australian Statistical Geography Standard (ASGS) correspondence was used to match 2011 LGA boundaries to 2016 LGA boundaries. As with the assessment of 2016 data, 2011 Census data showed that most of the LGAs had 20-30% of jobs highly vulnerable automation.

Across the RAI's regional types, there has been little change in vulnerability over the five years to 2016. Similar to 2016, Regional Cities had the greatest proportion of jobs with high vulnerability (29.5%), while Metropolitan Areas had the greatest proportion of low vulnerability jobs (46.6%).

⁶ KIBS are services and business operations heavily reliant on professional knowledge, such as finance, law, engineering and science.

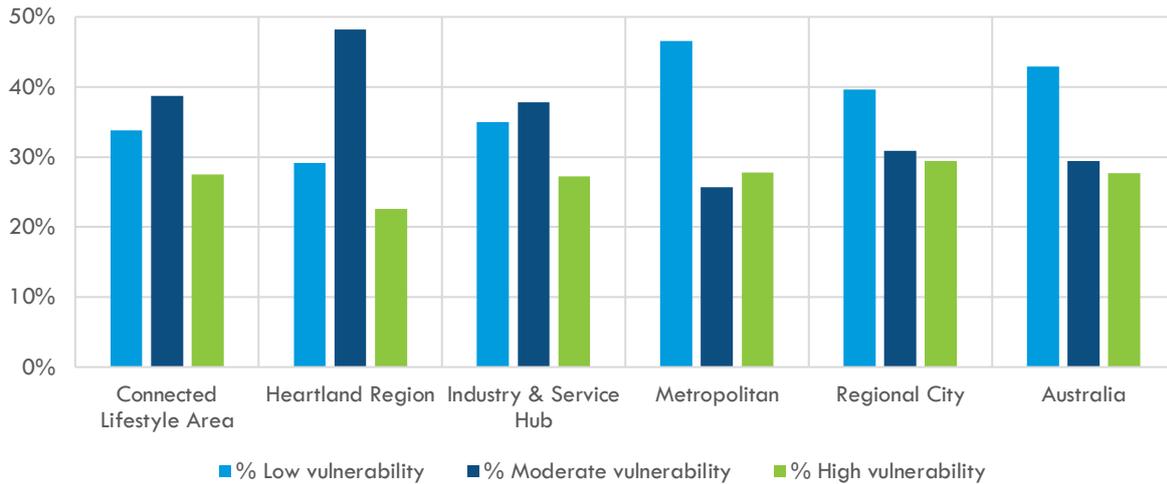


Figure 2: Proportion of jobs vulnerable to automation by regional type and vulnerability classification, 2011

Small decreases were recorded in the proportion of jobs deemed highly vulnerable to automation across all regional types. However, the extent of decreases varied. Regional Cities had the largest change in the proportion of highly vulnerable jobs between 2011 (29.5%) and 2016 (28.1%). See Figure 4 for details.

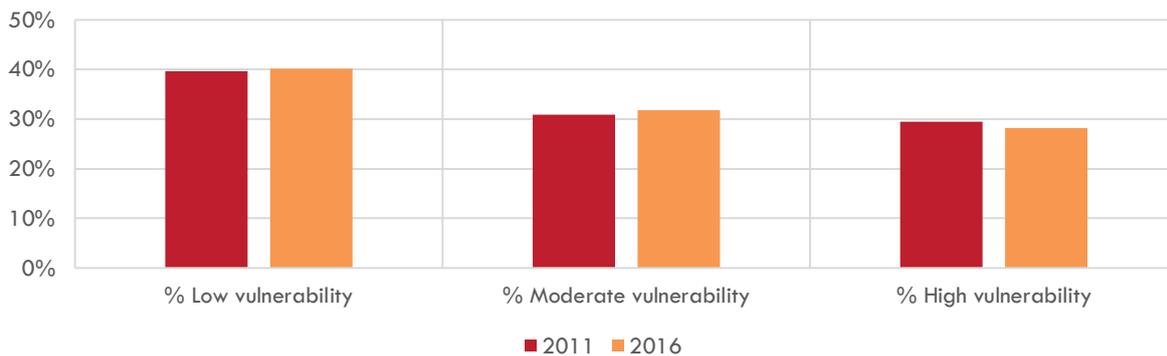


Figure 4: Proportion of jobs vulnerable to automation in Regional Cities, 2011 and 2016

Heartland Regions showed the smallest overall change, with 22.6% of jobs of high vulnerability to automation in 2011 compared with 22.5% in 2016 (Figure 5). Compared to other regional types, Heartland Regions also had the smallest proportion of highly vulnerable jobs, and no significant changes to jobs with low or moderate vulnerability over the five years through to 2016.

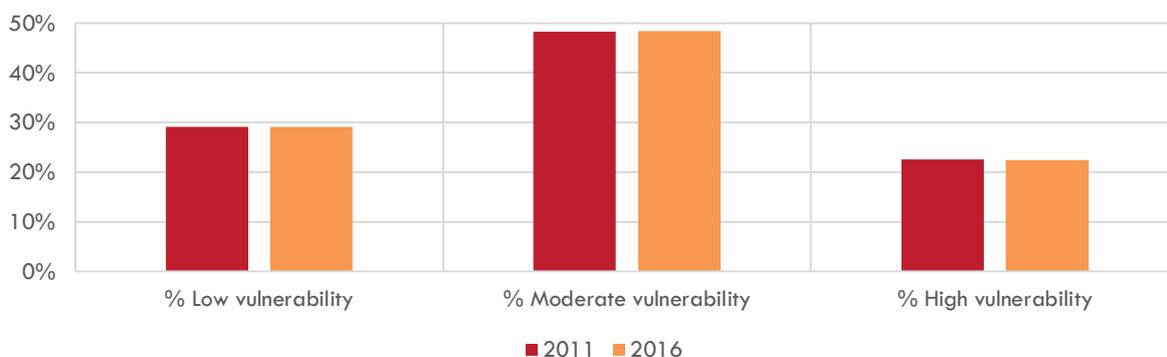


Figure 3: Proportion of jobs vulnerable to automation in Heartland Regions, 2011 and 2016

Other regional types that showed a greater change in the proportion of jobs with high vulnerability to automation also showed increases in the proportion of jobs with low or moderate vulnerability, though the differences in low vulnerability were minimal. Only Metropolitan Areas and Regional Cities showed positive changes to the proportion of jobs with low vulnerability, while Industry and Services Hubs showed greater changes in the increase of jobs with moderate vulnerability. Connected Lifestyle Areas were similar to Heartland Regions, showing little change between 2011 and 2016.

In Australia, regardless of regional type, the job mix has shifted slightly from jobs with high to low vulnerability. However, at the regional level, the situation varies. For regions that have not shown much change in overall vulnerability but still have a high proportion of highly vulnerable jobs, it will be necessary to consider future economic strategies that incorporate ongoing workforce development as well as improved technological connectivity and capacity.

SUMMARY

- Different regional types have different proportions of jobs vulnerable to automation and also have diverse strengths to adapt to future jobs.
- Regional Cities have the greatest proportion of jobs highly vulnerable to automation, but they also have strengths in innovation and entrepreneurial skills which are necessary to adapt to the changing nature of work.
- Heartland Regions have the smallest proportion of jobs highly vulnerable to automation, however they do not have the strength of technological connectivity to cope with the expected growth of digital jobs.
- Metropolitan Areas have the greatest proportion of low vulnerability jobs and also have technological readiness and connectivity to take advantage of the changing nature of work.
- Between 2011 and 2016, there was a slight overall shift from high vulnerability jobs to low vulnerability jobs, occurring mostly in Metropolitan Areas and Regional Cities.
- The focus of discussions around the vulnerability of jobs to automation should not only be on job losses but also on how jobs will change, and how regions can be better prepared to manage those changes.

OTHER RESOURCES

The RAI is looking at the future of jobs and workforce development as part of its 2018 Shared Inquiry Program. Accompanying this report as part of the Regional Job Automation Pack is a methodology paper, a comprehensive list of ANZSCO occupations and vulnerability ratings, and an interactive Job Vulnerability Data Tool. These resources are available via the program website:

www.regionalaustralia.org.au/home/future-regional-jobs