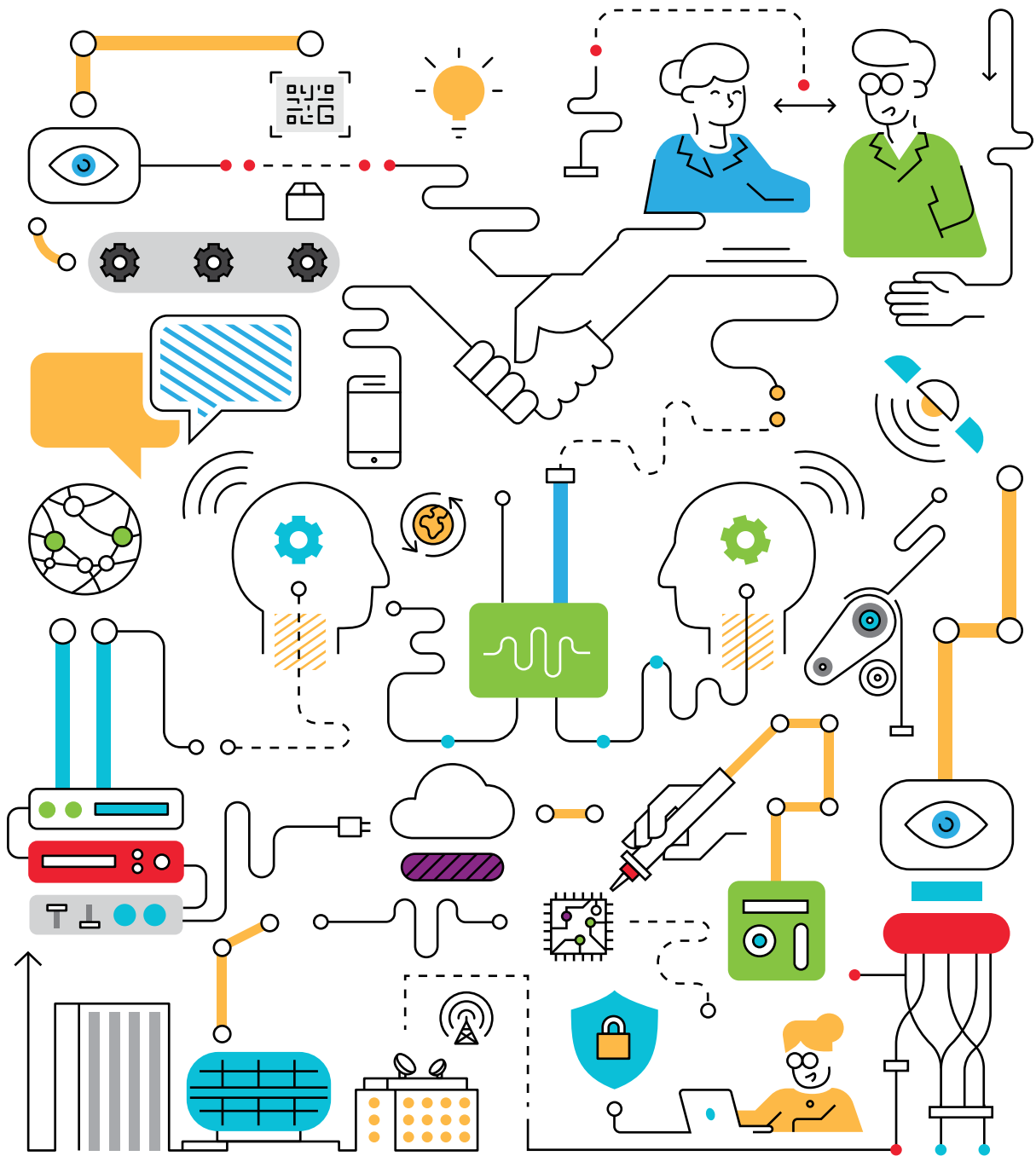


NATIONAL SURVEY REPORT

# Peak Human Potential:

Preparing Australia's workforce  
for the digital future





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The Centre for the New Workforce at Swinburne University of Technology is a research, analysis and thought leadership initiative that investigates the fundamental changes occurring in Australian workplaces arising from digital technologies and how these affect the future of work. We seek to develop new approaches to learning that help prepare people and their organisations for this future.

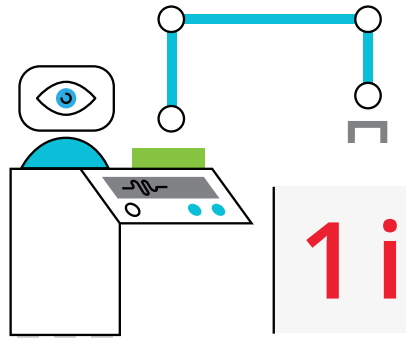
# Preparing for the Future of Work

Perspectives of working Australians

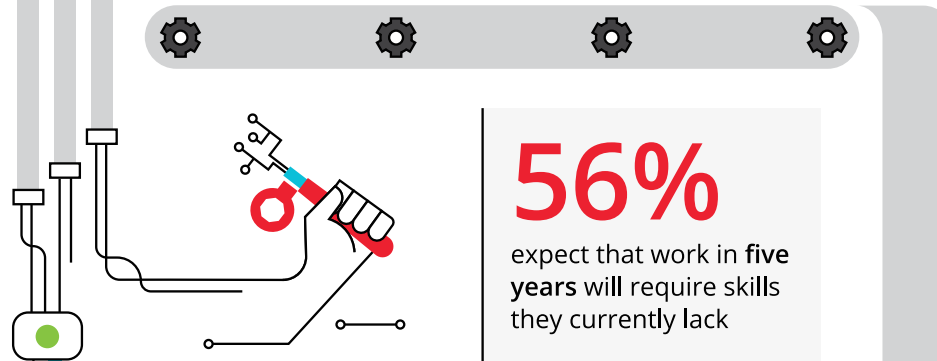


**59%**

accept personal responsibility for preparing themselves for the future of work

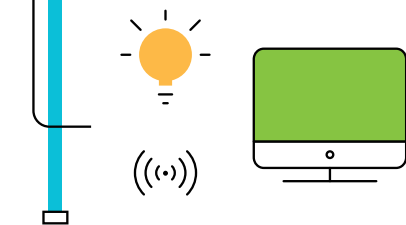


**1 in 2** are fearful of losing their job to artificial intelligence and automation



**56%**

expect that work in **five years** will require skills they currently lack

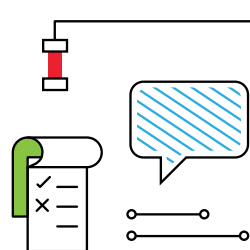


**1 in 3**

view digital and technology skills as the most important skillset for the future

**38%**

prefer learning on the job more than other learning formats

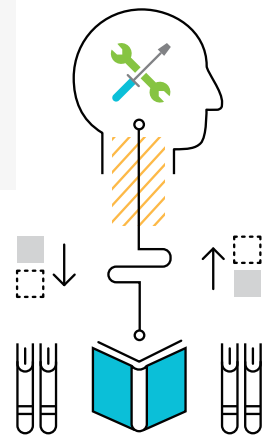


**1 in 2**

lack confidence in their ability to prepare for the future of work

**3 in 4**

are motivated to learn new skills in the next **12 months**



# EXECUTIVE SUMMARY

“I think if we focus on what humans do best, connecting to humans, and lighting the fire in a human by connecting to their motivational purpose...we’re going to see a huge boom in the future of work.”

**Heather McGowan,**  
Future of work strategist

**Australia’s workforce – and, by extension, its economy – is on the precipice of massive change. With digital technologies like artificial intelligence (AI), machine learning, high-tech robotics and the Internet of Things disrupting and displacing human labour at an accelerating rate, the workers of today and tomorrow face uncertainty about job security. It is imperative that educators, policy makers and employers think carefully about how to prepare workers for the new future of work and take action before it’s too late.**

The OECD estimates that 14% of existing jobs in Australia could disappear over the next 15 to 20 years, and a further 32% of jobs are likely subject to radical change.<sup>1</sup> McKinsey Australia estimates that almost 50% of work tasks performed by people could be displaced by automation by 2030.<sup>2</sup>

These statistics are alarming; a warning sign that urgent change is needed. Just as the Australian government invested \$50 billion to build the National Broadband Network, the national infrastructure needed to accelerate the digital revolution that began in the 1990s, new investment is now required.

It’s time for Australia to invest in our workers with the skills, competencies and know-how required to thrive in the digital, automated future and build a national learning infrastructure.

Up against automation technologies, how can Australian workers gain a competitive advantage? What does success for the worker of the future look like? We surveyed 1,000 working Australians – from bus drivers to CEOs, from freelancers to full-time workers, from Millennials to Baby Boomers, and from all sectors of the economy – to understand how they expect to succeed in the future of work.

## **Future-ready workers**

Economy-wide, Australian workers acknowledge digital and technological skills as the most important skills needed for this new future. But deeper analysis reveals that digital skills are a baseline competency, not a point of difference for workers in the digital economy.

There’s a remarkable trend emerging across the Australian economy. The more

an industry is disrupted by digital technologies, the more that workers in those industries value uniquely human ‘social competencies’. From collaboration, empathy and social skills to entrepreneurial skills, these social competencies are less vulnerable to being displaced by AI and automation.

Which workers? Think those in the highly digitised knowledge sector, including industries such as technology, media, telecommunications and finance. Traditional expertise is still fundamentally important. But workers in these disrupted industries – many of whom have already been displaced or lost their jobs due to digital disruption – place almost equal importance on social competencies as they do traditional expertise to be able to work in the digital economy.

By contrast, workers in the least-disrupted industries – such as mining, construction and utilities – value traditional expertise three times more than social competencies. The medium-level digitised service sector, which employs four out of five Australian workers, falls between the two extremes.

Why are these knowledge sector workers’ views important? They align with the balanced skill set forecast by the OECD and McKinsey, and well described in a 2019 World Economic Forum paper *Leading through the Fourth Industrial Revolution*: “to be truly successful in new roles, workers need unique ‘combinatorial skill sets’ at the intersection of innately human skills, functional skills, know-how and experience, and technology skills.”

Educators and employers, especially in the technology-trailing sectors of the economy, must take heed of the growing importance of social competencies for workers in digital environments.

Another group of workers are ideally placed to help their employers to digitise. Millennials – sometimes known as digital natives – have a similar future of work mindset to knowledge sector workers. They rate social competencies almost as importantly as traditional expertise, and much higher than older workers. The question for employers is: how do we empower younger workers for their future-focused mindsets while embracing older workers for their experience in creating a collaborative culture?

## Learning-integrated work

How do workers want to prepare for the future of work? With the rise and rise of disruptive technologies – where the workplace goalposts constantly shift and workers need to be learning all the time to remain relevant – the learning context matters more than ever. Australian workers, regardless of education background, income level, industry or age, prefer ‘learning on the job’ as the best way to prepare to work in digital environments over all other formats, including through formal credentialed education, micro-credentials and online courses.

The study reveals another remarkable trend: the more digitally disrupted their industry, the more workers prefer to learn on the job. Work is where disruption is taking place, not in the classroom. Formal, structured education’s ability to simulate the transforming workplace decreases as the leading edge of technology rapidly advances. We must reverse this disconnection by bringing learning and work together.

We call this new approach ‘learning-integrated work’ where learning is increasingly taken off campus and immersed in disruptive work environments. For instance, into agile environments, into coworking spaces, onto digital freelancing platforms or into Industry 4.0 settings.

The goal for workers in these digitally disruptive environments is less about producing results and more learning how to create new value by leveraging their combinatorial skill sets. Value creation – work that enhances an organisation’s competitive advantage – will distinguish the ‘learning worker’ alongside increasingly sophisticated technologies increasingly producing.

Some examples of learning workers:

- The factory floor worker empowered to optimise manufacturing processes for which they are responsible
- The designer experimenting with VR technology to improve the design process
- The medical specialist exploiting AI’s diagnostic ability, freeing their time to focus on bespoke patient care
- The agile team of cross-functional experts figuring out how to develop a new product

## A new learning infrastructure

For learning and work to converge, we need a new learning infrastructure. Education providers and employers must build on their traditional but often disconnected roles in educating and training workers, and start coming together in partnerships across Australia with the leadership and support of government.

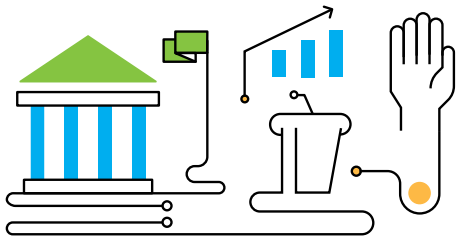
We need to lift all workers into the digital economy by providing basic digital training. Many of these future skills are best provided through vocational education, especially within a more coherent tertiary education system. But for learning and work to converge, we need a learning infrastructure that brings education providers and employers together, too.

We need to shift learning into future workplaces by trialling new learning approaches delivered through partnerships of education institutions and employers. These partnerships would form the foundation of the learning infrastructure, with a focus on developing learning workers, integrating learning into work, and reimagining accreditation. There will be many successful formulas. The AiGroup, Siemens and Swinburne University Industry 4.0 Higher Apprenticeship Program is an early case study.

Only the government has the policy levers and resources to support digital training of workers, and to coordinate and network this new learning infrastructure of partnerships across the economy. Government funding for basic digital competency should be tied to the individual worker to learn at work, catalysing educator-employer partnerships. All funding must prioritise support for workers most vulnerable to being displaced by technology.

Australia has the opportunity to prepare its workforce for the digital future, and realise the peak human potential in our workers. It is no longer enough to talk about change, however. The future of work is now.

## Government



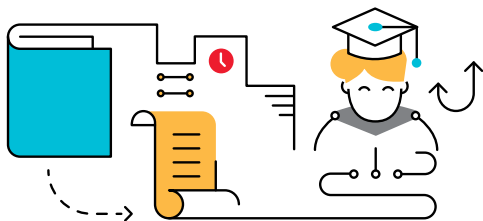
### Opportunity:

Develop a learning infrastructure of partnerships between educators and employers

### Key Action:

Support Australian workers to develop basic digital competency through learning in the workplace

## Education Institutions



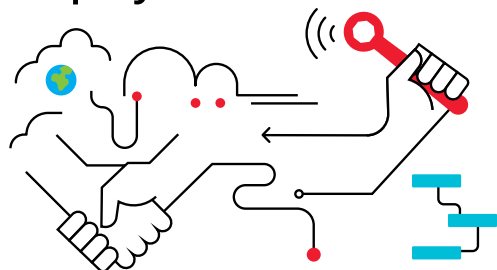
### Opportunity:

Be leaders in developing learning workers

### Key Action:

Develop new approaches to integrate learning into work

## Employers



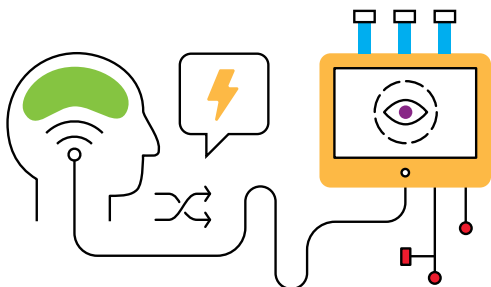
### Opportunity:

Become a learning organisation to enhance competitive advantage

### Key Action:

Invest in the workforce by embedding learning into the workplace

## Individual



### Opportunity:

Develop a unique point of difference in the future of work

### Key Action:

Embrace continuous, self-directed learning, collaborate and push boundaries

# INTRODUCTION

The Fourth Industrial Revolution is fundamentally changing the Australian economy, driven by the increasing sophistication and reach of digital technologies. Across industries and job roles, automation and AI are making their presence felt – robots are becoming more adept at routine and predictable manual human labour; AI is performing basic cognitive tasks that were previously performed by humans.

The growing hyperconnectivity of technologies, especially through the Internet of Things and cyber-physical systems, is changing work itself. Agile ways of structuring work in firms, new ways of organising work through digital platforms, and the increasing divisibility of work are some of the ways the transformation is emerging.

To succeed in the future of work, organisations must empower their workers. A World Economic Forum paper makes the point: ‘While it is tempting to point to technology as the key differentiator for organisations, people comprise the most important source of competitive strength.’<sup>3</sup> Future of work strategist Heather McGowan concurs, saying, ‘No matter how sophisticated the technology, it is still a tool and tools need humans.’<sup>4</sup>

Yet many employers continue to think about the future of work from a technology perspective, focusing on how digital technologies – such as the Internet of Things, AI, big data, mobility and cloud computing – can lead to competitive advantage. Less attention is being paid to the impact of these technologies on people and how to help them prepare.

For Australia’s economy to flourish into the future, it is imperative that we think not just of the digital technologies that will enhance work, but of the people who need to do work to pay the bills. How can we support workers to reach their peak potential while using these impressive technologies? If AI and robots are replacing human labour for efficiency and productivity gains, what will happen to our human workforce?

## WHAT IS THE ‘FUTURE OF WORK’?

What distinguishes the Fourth Industrial Revolution? Three fundamental forces characterise the transformation that’s underway. The exponential nature of digital technologies means we are experiencing change at an accelerating pace. The digital hyperconnectivity of all things and people, especially through the Internet of Things, means increasing interdependency. And we are seeing vast digital ecosystems emerge that are constantly evolving.

As a consequence, work is transforming from being predictable, linear, mechanistic and siloed – where success was measured in terms of productive output – to being networked, collaborative, cross-functional and continuously changing. How work gets done, who does it, where it happens, how it is organised and even what work is – this all changes.

### Where the future of work is emerging

- Automation and AI environments where digital technologies are changing the way in which value is being created, for instance, Industry 4.0 and the Internet of Things (value-add processes such as advanced manufacturing, medtech, energy, food)
- Digital freelancing platforms where work is being disconnected from jobs (Expert360, Freelancer, Upwork)
- Agile environments where organisations are restructuring themselves to be as nimble as the rapidly shifting and unpredictable environments in which they operate (ANZ, Telstra, NAB)
- Coworking spaces where different businesses come together in highly collaborative and dynamic environments (WeWork being the best known, The Commons, Creative Cubes, Fishburners, Hub Australia)



# ABOUT THIS REPORT

To better understand Australian workers' views towards the future of work, the Centre for the New Workforce conducted a study with our research partner YouGov. In November 2018, we asked 1,000 Australian workers about their attitudes to work, their perceptions about how work is changing, and how they are preparing for the future. To gain deeper insight, we analysed the results against comparable research from organisations including McKinsey, World Economic Forum, AiGroup and Deloitte.

Within this report, we provide expert analysis and recommendations on how policy makers, educators and employers can help pave the way for a successful future for Australia's workforce.

## **The report contains three sections:**

- **Section 1** presents the survey results
- **Section 2** segments the results to examine generational and sectoral perspectives of the future of work, and provides analysis into what these results mean for Australia's workers
- **Section 3** makes recommendations on how Australia can build a national workforce for the digital economy

# SECTION 1. SURVEY RESULTS

## Part 1. Attitudes towards the future of work.

We asked working Australians about their perceptions and attitudes towards digital technologies, specifically their level of concern, how these technologies might impact their work, and whether they are ready to prepare for the future. We also asked about how confident they feel in learning the skills required to work with new digital technologies, such as data analytics, coding, programming, app development, the Internet of Things, cyber security, social media, digital marketing, AI and automation.

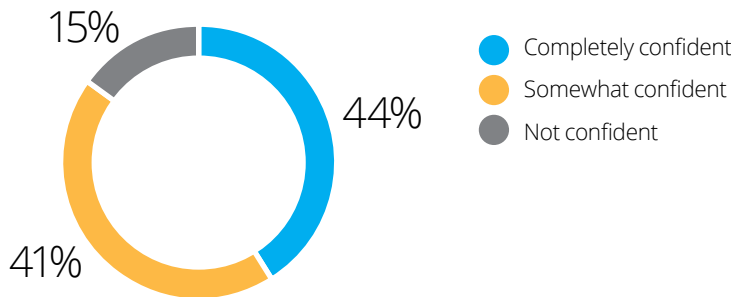
### QUESTION 1.

How confident are you that your current skillset is suited for the next five years of work?

**56%**

More than half of working Australians expect that work in five years' time will require skills they currently do not have. Put another way, they expect their job will change in the next five years.

Figure 1. Confidence current skillset will be relevant in five years' time



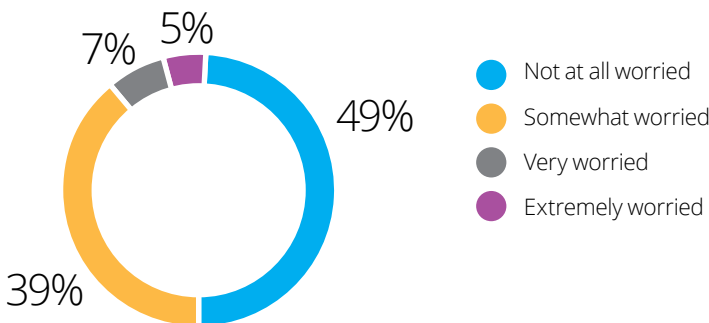
### QUESTION 2.

When you think about the work you currently do, are you worried about potentially losing your job due to AI or automation?

**51%**

Slightly more than half of Australian workers – equating to nearly 7 million people – are **worried about losing their job** to automation and AI

Figure 2. Concern about losing your job due to automation and AI



### QUESTION 3.

#### How does this fear of digital technologies compare with other factors on job loss?\* \*\*

Fear of job loss arising from AI and automation was rated as a more serious threat than other factors, including 'a change in the economy'. The top three threats are:

<b>41%</b>	<b>36%</b>	<b>36%</b>
'Digital technologies such as artificial intelligence (computers) and automation (machines)'	'A change in the economy'	'Being replaced by someone willing to do their job/work for less money'

\*Only those who fear losing their job to AI and automation (n = 515) were asked about worry factors.  
 \*\*Respondents were given a range of options from which they could select all that apply, hence total frequency adds to more than 100%.

### QUESTION 4.

#### How will digital technologies impact on work in the future?\*

Australian workers seem to take an 'each-way bet', perceiving both positive benefits and negative impacts of AI and automation technologies on work in the future.

			<b>OUTCOME</b> (Positive, Negative or both)
<b>42%</b>	<b>THINK DIGITAL TECHNOLOGIES WILL</b>	Create exciting new kinds of work that do not exist now	<b>+</b>
<b>41%</b>		Replace workers	<b>-</b>
<b>40%</b>		Help people do their jobs better	<b>+</b>
<b>27%</b>		Make work harder initially before things get better	<b>+/-</b>
<b>27%</b>		Create more opportunities for freelancers	<b>+/-</b>
<b>17%</b>		Make the quality of work worse	<b>-</b>

\*Respondents were given a range of options from which they could select all that apply, hence total frequency adds to more than 100%.

**QUESTION 5.**

What is your current level of interest in learning new skills over the next 12 months?

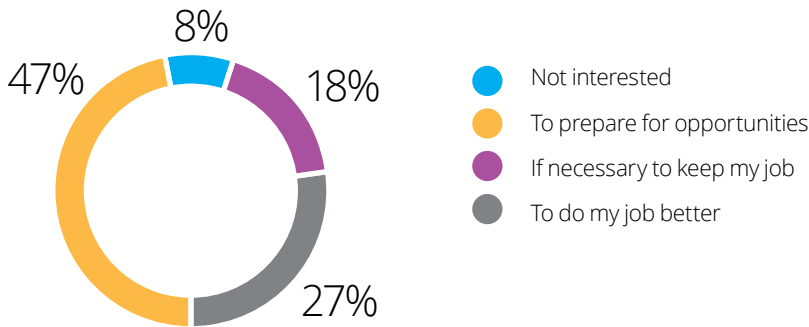
**74%**

Australian workers predominantly prefer learning when there are **'pull'** factors – such as realising a personal ambition, and when they can self-direct their learning.

**18%**

**'Push'** factors – learning out of necessity – are preferred by significantly fewer.

Figure 3. Motivations to prepare for the future of work – interest in learning new skills



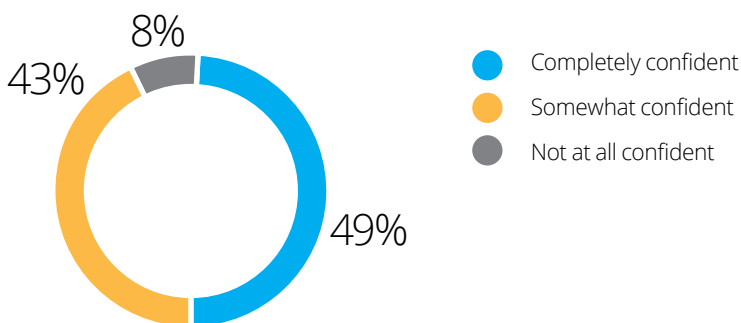
**QUESTION 6.**

How confident are you in your ability to learn new skills to be able to work with these digital technologies?

**51%**

A slight majority of working Australians are **lacking confidence** in their ability to prepare for the future of work.

Figure 4. Confidence in ability to learn new skills

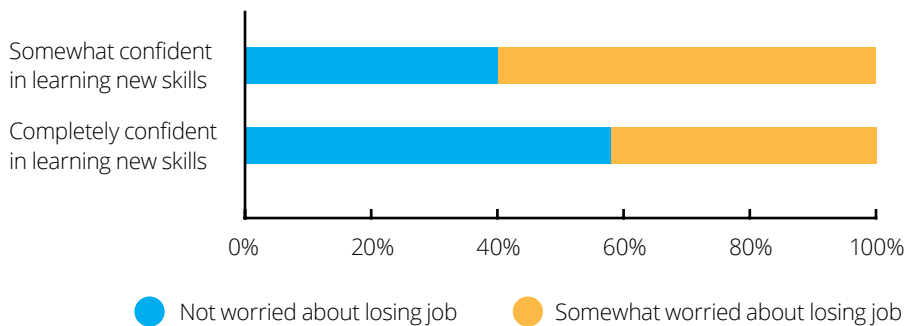


### QUESTION 7.

#### What impact does job security have on a worker's ability to learn?

The more secure a worker feels in their job, the more confidence they have in learning new skills to be able to work with these digital technologies.

*Figure 5. Relationship between job security and confidence in learning skills*



#### SUMMARY

Australian workers are fearful of both the threat digital technologies pose to their job, and the rate of change at which these technologies are advancing. More than half expect their job to change to some extent in the next five years. Job insecurity arising from digital technologies is higher than concerns about the economy. But Australian workers are not luddites and do not fear the technology itself. They have a level-headed appreciation of the benefits of digital technologies. Workers across the country signal a willingness to prepare now for the approaching future but lack the confidence to do so. Job insecurity is likely impacting lower confidence levels in learning new skills.

# SECTION 1. SURVEY RESULTS

## Part 2. Preparing for the future of work.

With a clearer view on Australian workers' attitudes towards their future, we were keen to see how they would like to prepare for it. Do they want to take charge or do they think government, educators and employers are responsible? What skills are most important? Where do they go for the necessary expertise and how do they want to learn?

### QUESTION 8.

Who has the most responsibility for preparing you for the workforce of the future?

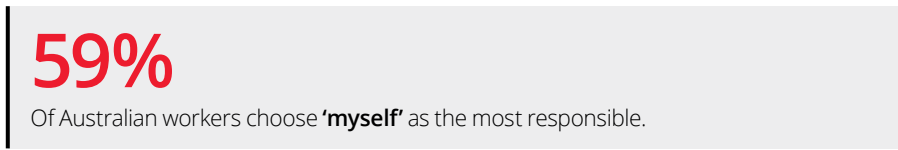
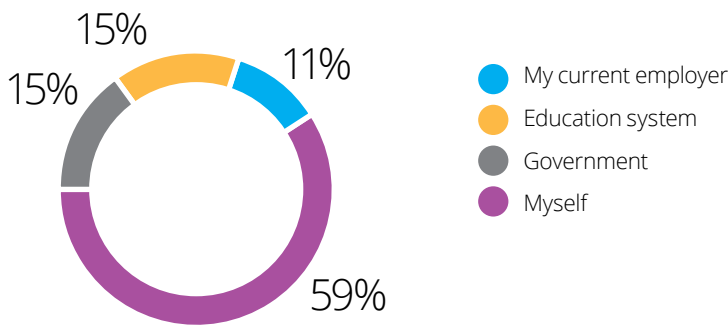


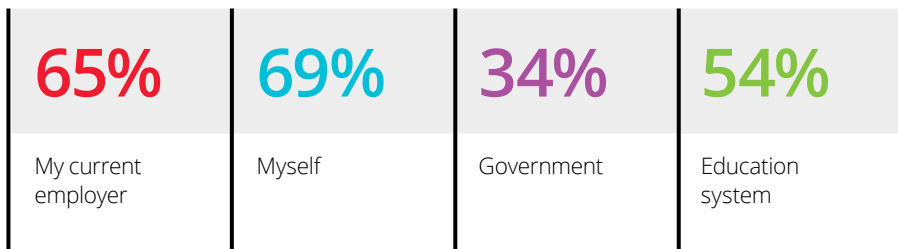
Figure 6. Where responsibility lies for preparing for the future of work



### QUESTION 9.

Thinking of your choice of most responsible, how satisfied are you with their preparation of you for the workforce of the future?\*

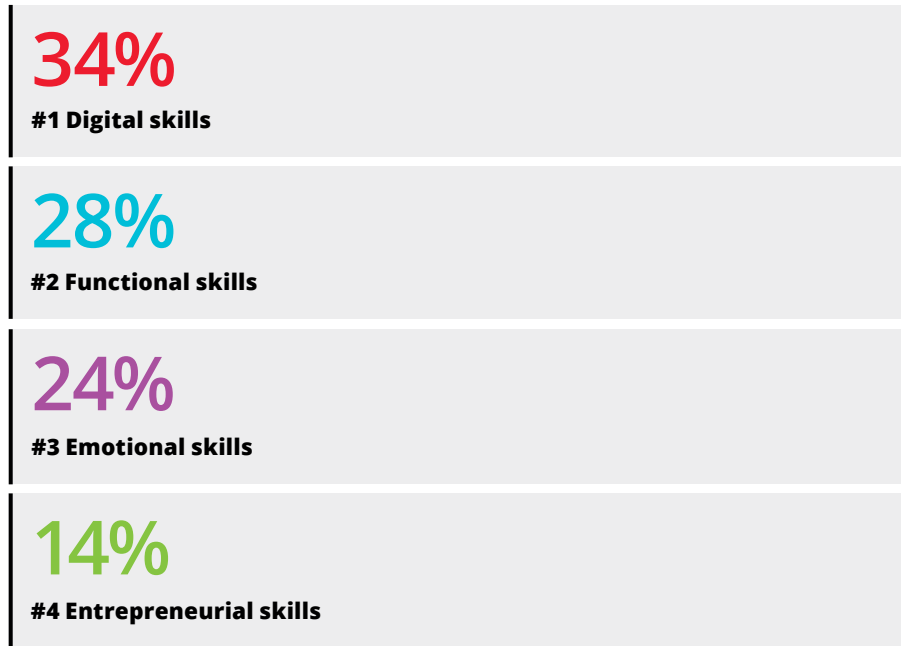
Workers who chose 'government' are least satisfied with government, followed by those who chose the 'education system'. 'My current employer' and 'Myself' both received higher levels of satisfaction, respectively.



\*Satisfaction combines frequencies of 'very satisfied' and 'somewhat satisfied'.

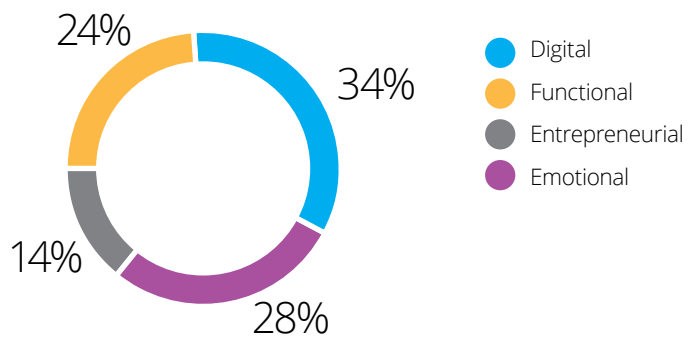
**QUESTION 10.**

Thinking about the workplace of the future, which of these skills do you think will be most important?



DESCRIPTION IN SURVEY	TERM USED IN THE REPORT
Digital and technology skills	Digital skills
Traditional skills and expertise related to the job	Functional skills
Collaboration, empathy and social skills	Emotional skills
Entrepreneurial skills	Entrepreneurial skills

*Figure 7. The most important skills for the future of work*

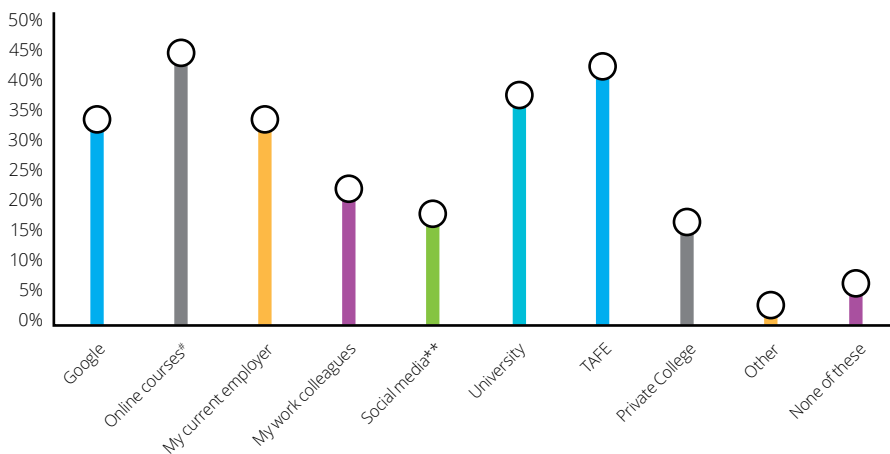


### QUESTION 11.

Which of the following do you regard as very useful to improve your ability to work with digital technologies?\*

- The leading choice of learning resource for Australian workers is 'Online courses (e.g. Coursera, Lynda.com, Khan Academy, etc)' at 46%, followed by TAFE at 44%, then university at 40%.
- In preparing for the future of work, Australian workers signal they prefer learning from resources developed by experts, with a slight preference for experts from industry (online and TAFE) over academics (university).
- Online, sometimes referred to as e-learning, is generally for just-in-time learning of a specific practical skill relating to a task, TAFE for a range of technical expertise relating to a trade, and university for deeper expertise relating to a profession. We note that TAFE and university are typically longer-term commitments.

Figure 8. Preferred learning resources to work with digital technologies



\*Respondents were given a range of options from which they could select all that apply, hence total frequency adds to more than 100%.

#Coursera, Lynda.com, Khan, Academy, etc.

\*\*LinkedIn, Twitter, etc.



**QUESTION 12.**

What kind of learning format do you most prefer to improve your ability to work with digital technologies?

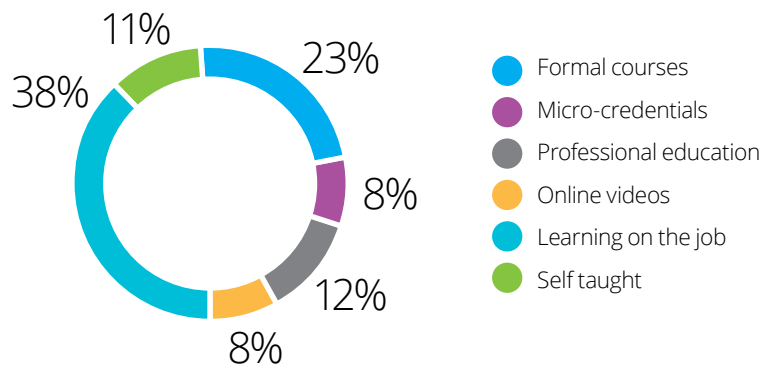
**38%**

Of Australian workers prefer 'learning on the job'

**23%**

Prefer 'formal courses leading to a credential (e.g certificate, diploma or degree)'

*Figure 9. Preferred learning formats to work with digital technologies*



**SUMMARY**

Australian workers indicate they want to take charge themselves, to prepare through learning, and lift themselves to a higher level. Digital and technological skills are rated by Australian workers as the most important skills to succeed in the future workplace, more so than even the traditional skills or expertise that define their job.

They want their learning to be informed by specialists with a slight preference for industry experts over academic experts. Australian workers might prefer online providers as a resource, but it is not their preferred learning format. To prepare to work with digital technologies, Australian workers clearly signal that 'learning on the job' is overwhelmingly preferred over all other formats.

## SECTION 2. ANALYSIS:

# The Australian workforce at the wavefront of disruption

### Skills needed for the future of work

In their March 2019 report, McKinsey & Company modelled how automation technologies – advanced robotics, machine learning and AI – could impact work across the Australian economy. The findings of their midpoint scenario suggest up to 46% of current work activities in Australia could be displaced by automation by 2030. The report predicts that demand will increase for workers in unpredictable and interactive roles such as nursing, caregiving and sales, but there will be less work for radiographers, call centre workers, mechanics and legal research assistants. By 2030, Australian workers will spend at least 60% more time using technological skills than they currently do, as well as more than 40% more time using social and emotional skills.

From an employer perspective, a 2018 Australian Industry Group (AiGroup) report *Skilling, a national imperative* looked at the skills, education and training requirements for organisations moving into the digital economy. The survey gauged Australian employers' sentiments around skills and training practices, and identified a strong need to transform workforces for digitally-enabled environments. The report noted increased demand for enterprise skills and a need for better teamwork and communication skills.

Recent studies on university graduates find that higher education is not keeping up with workplace needs. An EY report *The University of the Future* reports that 42% of current and past graduates feel their degree requires transformation as digital technologies take off in the workplace. Deloitte's *Higher education for a changing world* finds that 31% of workers interested in further study expect a strong degree of collaboration between education providers and industry to integrate employability skills and competencies required into their course, while 68% place more importance on skill-based training than on formal qualifications.

A 2019 report by the National Centre for Vocational Education Research (NCVER) *Skilling the Australian workforce for the digital economy* recommends that an Australian Workforce Digital Skills Framework (AWDSF) be developed. The AWDSF has four broad digital skills categories for Australian workers: digital ways of thinking, digital ways of working, digital tools for working, and living in the digital age. The authors note that a "digital skills framework needs to consider both hard technical skills and more generic 'soft' interpersonal skills."

For workers to succeed in the future of work, according to the World Economic Forum paper on the Fourth Industrial Revolution, they need "unique 'combinatorial skill sets' of innately human skills, functional skills, know-how and experience, and technology skills." Workers will increasingly combine social competencies – those related to empathy, collaboration and social interaction – with higher level cognitive skills, augmented by technology.

Our survey shows for the first time the skills expected for the future of work from the worker's perspective. Australian workers deem digital skills as the most important for the workplace of the future (34%), followed by functional skills (28%) and emotional skills (24%) (see Figure 7). These findings are in line with the views of employers and workforce modelling. However, deeper inspection reveals a more complex picture.

In this section of the report, we take a closer look at the changing importance of skills across generations of the workforce, and across sectors of the Australian economy. Generations are horizontal stratifications of the workforce; sectors are vertical slices.

## Generational perspectives of skills needed for the future workplace

We broke down the Australian workforce into three generations – Baby Boomers, Gen X and Millennials – to see how each generation compares when it comes to rating the importance of different skills. Our analysis shows that Millennials value a more balanced set of skills for the future of work than do older generations (see Figure 10).

The marked divergence between Millennials and the older Gen X and Baby Boomer generations manifests in two ways:

1. Millennials rate emotional skills as most important whereas Baby Boomers and Gen X rate digital skills as most important.
2. Millennials value a good balance of emotional, digital and functional skills. In stark contrast, Baby Boomers and Gen X generations rate expertise (digital and functional) significantly higher than emotional skills.

**EXPERTISE**  
FUNCTIONAL + DIGITAL SKILLS

**SOCIAL**  
EMOTIONAL + ENTREPRENEURIAL SKILLS

## Expertise vs social skills

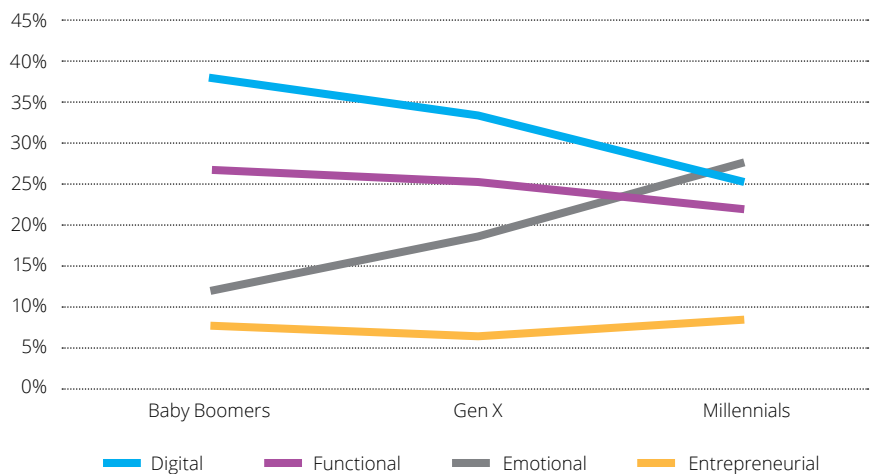
To further illustrate the difference in attitude between generations, we now group the four skill types investigated in this study into two types of competencies: expertise (functional and digital) and social (emotional and entrepreneurial).

Work that is routine and predictable – which, broadly speaking, requires technical competence and expertise (in other words, digital and functional) – is more vulnerable to being displaced by digital technologies, because such work can more easily be broken down into specific tasks and codified. Robots are getting better at repetitive manual work; AI will increasingly take care of routine cognitive work.

More uniquely ‘human’ skills or social competencies – which include the emotional, collaborative, interpersonal, entrepreneurial and leadership skills needed to perform work with other people – are less vulnerable as they are neither predictable nor routine, are difficult to atomise and cannot be easily codified.

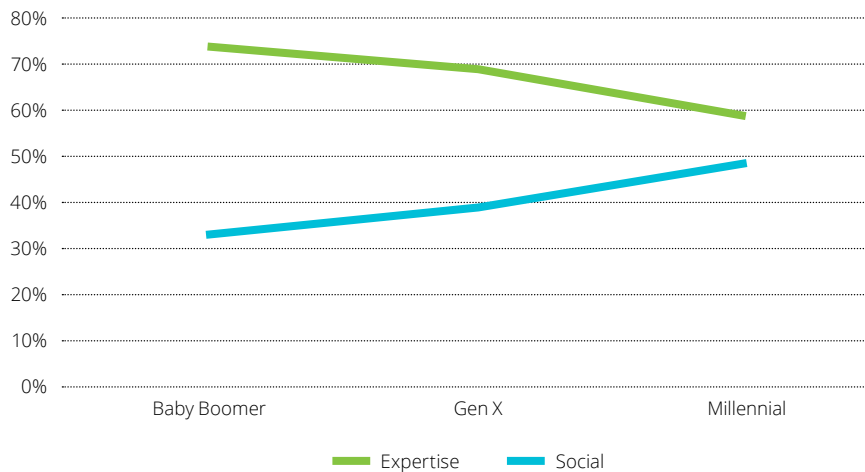
Australian workers’ attitudes towards the importance of expertise and social competencies for the future workplace are markedly different across generations (see Figure 11).

**Figure 10. Most important skills for the future of work**



\*All comparisons have a  $p < 0.001$ , except for Millennials where the comparison is  $p < 0.01$ .

**Figure 11. Expertise vs social competencies for the future of work, by generation**




\* Expertise – aggregate of frequencies for functional and digital skills (see Question 10)  
 Social competencies – aggregate of frequencies for emotional and entrepreneurial skills (see Question 10)

Each generation rates expertise as most important for the future of work. However, older workers value expertise significantly higher than social competencies, especially compared with younger workers. The explanation is likely complex but we offer some thinking behind this.

On a fundamental level, the views of each generation of worker towards skills suggest different conceptions of work. Baby Boomers, and to a lesser degree Gen X, appear to hold a more traditional and mechanistic conception of work. Functional and digital skills are generally more specific to performing explicit tasks (manual and cognitive) as well as in performing higher level cognitive work, such as problem solving more complex tasks.

The younger Millennial generation, on the other hand, places higher relative value on social competencies, almost on par with expertise. We suggest that younger workers (especially 18 to 24-year-old Gen Z workers) – sometimes referred to as ‘digital natives’ and many of whom learned coding at school – have more sophisticated capability in highly collaborative digital environments. For instance, they have the highest social networking penetration (around twice that of Baby Boomers), perform the most freelancing work through digital platforms, and have the highest usage of massive multiplayer online games, to name a few.

Putting speculation aside, successful workforce transformation must take into account that younger and older workers have divergent views on the future work, which will impact on learning. Organisations need to consider how to empower all workers – Millennials for their future-focused mindsets, older workers for their many years of experience with systems, products, customers and culture – to create an age-diverse collaborative culture in digital environments.



**INSIGHT 1.**

The balanced skills mindset of Millennials more closely aligns to the combinatorial skills demanded of the workplace of the future.

### Sectoral perspectives of skills needed for the future of work

To examine how workers in different sectors rate the skills needed for the future of work, let us first look at McKinsey Australia analysis from the May 2017 *Digital Australia* report, which shows the extent of digitisation of Australian industry. Digitisation is defined as the incorporation of “digital technologies and ways of working which together enable a set of opportunities in: innovating business models, product offerings, and markets; growing existing revenue streams and enhancing the customer experience via improved customer interactions and service; and streamlining internal processes and operations.”


When related industries are grouped together into three broad sectors (excluding government), the knowledge-intensive sector has a relatively high level of digitisation, the service sector (which employs 4 in 5 Australian workers) has a medium level of digitisation, and the asset-intensive sector has a lower level of digitisation (see *Figure 11*; see Appendix for industries in each sector). The McKinsey report notes that digitisation levels are not evenly spread across industries within a sector, or across companies within an industry.

Digitisation is the necessary precursor to automation. So industries with higher levels of digitisation – such as those in the knowledge-intensive sector – are further along the path to automation than those with lower levels of digitisation. Given this,

we were curious to see what patterns there are between the level of digitisation of a sector and Australian workers’ attitudes towards skills and learning within each sector (see *Figure 13*).

Workers in the asset sector value expertise three times more than social competencies (75% compared to 25%). Workers in the service sector value expertise over social competencies at 60% to 40%. Knowledge sector workers value social competencies and expertise at roughly equal importance. This trend suggests the further an industry is along the path to automation, the more that workers in that industry value social competencies in the future workplace.<sup>5</sup>

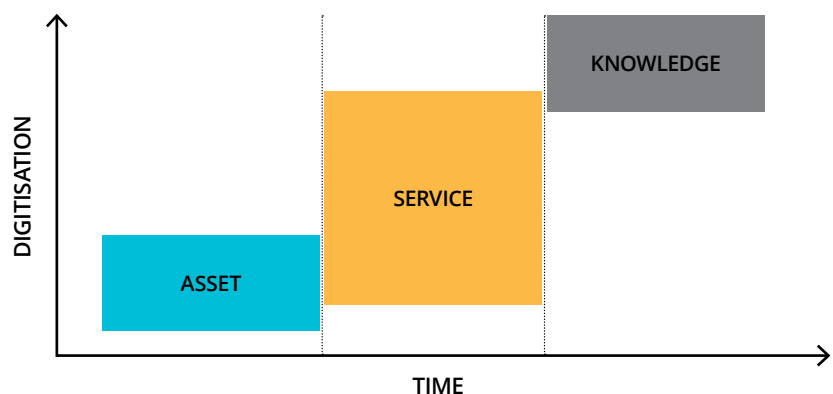
Insight into why knowledge sector workers value social competencies more can be inferred from workers’ feelings of job security across sectors. Knowledge sector workers are more worried (58%) about losing their job to AI and automation than workers in the service and asset sectors (48% each) (see *Figure 14*).



**INSIGHT 2.**

The further an industry is down the path to integrating automation technologies, the more workers value the importance of social competencies – such as emotional, collaborative, leadership, empathy and entrepreneurial skills – relative to expertise.

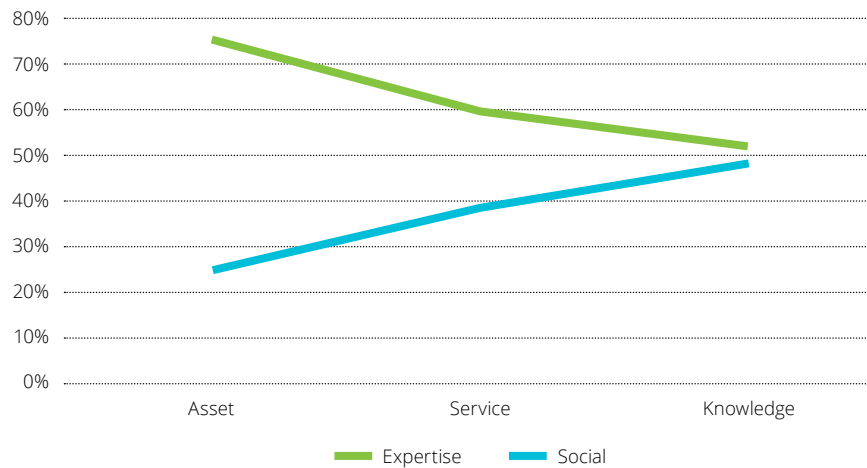
**Figure 12. Schematic representation of digitisation levels of non-government sectors of the Australian economy\*\*\***



\*Based on McKinsey modelling

\*\*Area of each sector suggests approximate proportion of the economy

**Figure 13. Comparison of the importance of expertise and social competencies for the future workplace, by sector\***



\* Expertise – aggregate of frequencies for functional and digital skills (see Question 10)  
 Social competencies – aggregate of frequencies for emotional and entrepreneurial skills (see Question 10)

**Figure 14. Percentage of Australian workers worried about losing their job to AI or automation, by sector\***



\*All comparisons have a  $p < 0.001$ .

Knowledge sector workers – such as those in the information, technology, media or telecommunications industries – have been working in disruptive digital environments for longer. Despite being technically competent, many people have lost their jobs or had their work profoundly altered due to technology. The displaced work has often been technical in nature, such as data processing, analytical and diagnostic work, using skills acquired through formal education

and training. When asked to think about the future workplace, one in which AI and automation technologies will be increasingly pervasive, workers in this sector value social competencies more than workers in less disrupted sectors of the economy do.

## Impact of automation on learning and the future of work

Australian workers prefer to 'learn on the job' to prepare for the workplace of the future (see Question 12). Even when we analyse learning format preferences against the education level attained by Australian workers, from school leavers to workers with higher degrees, without exception 'learning on the job' is the preferred format at every education level. The same is true across all worker demographics.

We were curious to see how preference for 'learning on the job' changed across different sectors. To identify trends of learning preference across each sector, we draw on the results from Question 12, related to the level of digitisation of each sector, as depicted in *Figure 12*. *Figure 15* shows the results for workers in each sector.

The more a sector has taken up digital technologies, the more that workers in that sector prefer 'learning on the job' over all other learning formats.

### Not just learning on the job, but learning immersed in disruption

As evident in this research, Australian workers value the expertise of TAFEs and universities across the country; a trade or professional expertise for work will still be needed. But this research, combined with studies performed by Deloitte and EY, indicates Australian

workers want formal education to be more job relevant in these digitally disruptive environments.

In the future of work, students and workers will require a new suite of skills. The recently announced Australian Government's National Skills Commission will presumably help inform the national skills package *Delivering Skills for Today and Tomorrow*, "to ensure Australians can access the training they need for the jobs of today and prepare for the jobs of the future".<sup>6</sup> Organisations such as Faethm – an AI analytics platform for the future of work – provide granular breakdowns of tasks expected in future roles, mapped to existing ones, identifying skills gaps. Educators must ensure students are equipped with these future-ready skills, at the same time as helping workers make the transition.

And tertiary education providers already incorporate collaborative work experiences into their curricula – generally known as 'work-integrated learning'. These programs are growing in popularity with students.

But to prepare people for the workplace of the future requires a mindset shift – for both educators and employers. It is not just about how we integrate the expertise offered by TAFE or higher education, generally in the form of explicit knowledge, into collaborative work environments. It is also about ensuring these learning experiences are immersed

**Figure 15. Importance of 'learning on the job' as a preference, by sector\***



\*All comparisons have a  $p < 0.01$  or better.

in the continuously changing, digitally disruptive environments where workers need to develop the know-how and tacit knowledge to thrive in the future of work.

The workplace is where digital disruption of work happens – it's not happening in the classroom at universities, TAFEs or colleges. In future of work environments, people – both workers and students – can gain firsthand experience of the impact of digital technologies. And, as the disruption from these technologies grows, the trend of learning on the job will only become more important.

This helps explain why workers in more digitally disrupted industries value formal education less than workers in industries with lower levels of digitisation. Formal, structured education's ability to simulate the transforming workplace decreases as the leading edge of technology advances.

While these trends will need to be observed over time, the observations reported here suggest the attitudes of workers in the knowledge sector are a helpful lead indicator for the changes in learning preferences to come as the AI and automation technology wavefront moves through the economy.

### INSIGHT 3.



The more that a sector is disrupted by digital technologies, the more that workers prefer learning on the job to prepare for the workplace of the future.

## EXPLICIT AND TACIT FORMS OF KNOWLEDGE

The best source of an organisation's sustained competitive advantage is knowledge. The 'explicit' form of knowledge is easily articulated, codified, verified, and able to be shared. Explicit knowledge is the essential ingredient in building new products, creating new services, and developing new apps and devices. It is what universities and R&D laboratories produce using rigorous methodologies. It accumulates in textbooks. And it is what we study at TAFE, university or take in a Massive Open Online Course. The mechanism for creating new explicit knowledge from existing explicit knowledge can sometimes be comparatively slow – and potentially costly – especially where the problem cannot be well defined.

In an era of accelerating technologies and dynamic conditions, the companies and organisations with workers who can create value the fastest will have the edge. According to John Hagel and John Seely Brown in a 2017 HBR article, "in a rapidly changing world, much of the new knowledge comes in the form of tacit knowledge."<sup>7</sup>

Ikujiro Nonaka showed how creating tacit knowledge first can be a fast and effective pathway to creating explicit knowledge. It starts with "tapping the tacit and highly subjective insights" of individuals and clearly articulating it. Once "externalised", as this step is called, those insights can then be tested in developing explicit knowledge. This knowledge then spirals upwards continually cycling between tacit and explicit forms.<sup>8</sup>

A worker experimenting with new technologies and developing insights is 'tacit' learning in action. So, too, is collaborating with others in ambiguous and dynamic environments on divergent problems. These tacit approaches to learning become even more important in the face of rapidly accelerating technologies because they can create new value faster.

And the most valuable form of learning, according to Hagel and Brown, "is creating new knowledge", especially in novel situations. Thus, learning on the job in rapidly changing and dynamic environments is best demonstrated through creating value.



### Those at risk of being left behind

There will be decreasing demand across the Australian economy for routine and predictable work, especially work requiring basic manual and cognitive skills. By 2030, McKinsey modelling indicates there will be fewer jobs for machine and equipment operators, drivers, mechanics, nurses, tradespeople, security guards, data entry operators, cashiers, bookkeepers, and in customer service.

As the uptake of AI and automation increases, these jobs become more vulnerable. Digital technologies will continue to advance in their capability, become more widely available and more affordable. They will gradually displace low value human labour in these low-paying jobs.

Figure 16 shows three measures of worker confidence against annual household income. Australian workers from low income households (<\$50k) have the lowest confidence in the relevance of their current skills, the lowest confidence in their ability to learn new skills and the highest levels of job insecurity. Not only do workers on low incomes feel vulnerable but they also lack confidence in their ability to create the opportunity to change their circumstance.

Low income directly correlates to low-skilled labour, but it is also a proxy for other disadvantaged groups. Generally low income has a higher representation of female workers, workers with low levels of education and workers with disabilities, as well as young people.

For instance, regarding job security, the Foundation for Young Australians reports that young people today could have 17 jobs over five industries in their lifetime. FYA says this “lack of job security and income stability means young people face barriers to key adulthood milestones like moving out of home or buying property.”<sup>9</sup>

Nobel Laureate Joseph Stiglitz thinks the digital revolution is an opportunity to reduce inequality. Owing to their ability to democratise work, digital technologies genuinely promise better access to economic opportunity for everyone, from bus drivers to those in senior executive roles. Despite his optimism, however, Stiglitz is yet to see a reversal in inequality.<sup>10</sup>

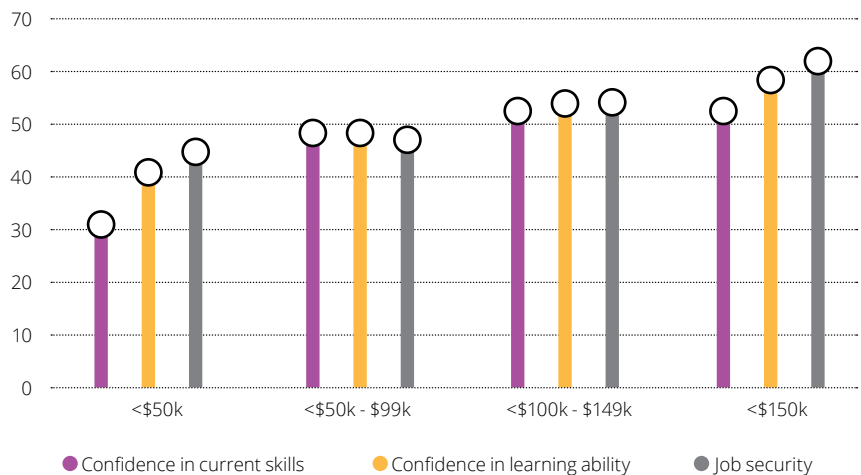
Without providing opportunities for the most vulnerable workers to prepare to work with digital technologies, there is a strong risk that existing disadvantage could not only be reinforced but compounded. With the increasing pace of technology advancement, it is becoming more urgent that we provide opportunities for everyone in the future of work.

#### INSIGHT 4.



The more vulnerable a worker feels about being displaced by digital technologies, the less confident they feel in being able to prepare themselves for the future of work.

Figure 16. Confidence levels by annual household income



## **OPPORTUNITIES FOR WORKERS IN THE DIGITAL FUTURE**

As digital technologies get better at doing routine and predictable forms of work, uniquely human social competencies, combined with higher level cognitive skills, will come to the fore. In these future of work environments, workers increasingly become decision-makers and value creators.

Here are some emerging examples:

- The designer who experiments with virtual reality technologies to improve the design process, and where his colleagues learn by watching his every move projected onto a screen
- The customer service officer who uses her experience and skills, plus a solid understanding of her company's principles, to analyse and solve a customer's problem based on their digital profile
- The factory floor worker who is empowered to optimise manufacturing processes for which she is responsible
- The agile team of cross-functional experts who figure out how to communicate across knowledge boundaries by defining a common objective
- The founder of a small start-up who supports and gets support from fellow entrepreneurs in a coworking space, recognising that the success of everyone feeds his success
- The farmer who uses drones to monitor stock in distant paddocks
- The palm oil plantation workers who use GPS technology combined with blockchain technology to assure consumers their produce is not from illegally-cleared land
- The online freelancer community that emerges to support one another in dealing with international client problems and cultural differences
- The medical specialist who exploits the diagnostic ability of AI, freeing her time to develop bespoke patient care
- The former middle manager in a large corporation who is now part of a problem-focused, multi-disciplinary agile team, and valued for his wealth of experience

## SECTION 3. RECOMMENDATIONS:

# Building a national workforce for Australia's digital future

Given that change is inevitable – that automation and AI will increasingly encroach upon traditional jobs – what should be done? How can we prepare our workers for the future of work so that they access exciting work opportunities? Within this section, we make three broad recommendations for building a national workforce for Australia's digital future, and invite discussion with government, educators and employers on how to make this happen.

### Recommendation 1: We need to develop 'learning workers'

#### Simply retooling Australian workers with digital skills will not be enough.

To succeed in the future of work, workers need to develop and maintain their uniquely human competitive advantage over increasingly sophisticated technologies. We propose they become 'learning workers' who possess a hierarchy of attributes that enable this advantage, combined with the right mindset and honed by working in ever-more digital environments.

What does this hierarchy of attributes look like? While workers will still need specific skills or expertise related to their trade or profession, based on a mastery of explicit knowledge, this will not be enough in the future of work. They will need a balanced

combinatorial skill set, so they can navigate the dynamic and disruptive digital environments with competence, confidence, resilience and agency. See Figure 17.

#### Trade skills or professional expertise

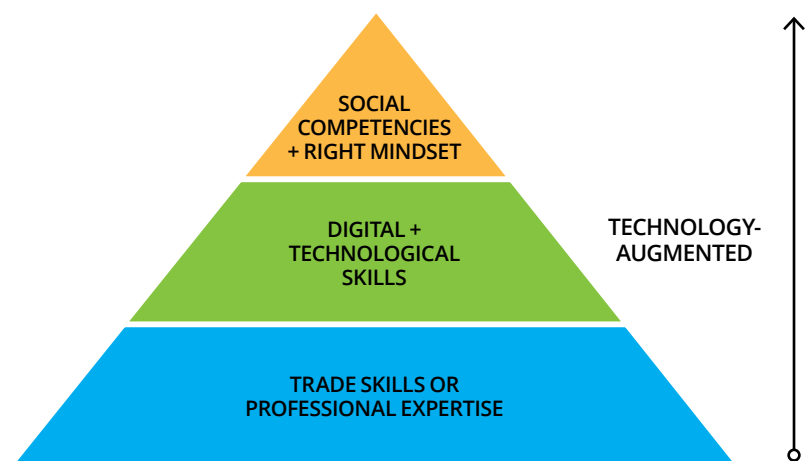
An expertise or trade will continue to be a fundamental foundation for most workers. However, the focus will increasingly be more on higher level technical expertise related to that line of work rather than on accumulation of explicit knowledge. For instance, leveraging their explicit knowledge to solve complex problems, to perform critical analysis, to make decisions, to work in ambiguous and dynamic problem spaces, to work across different knowledge domains, to develop new ideas and identify ways of creating value, will become more important.

#### Digital and technological skills

According to the proposed Australian Workforce Digital Skills Framework (AWDSF), digital skills competency is the basic ability to use digital technology for work such as through communication (find, evaluate and compose) on various digital platforms. Higher level digital skills in the AWDSF include being able to apply advanced digital tools, to analyse and evaluate data, and ultimately to create or solve problems in digital environments.

We note that at some point soon, there will be no distinction of digital and

Figure 17. The attributes of the learning worker



technological skills from a person's trade skills or professional expertise. They will integrate to become part of the worker's overall functional expertise.

### **Social competencies and the right mindset**

Success in the workplace of the future requires enhanced social competencies (collaboration, empathy and social skills plus leadership and entrepreneurial skills) combined with the right mindset (risk-taking, curiosity, ability to handle ambiguity, continuous learning, agency). Social competencies are essential in helping transfer to other workers the tacit knowledge created in new environments. This includes social skills such as storytelling using analogy, and demonstrating aided by visualisation.

More than just connecting with colleagues, customers and clients, social competencies will increasingly include the ability to work with people across digital platforms. Collaborative skills, for instance, will evolve from working with those we know to those we do not across the globe through digital networks.

### **Value creation is the new measure of success for the learning worker**

The Kirkpatrick Model, developed in 1954, has been the gold standard in evaluating whether a learner has demonstrated mastery in a work environment. It measures their ability to employ their explicit knowledge in doing tasks to produce results that enhance organisational performance. 'Result' is the highest of the four levels of the Kirkpatrick Model, and reflects work of an era when the output was easily quantified and measured against business objectives. Examples of 'result' include traditional measures of organisational success such as cost savings, higher returns on investments, improved quality of products, less accidents in the workplace, more efficient production times and a higher quantity of sales. Results are immediate, objective and follow the scientific management approach of how to run organisations.

In the future of work, where organisations are constantly evolving in complex ecosystems, this concept of results must also evolve. Rather than analyse, plan and

implement, workers will increasingly need to experiment and learn how to help the organisation advance or evolve. Instead of result, we propose value creation.

Value creation is work that enhances the competitive advantage of the organisation.

Value creation can be both direct and indirect – unlike results, where the outcome relates directly to organisational performance, value creation may not be. Network effects, for instance, are where the organisation benefits indirectly from value being created for its network and the wider ecosystem, leveraging interdependencies.

In rapidly changing conditions, the most effective way to demonstrate learning is to create value. The learning worker is able to adapt and evolve in continuously changing digital environments, augmenting their ability through technology, while creating value for their organisation at the same time.

The right technical and functional skills are an essential foundation leading to value creation, as are social competencies. But it will also increasingly rely on the worker's ability to develop tacit knowledge of working in these disruptive and rapidly-changing environments – to learn how to create value in perpetually novel situations. As Heather McGowan emphasises, explicit knowledge is measured by productivity; tacit knowledge is the premium a worker develops in learning around the tasks that rely on explicit knowledge.<sup>11</sup> These tacit insights are demonstrated by creating new value.

Tasked with a value creation objective, students and workers develop the underlying capabilities of being tacit learners, such as curiosity, critical thinking, risk-taking competence, imagination, and creativity. In other words, developing tacit knowledge enhances the right mindset of the learning worker.

## Recommendation 2: We need to integrate learning into work

To prepare for the ever-changing digital future, Australian workers prefer 'learning on the job' over any other format. We propose that this becomes 'learning-integrated work', where learning is integrated into the workplace, especially in continuously changing, digitally disruptive environments.

Reflecting the hierarchy of attributes of the learning worker, learning-integrated work has a hierarchy of three learning levels. Learning-integrated work applies as equally to students at TAFE or university as it does to workers in the future of work. See Figure 18.

### Knowledge and expertise

Learning new explicit knowledge and developing relevant expertise for these new roles make up the learning foundation of learning-integrated work. Experiential 'hands-on' learning is important to master this new knowledge. This first level of learning focuses on advancing a worker's functional and technological skills.

### Interactive & self-directed

The second learning level focuses on developing social competencies in the forms of interactive learning, self-directed learning, and cross-functional learning.

Research shows that learning through and with others at work is far more effective than learning individually. Allowing the worker to self-direct their learning based on their curiosity and motivations is empowering and helps develop their agency. Working across boundaries (knowledge, expertise, cultural, etc) not only requires advanced social capabilities, it also enhances cross-functional cognitive skills.

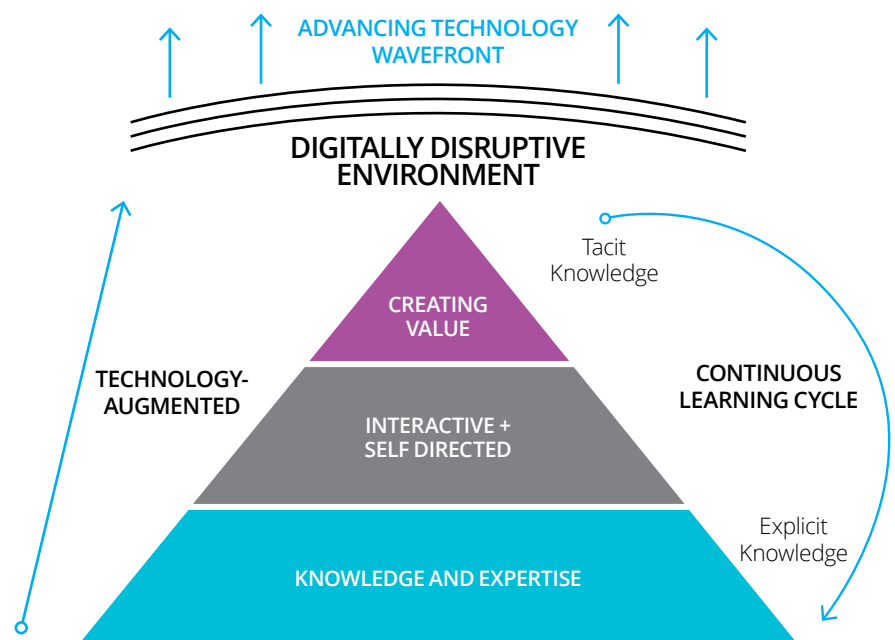
### Creating value

The highest level of learning is creating value, the goal of learning-integrated work. By focusing on learning how to create value in digitally disruptive environments, the learning worker develops the tacit knowledge to work effectively in the digital future.

The continuous learning cycle is more than ongoing development of a worker's foundational knowledge and functional expertise. Continuous learning is also creating value through converting tacit knowledge into explicit knowledge.

Finally, the learning context matters. As learning expert Eva Kyndt reminds us, workplace learning is a process, not an event, and it is most effective when it occurs in a work environment.<sup>12</sup> Learning-integrated work occurs in disruptive environments and where technology is augmenting the worker's capability.

Figure 18. Learning-integrated work



## **LEARNING-INTEGRATED WORK**

### **Learning level 1: Knowledge and expertise**

- Future work-relevant – skills related to the worker's evolving role and industry
- Incrementalised – explicit knowledge delivered through micro learning opportunities
- Just-in-time – supports learning at the moment it is required at work
- Experiential – hands-on/tacit approaches to apply learning in real-work contexts

### **Learning level 2: Interactive and self-directed**

- Social – learning through interacting with others is the main source for learning within organisations
- Self-directed – empower the worker to learn what they choose and need
- Cross-functional – develop cognitive and social competencies working across boundaries

### **Learning level 3: Creating value**

- Creating value – the goal of learning-integrated work is enhancing advantage
- Accreditation – based on value creation

### **Context: Future work environment**

- Digitally disruptive environments – immersed at technology's rapidly-advancing edge
- Continuous learning – supports continual upskilling and new skilling of all learning worker attributes; cycling between explicit and tacit forms of knowledge
- Technology-augmented – technology elevating the worker's ability

With just over half of working Australians feeling insecure in their job, learning-integrated work would help deliver a range of other benefits:

- 1. Job security** – mitigating risk of job loss as workers take charge through professional development
- 2. Time** – minimises time pressures by incorporating learning into work schedules
- 3. Cost** – minimises cost pressures for workers through incrementalised learning

The traditional notion of a linear career is no longer a reality. Learning is no longer something that occurs only at the beginning of someone's working life. Workers will not only have many jobs over their lifetime – each of their jobs will be continually changing while they work.

### **Work and learning must converge**

The pace of change and the non-linear pathways through which technology will transform the economy mean traditional education and training – and the skills it develops – will need to respond to this convergence. Learning for the future of work needs to mimic work of the future. The best way to achieve this is to increasingly immerse learning in work environments – for workers and students alike.

### Recommendation 3: We need a new learning infrastructure

Learning has always been the tool of individual and organisational advancement. With digital technologies reshaping the Australian economy and transforming work, the learning worker and learning-integrated work will be essential components advancing individuals and organisations, and helping drive a new wave of productivity.

But in a world ever-more hyperconnected, winning will become increasingly interdependent on the success of others. We need to move beyond a system of 'passing the baton' where educators have the responsibility of preparing graduates for work and handing them over to employers for the rest of their careers. Continuous learning demands a new approach.

We need a new learning infrastructure that drives deep and continuous connections between educators and employers supported by government. The core objective is to prepare workers for the digital economy and maintain their advantage, ongoing.

The new learning infrastructure is based on three pillars.

- **New partnership models** – New approaches to partnerships between educators and employers need to be developed and implemented, focusing on developing learning workers, integrating learning into work and reimagining accreditation for value creation. There will likely be many successful formulas for models across different sectors, industries and geographies.
- **A network of practice** – The learning infrastructure would facilitate the sharing of findings, experience and best practice approaches between educators and employers across the network. This national network of practice would foster collaboration through research, exchange of information and support relating to integrating learning in the workplace.
- **Values** – Collective responsibility of employers and educators towards preparing workers is essential in the partnership model. Both have their unique roles but with shared obligation. Inclusivity must also be a core value of the learning infrastructure to ensure those workers most vulnerable of being displaced are supported.

#### PROTO EDUCATOR-EMPLOYER PARTNERSHIPS

The AiGroup, Siemens and Swinburne University Industry 4.0 Higher Apprenticeship Program is an early exemplar of an educator-employer partnership, focused on preparing students for the future of work. Clustering of SMEs is another approach, such as the Advanced Manufacturing Industry 4.0 SME Hub at Swinburne.

Both programs are new models of university-industry collaboration for learning-integrated work. Students work side-by-side with industry helping create new value through developing and co-creating new technologies and work practices.

### **'Lift and shift' – how to get started**

The pace of change and new pathways through which technology is already transforming the Australian economy mean traditional education and training – and the skills it develops – need to begin responding now. The best way to achieve this is to increasingly immerse learning in work environments.

We need to lift workers into the digital economy by providing basic digital competency. The most immediate challenge is to equip the workforce with the skills to work with digital technologies. All workers must have access to this training, relevant to the emerging needs of their organisation, industry or sector.

We need to shift learning into future workplaces by trialling new learning approaches delivered through partnerships between education institutions and employers. These learning partnerships would form the foundation of the learning infrastructure, and focus on developing learning workers, integrating learning into work, and reimagining accreditation. There will be many successful formulas.

Efforts could commence by building on successful work-integrated learning programs, such as by piloting learning-integrated work partnerships between TAFEs, VET providers and universities with employers. These partnerships need to be trialled in each state and across sectors of the economy. More than simply delivery of conventional learning approaches into work (e.g. delivering content through a learning management system), the focus must be on developing an approach that integrates all levels of learning in learning-integrated work.

#### **Coordinating a national approach**

**Government.** Only government has the policy levers and resources to support digital training of workers, and to coordinate and network this new learning infrastructure of partnerships across the economy. Government funding should be tied to the individual worker to learn at work, catalysing educator-employer partnerships. Government support to help establish these nascent partnerships would likely be required. All funding must prioritise support for workers vulnerable of being displaced by technology, as well as target support for SMEs.

At the same time as preparing people, education institutions and employers must also invest in developing and embedding AI and automation technologies in their organisations. Digitally-enabled infrastructure is also required to support them.

**Education institutions.** Educators must start now ensuring students are equipped with new future skills. Educators will continue to provide a foundation learning – through diplomas and degrees – for those entering the workforce. But as future work emerges, students and workers will require a new suite of skills to perform these new roles. Educators must begin embedding into existing courses these digital, technological and functional skills aligned to the future of work. All offerings must have an enhanced focus on developing social competencies, with a focus on developing learning workers. New approaches to immersing learning in digitally-disruptive environments need to be pursued.

**Employers.** Employers, with the support of industry groups, must recognise their responsibility to become a learning organisation. Workers vulnerable of being displaced need to be supported through upskilling. A learning culture needs to be fostered that supports curiosity, risk-taking, and entrepreneurial ways of thinking. All workers need to be supported and encouraged to continually learn. Organisations need to consider how to empower workers of all generations – Millennials for their future-focused mindsets, older workers for their many years of experience with systems, products, customers and culture – to create an age-diverse collaborative culture in digital environments. And they must look at ways to accelerate automation and uptake of digital technologies.

**Educators and employers.** Both education institutions and employers must start coming together recognising the imperative of increasingly integrating learning into future workplaces. New approaches to accreditation need to begin being conceived and developed. Competency is demonstrated through the ability of students and workers to create value.



## PREPARING A NATIONAL WORKFORCE FOR THE DIGITAL ECONOMY

<p>GOVERNMENT</p>	<p><b>Opportunity:</b></p> <ul style="list-style-type: none"> <li>• Develop a new national learning infrastructure to enable productivity growth in the digital economy</li> </ul> <p><b>Key Actions:</b></p> <ul style="list-style-type: none"> <li>• Provide access for all Australian workers to develop basic digital competency delivered as learning-integrated work, e.g. through TAFE-employer partnerships</li> <li>• Invest in pilot educator-employer approaches in different sectors and coordinate a national network of practice of learning-integrated work</li> <li>• Target support to reskill vulnerable workers, and to assist SMEs in their workforce transformation</li> </ul>
<p>EDUCATION INSTITUTIONS</p>	<p><b>Opportunity:</b></p> <ul style="list-style-type: none"> <li>• Be leaders in developing learning workers</li> </ul> <p><b>Key Actions:</b></p> <ul style="list-style-type: none"> <li>• Develop new approaches to integrate learning into work</li> <li>• Boost efforts to enhance social competencies of students and integrate digital technologies into all courses</li> <li>• Work with employers to develop new approaches to accreditation focused on value creation</li> </ul>
<p>EMPLOYERS</p>	<p><b>Opportunity:</b></p> <ul style="list-style-type: none"> <li>• Become a learning organisation to enhance competitive advantage</li> </ul> <p><b>Key Actions:</b></p> <ul style="list-style-type: none"> <li>• Integrate learning into the workplace and foster a learning culture</li> <li>• Invest in preparing workers as AI and automation technologies are introduced into the workplace, and immediately begin re-skilling workers vulnerable to being displaced</li> <li>• Empower younger workers for their future-focused mindsets and embrace older workers for their experience in creating a collaborative culture</li> </ul>
<p>INDIVIDUALS</p>	<p><b>Opportunity:</b></p> <ul style="list-style-type: none"> <li>• Develop a unique point of difference in the future of work</li> </ul> <p><b>Key Actions:</b></p> <ul style="list-style-type: none"> <li>• Embrace continuous and self-directed learning</li> <li>• Develop the right mindset (risk-taking, curiosity, ability to handle ambiguity, agency)</li> <li>• Focus on developing a combinatorial skill set and push boundaries in disruptive environments</li> </ul>

# CONCLUSION

Automation and AI technologies are already making their way into workplaces across Australia – the pace of their uptake will only accelerate and their impact will intensify. Australian workers signal they have a skills gap between current capabilities and those required in the future of work. They are deficient in digital skills and they recognise that uniquely human skills are their competitive advantage in workplaces disrupted by digital technologies.

There is a growing recognition by government, employers and educators that skills will be the core currency in the future of work labour market. But as automation and work converge, this skills gap will become an experiential gap if not tackled.

Learning and work must also converge. Given the pace and continuous change of how technology is transforming work, traditional education – and the skills it develops – must respond to this convergence. Learning for the future of work needs a new learning infrastructure which increasingly immerses learning in digitally disruptive work environments – for workers and students alike.

This report set out to demonstrate the need to change the way we think about preparing for the future of work. It is not the first call for workers to gain more digital skills. But it is likely the first time a survey of all Australian workers reinforces this call to arms.

The case for change is built on three findings for work in the disruptive and dynamic environments of the digital future:

- Workers' growing recognition of the importance of their social competencies
- The rising importance of tacit knowledge
- The imperative of integrating learning with work

The key actor will be the learning worker. Their worth will gradually be measured more by their ability to create value and less by their units of productive output. Encouragingly, a majority of Australian workers are ready; they want to take charge of their working future now.

Who is responsible for ensuring that current and future workers – across all generations, from all sectors and from all backgrounds – have the best chance of succeeding in this evolving world of work? A new learning infrastructure needs to build on the foundation of the learning worker and learning-integrated work. This requires a coordinated and collaborative national response from government and new partnerships between employers and educators.

The Fourth Industrial Revolution promises to liberate workers from routine work better done by technology. To help workers realise peak human potential requires forward-thinking leadership and bold re-envisioning of traditional roles of institutions. We believe there is a strong case to act to prepare our workers and keep people at the centre of the future of work. We invite discussion with government, employers and educators on how we begin building a national workforce for Australia's digital future. The future of work is now.

# APPENDIX

## 1. About the survey

The Centre for the New Workforce (CNeW) at Swinburne University of Technology commissioned YouGov to perform a survey to measure Australian workers' attitudes towards the future of work. Designed by CNeW, the survey aimed to measure attitudes of working Australians towards work, skills and learning, and to understand attitudes and perceptions towards digital technologies' impact on work.

In this research, we surveyed 1,031 Australians between the ages of 18 to 65+ years who are currently in the workforce (882), or currently actively looking (149). The sample was nationally representative of Australian demographics including across sex, age, geography, income, household, and industry. The survey was in the field in November 2018.

To better understand the sample population, respondents were first asked a range of demographic questions, and asked to self-select the most appropriate response in categories such as income, residence, education level, work status, job function, type of company and industry.

The main body of the survey was divided into 14 questions. Where multiple responses were possible (e.g. 'select all that apply'), responses were rotated randomly for respondents. Where ranking of responses was required, the order of options was randomised. For subjective responses and attitudes towards a particular statement we used a Likert scale.

Throughout this report, we have provided breakdown by sub-groupings, such as by generation, industry sector, and education levels. Any noted differences between these groups have been statistically tested to determine significance with 99% confidence.

## 2. Terms used in survey analysis

### Generations

Millennials (18-34 year-olds), Gen X (35-49 year-olds) and Baby Boomers (50-65+ year-olds).

### Industry sectors<sup>3</sup>

**Asset-intensive:** mining; manufacturing & production; electricity, gas, water & waste services; construction.

**Service-focused:** wholesale trade; retail trade; accommodation and food services; transport, postal and warehousing; rental/hiring, education & training; healthcare; arts and recreation; other services.

**Knowledge-intensive:** professional, scientific and technical services; information, media and technology; financial and insurance services; administrative and support services.

# ENDNOTES

<sup>1</sup> OECD 2019, 'Rapid action needed for people to meet challenges of changing world of work, viewed May 2019, <http://www.oecd.org/newsroom/rapid-action-needed-for-people-to-meet-challenges-of-changing-world-of-work.htm>

<sup>2</sup> McKinsey & Company 2019, 'Australia's automation opportunity: Reigniting productivity and inclusive income growth, viewed May 2019, <https://www.mckinsey.com/featured-insights/future-of-work/australias-automation-opportunity-reigniting-productivity-and-inclusive-income-growth>

<sup>3</sup> World Economic Forum 2019, 'Leading through the Fourth Industrial Revolution', viewed May 2019, [http://www3.weforum.org/docs/WEF\\_Leading\\_through\\_the\\_Fourth\\_Industrial\\_Revolution.pdf](http://www3.weforum.org/docs/WEF_Leading_through_the_Fourth_Industrial_Revolution.pdf)

<sup>4</sup> Speaking.com 2018, 'How to adapt to the radically changing workplace, with Heather McGowan', viewed May 2019, <https://speaking.com/blog-post/how-to-adapt-to-the-radically-changing-workplace-with-heather-mcgowan/>

<sup>5</sup> To ensure workers' attitudes towards social competencies for the future workplace did not simply reflect their attitudes of the current workplace, we asked respondents for their views on a range of social competency factors of the current workplace (e.g. collaboration, curiosity, entrepreneurial, risk-taking, etc). There was no discernible difference across sectors in attitudes towards social competencies in their current workplace.

<sup>6</sup> <https://www.education.gov.au/skills-and-training-budget-overview-2019-20>

<sup>7</sup> Hagel, J; Brown, J. S. 'Help employees create knowledge – not just share it', Harvard Business Review 2017

<sup>8</sup> Nonaka, I. The Knowledge-Creating Company, Harvard Business Review 2007

<sup>9</sup> Foundation for Young Australians 2019, 'What young people want you to know about flexible work'.

<sup>10</sup> <https://www.bbva.com/en/nobel-laureate-stiglitz-explores-the-social-challenges-posed-by-the-digital-revolution/>

<sup>11</sup> <https://think-boundless.com/heather-mcgowan-learning-future-of-work/>

<sup>12</sup> Kyndt, Eva 2019, 'How to choose your learning and development provider' (blog post), viewed May 2019, retrieved from <https://www.linkedin.com/pulse/how-choose-your-learning-development-provider-four-relevant-eva-kyndt/>

<sup>13</sup> McKinsey & Company 2017, 'Digital Australia: seizing opportunities from the Fourth Industrial Revolution, viewed May 2019, <https://www.mckinsey.com/featured-insights/asia-pacific/digital-australia-seizing-opportunity-from-the-fourth-industrial-revolution>

# REFERENCES

AI Group 2018, 'Skilling, a national imperative', viewed May 2019, [https://cdn.aigroup.com.au/Reports/2018/Survey\\_Report\\_WFDNeeds\\_Skilling\\_Sept2018.pdf](https://cdn.aigroup.com.au/Reports/2018/Survey_Report_WFDNeeds_Skilling_Sept2018.pdf)

Deloitte 2018, 'Higher education for a changing world', viewed May 2019, <https://www2.deloitte.com/au/en/pages/public-sector/articles/higher-education-changing-world.html>

Deloitte 2019, 'What is the future of work?', viewed May 2019, <https://www2.deloitte.com/insights/us/en/focus/technology-and-the-future-of-work/redefining-work-workforces-workplaces.html>

EY 2018, 'Can the universities of today lead learning for tomorrow?', viewed May 2019, <https://cdn.ey.com/echannel/au/en/industries/government---public-sector/ey-university-of-the-future-2030/EY-university-of-the-future-2030.pdf>

Foundation for Young Australians 2019, 'What young people want you to know about flexible work', viewed May 2019, <https://www.fya.org.au/2018/10/27/what-young-people-want-you-to-know-about-flexible-work/>

Gekara, V, Snell, D, Molla, A, Karanasios, S & Thomas, A 2019 'Skilling the Australian workforce for the digital economy', NCVET, Adelaide.

Harvard Business Review 2017, 'Help employees create knowledge – not just share it', viewed May 2019, <https://hbr.org/2017/08/help-employees-create-knowledge-not-just-share-it>

McKinsey & Company 2019, 'Australia's automation opportunity: Reigniting productivity and inclusive income growth', viewed May 2019, <https://www.mckinsey.com/featured-insights/future-of-work/australias-automation-opportunity-reigniting-productivity-and-inclusive-income-growth>

McKinsey & Company 2017, 'Digital Australia: seizing opportunities from the Fourth Industrial Revolution', viewed May 2019, <https://www.mckinsey.com/featured-insights/asia-pacific/digital-australia-seizing-opportunity-from-the-fourth-industrial-revolution>

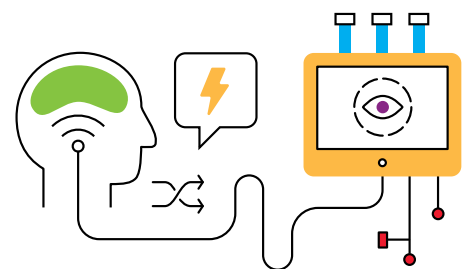
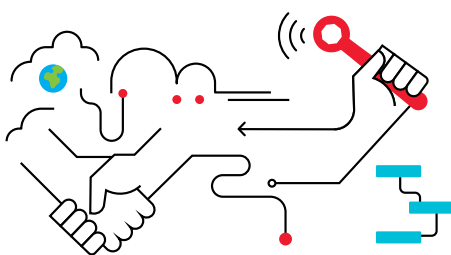
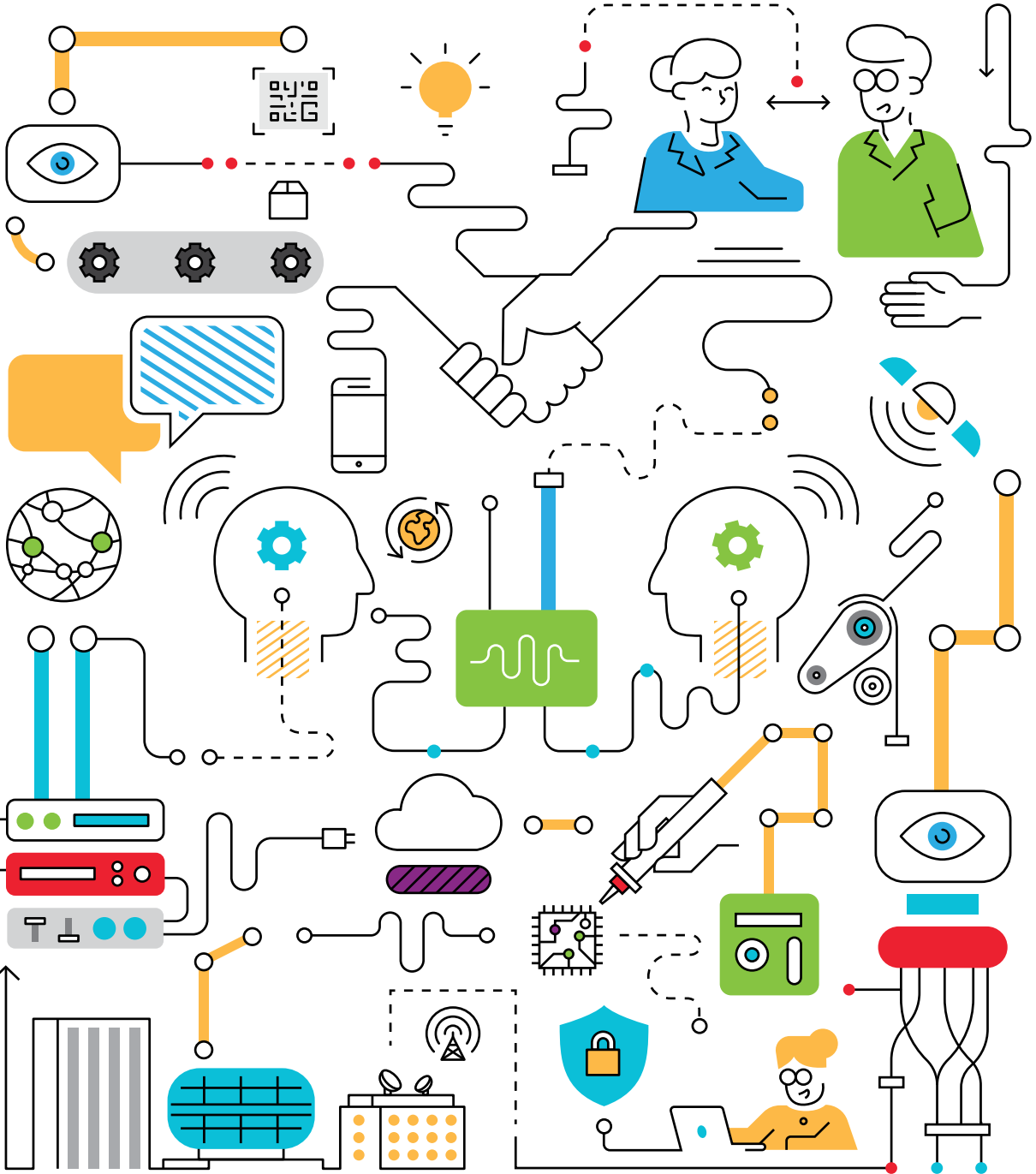
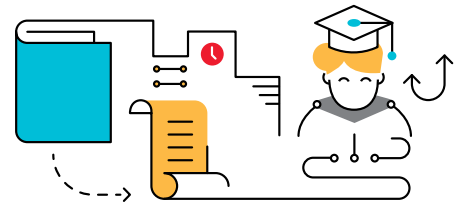
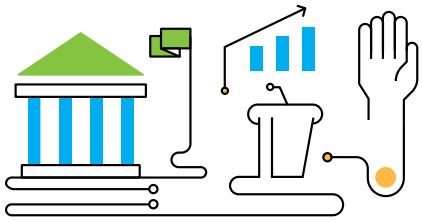
OECD 2019, 'Rapid action needed for people to meet challenges of changing world of work', viewed May 2019, <http://www.oecd.org/newsroom/rapid-action-needed-for-people-to-meet-challenges-of-changing-world-of-work.htm>

World Economic Forum 2019, 'Leading through the Fourth Industrial Revolution', viewed May 2019, [http://www3.weforum.org/docs/WEF\\_Leading\\_through\\_the\\_Fourth\\_Industrial\\_Revolution.pdf](http://www3.weforum.org/docs/WEF_Leading_through_the_Fourth_Industrial_Revolution.pdf)

World Economic Forum 2019, 'Strategies for the New Economy', viewed May 2019, [http://www3.weforum.org/docs/WEF\\_2019\\_Strategies\\_for\\_the\\_New\\_Economy\\_Skills.pdf](http://www3.weforum.org/docs/WEF_2019_Strategies_for_the_New_Economy_Skills.pdf)

World Economic Forum 2019, 'The digital transformation is a skills and education opportunity for all', viewed May 2019, <https://www.weforum.org/agenda/2019/02/digital-transformation-is-an-opportunity-to-re-skill-everyone-companies-must-use-it/>

World Economic Forum 2019, 'Towards a reskilling revolution', viewed May 2019, [http://www3.weforum.org/docs/WEF\\_Towards\\_a\\_Reskilling\\_Revolution.pdf](http://www3.weforum.org/docs/WEF_Towards_a_Reskilling_Revolution.pdf)





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Sean has extensive experience establishing and leading research and education initiatives, including as Deputy CEO of the United States Studies Centre at the University of Sydney. A strong believer in the transformative power of learning in supportive environments, he has led workforce initiatives focused on experiential learning that have prepared students for the changing global marketplace.

As a recognised thought leader on the impact of technology and globalisation on higher education, and more recently on the future of work, his work has shaped federal and state government policy.

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**RESEARCH PARTNER**

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**Copy editor:** Squidink Communications  
**Design and layout:** Washington Creative  
**Cover design, infographics and illustration:** Edelman Australia

**ACKNOWLEDGEMENTS**

The author would like to thank all reviewers for their constructive suggestions.

**ISBN**

978-1-925761-10-8

**DATE OF PUBLICATION**

June 2019

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