CENTRE FOR
EDUCATION & TRAINING

Skilling Australia to lock in our digital future

A plan to ensure Australia has the skills and capabilities to embrace digital transformation

JULY 2022

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About Australian Industry Group

The Australian Industry Group (Ai Group®) is a peak employer organisation representing traditional, innovative and emerging industry sectors. We are a truly national organisation which has been supporting businesses across Australia for nearly 150 years.

Ai Group is genuinely representative of Australian industry. Together with partner organisations we represent the interests of more than 60,000 businesses employing more than 1 million staff. Our members are small and large businesses in sectors including manufacturing, construction, engineering, transport & logistics, labour hire, mining services, the defence industry, civil airlines and ICT.

Our vision is for a thriving industry and a prosperous community. We offer our membership strong advocacy and an effective voice at all levels of government underpinned by our respected position of policy leadership and political non-partisanship.

With more than 250 staff and networks of relationships that extend beyond borders (domestic and international) we have the resources and the expertise to meet the changing needs of our membership. We provide the practical information, advice and assistance you need to run your business. Our deep experience of industrial relations and workplace law positions Ai Group as Australia's leading industrial advocate.

We listen and we support our members in facing their challenges by remaining at the cutting edge of policy debate and legislative change. We provide solution-driven advice to address business opportunities and risks.

The Centre for Education and Training

Ai Group's Centre for Education and Training drives bold new thinking on education and training in the context of work. It explores new ways to build skills and capabilities of companies to succeed now, and into the future.

Our proactive research, policy and advocacy agenda strives to ensure Australia's skill development outcomes are in line with current and emerging economic needs, at the same time linking the real needs of industry with the training, education and career aspirations of individuals.

Executive summary

Where are we now?

New technologies are transforming the ways in which we live, learn, work and play in previously unimagined, and sometimes completely unexpected, ways.

The role of the individual in the workplace is **moving from functional to transformative**, as humans move away from checking, lifting, calculating and record keeping, to become the problem solvers, navigators and communicators.

'**Digital transformation**' is the strategic adoption of digital technologies to improve, and indeed transform, business models.

This 'transformation' is not a one-off event but an evolution, **whereby** firms travel from digitally nascent to digitally mature. In this sense, digital transformation is actually a story of **human leadership, vision, capability and management**.

Key drivers of digital transformation at the firm level are fending off competition, exploring new business models, optimising operations and responding to the challenges of the COVID-19 pandemic.

Opportunities

- Digital transformation is **creating many new jobs and tasks**, as we need people to develop, apply and service digital technology. This presents an opportunity to transition to higher value, more flexible and less physically demanding jobs.
- Digital transformation is also driving **increased demand for flexible education and training**, able to provide skilling and reskilling opportunities over a lifetime.

Challenges

- A **higher level of digital literacy** is now required across the workforce, as digital tools are increasingly being used to perform tasks across all industries and occupations.
- Ai Group surveys show that industry **demand for digital skills is broad and deep**, and ranges from basic digital skills to specialist technology skills.
- As more tasks are done by machines **some skills and jobs become redundant**. This is driving significant structural change, with many workers needing to upskill in search of alternative employment.

Digital transformation in Australian businesses

We conducted interviews and case studies with 18 Australian companies drawn from a broad cross section of Ai Group's membership.

We found

- The **pandemic** has been an incredible catalyst for change.
- For these businesses, adopting, and adapting to new technologies in recent years has:
  - Driven demand for **entirely new skillsets** in a relatively short time
  - Required existing jobs to be **re-designed**
  - Changed the role and function of **managers**
  - Driven **cost savings**
  - Caused **shortages** in 'in demand' skills
  - Caused businesses to focus more on **training and development**.
- As **COVID-19 turned more businesses towards e-commerce**, many needed a range of new skillsets, such as marketing, distribution and logistics, website building and maintenance, and data intelligence and analytics.
- Digital transformation has **changed the roles of managers** considerably. Managers and leaders are now required to co-ordinate a range of digital activities to meet an outcome, demanding increased levels of skill to interpret and analyse data to make timely decisions.
- Some businesses reported a **lack of collaboration across silos** in the business when planning for a whole of business digital transformation.
- There is a **wide spectrum of 'digital maturity'**, with strategic planning for a digital strategy less common outside of large corporations. Changes in smaller businesses tended to be more ad hoc and reactive.
- Changes in technology are driving **shifts in job function and job design**. Administrative roles have decreased, and production engineers and IT product managers had expanded, and now involve co-ordinating a range of digital inputs and processes to achieve an outcome.
- All the businesses were looking to **use digitally generated data to make business decisions more effectively**. That search varied in strategic depth, cost and complexity according to the size and nature of the business.
- The majority of businesses **reported difficulties recruiting and retaining staff with the increased digital capability** now required.
- Many felt the **education and training system needed to better reflect today's business environment** and prepare workers with a mindset to continually update their skills to remain productive.

How well is Australia doing?

When it comes to our digital progress, Australia receives a mixed report card.

In the latest World Digital Competitiveness Rankings Australia has year on year declined in digital competitiveness slipping from

13th in the world in 2018 to

20th in 2021

Australia performs best on **'talent'** which measures factors such as local and international skilled workers, digital/ technological skills and international experience.

Australia ranks poorly on most of the measures of **'business agility'**.

There is **room for improvement** in creating a culture of innovation, agility and education and training across the economy.

Where to from here?

1. Ensure baseline digital literacy for all

We know that, moving forward, meaningful participation in work (and life) will require a baseline level of digital literacy.

The Digital Skills Organisation has released and will maintain an employer-led *Digital Skill Standards Framework* to create benchmarks for the assessment of digital skills. This work should be progressed, with the aim of developing a nationally agreed and easy to understand benchmark for digital skills.

2. Remake the education and training system for lifelong learning

We need an education and training system that better suits where we're going, not where we've been. This means rethinking qualifications, funding and access to ensure we invest in workers' skills throughout their careers. We need to implement the recommendations of the *Review of the Australian Qualifications Framework* (AQF) to ensure it is positioned for the future. We also need to review the extent to which current tertiary education funding models support lifelong learning.

3. Make work-integrated and work-based learning the norm

The current higher education model of (a) study theory for 3-5 years (b) apply in the workplace is becoming less meaningful.

Technology-specific or technology-augmented skills and capabilities evolve quickly, forcing us to rethink traditional concepts of theoretical and applied learning. Work-based learning through cadetships and higher-level apprenticeships should be scaled up across all industries and occupations. There also needs to be adequate incentives for companies to support work-integrated and work-based learning.

4. Expressly develop 'human' capabilities and characteristics

As machines do more and more, a human's value to an enterprise is increasingly about the ability to spot opportunities, formulate strategies and build networks and collaborations.

We need to acknowledge the increasing role these capabilities play in workers' careers and educate and train with this mindset. This

means continuing to explore ways to develop general capabilities in school and tertiary education and exploring ways to recognise capabilities in tertiary admission.

5. Ensure no one is left behind

On our journey to a digitally augmented future of work many jobs will be automated, and new jobs will take their place.

We need to maximise the upsides of productivity-enhancing industry transition, while also minimising the downside risks of displaced and disengaged workers. This means a policy mix that empowers the adopters and innovators to take every opportunity technology brings, but also mitigates the risks for those most vulnerable, and ensuring the benefits are shared.

We need flexible, accessible training products to enable existing and older workers to develop the baseline digital capabilities they need to continue working. Governments at the state and federal level should explore ways to support displaced workers transitioning into entirely new industries and roles.

6. Get skilled migration right

For a nation like Australia, getting the skilled migration pipeline right – meaning finely tuned to demand – will be key to success.

Australia has, and will continue to rely on skilled migration to plug skill gaps and grow the economy. The Commonwealth Government should adequately resource and prioritise the provision of a timely, dynamic dataset on national skill needs and occupation classifications. This must be constantly reviewed and updated in consultation with industry.

7. Foster business certainty to drive investment

The investment needed to drive digital transformation across the economy relies on decisions at the enterprise level.

Policies need to incentivise and encourage business investment in both technology and technology skills if we are to succeed in reaping the benefits. National policy settings should be carefully calibrated to incentivise and encourage technology driven investment in people, particularly for small and medium enterprises.

8. Create trust in technology by protecting against risks

There is a level of fear and scepticism about the risks of relying too heavily on technology. If left unaddressed, these fears will hold Australia back.

Cyber security is an evolving challenge requiring significant collaboration between industry and government to build resilient systems. The Commonwealth Government must continue to play a strong role in building an environment that fosters trust in a digitally enabled economy. This should be done in close collaboration with industry.

9. Ensure a better data picture of skill needs

The collection and analysis of comprehensive and timely data on skills needs will be key to staying one step ahead of the digitalising economy.

A comprehensive and coordinated map of the supply and demand for skills across the economy will help the education and training system, skilled migration policy architecture, industry and individuals to respond to skills needs in the short, medium and long term. We need to explore ways to improve the quality of data to better understand skill challenges and stimulate investment in skill pipelines.

10. Work together to step up to the challenge

To step up to this opportunity, Australian businesses need the leadership, capability, and skills to seize the moment.

We need our current workforce, and the next generation, to be confident and skilled, and capable of reskilling and relearning as required. We need a policy response, at the national level, to ensure Australian businesses, large and small, are able to embrace this opportunity, and Australian workers are skilled and ready to take them there.

Contents

Introduction

Often we hear 'the future is digital, we need to get ready'. However, as we all know, that 'digital future' is now here.

The old rule books for business, trade, human capital management, customer service, education and training - even what constitutes a 'workplace' - are being rapidly rewritten. New technologies are transforming the ways in which we live, learn, work and play in previously unimagined, and sometimes completely unexpected, ways.

The role of the individual in the workplace is moving from functional to transformative, as humans move away from checking, lifting, calculating and record keeping, to become the problem solvers, navigators and communicators in socio-digital environments.

As a nation, we don't have the luxury of time to analyse and calmly prepare for 'a digital future'. Instead, there is a sense of urgency, as we navigate this great transformation in real time, working out how to effectively harness the power of both people and technology to achieve our goals.

Digital transformation is happening right now, in the boardrooms and workshops of Australian businesses all around the country.

As with other transformative shifts in human history, the road is proving bumpy and uneven, some are in the driver's seat, and some are in danger of being left behind. Sometimes the map is useful, and sometimes we can't see around corners but must keep going regardless. There are big opportunities, as well as big challenges, and many unknowns.

In 2022, as we reflect on the incredible change the last few years have brought, we, in Australia, have a choice. We can drift with the tide and hope for the best, or we can take stock, formulate a strategy and then drive on – with purpose and direction.

Our collective ability to navigate both the threats and the opportunities of digital transformation matters – to everyone. It matters to us as a nation, as getting this right will be critical to sustaining our productivity and global competitiveness. It matters to enterprises, big and small, as no industry or individual business will escape the tide of digital transformation that is coming for them, whether they like it or not.

It also matters to us all as individuals. If we fail to develop the skills and capabilities required to realise the benefits of technology, and ensure they are shared, we are in danger of going backwards in terms of the things that really matter. The sustained prosperity, and equity, for which Australia is world-renowned.

Beyond that, digital transformation can be harnessed to change work for the better, with the potential to improve gender equality, diversity and the inclusion of older workers and those with a disability. The settings around how we navigate this transformation are as important as the transformation itself.

About this report

This report provides an action plan to ensure we, as a nation, have the skills and capabilities to seize the opportunity presented by digital transformation.

First, we look to where we are now – exploring the drivers of digital transformation and how it is changing work. We set out the scale of the opportunity this presents, and some of the challenges we may need to overcome to fully embrace it.

Second, we look to the experience of Australian businesses, to see what effect digital transformation is having on skill needs and management at the enterprise level. We unpack the concept of the 'digital journey' and investigate the key enablers and barriers to Australian companies embracing the digital opportunity from a skills perspective.

Then, building on these global and local insights, we look to where we need to be, and set out the policy strategies to help us get there.

What follows is an action plan for governments, the education and training system, industry, and individuals to work together to embrace this once in a generation opportunity.

Methodology

In bringing together this report the Centre for Education and Training undertook:

- A comprehensive review of the global and Australian literature on digital transformation, and
- 15 detailed semi-structured interviews and 3 in depth case study discussions with a range of Australian companies (conducted in March 2022).

The businesses we spoke with were drawn from a broad cross section of Ai Group's members. They included large, medium, and small enterprises, in cities and regional areas, and spanned a wide range of industries including the Engineering Services, Manufacturing, Retail, Software Services and Trades sectors.

Where are we now?

"The jobs haven't changed, but the tools have. Our work now utilises advanced tools and we need advanced people to help us use them."

General Manager, engineering services company

What is digital transformation?

We hear the term 'digital transformation' used everywhere, but what does it really mean in the context of industry, work and skills?

People have been working alongside digital technologies, to a greater or lesser degree depending on the industry, for decades. Human jobs and tasks have evolved and adapted with advances in technology. Some occupations of yesteryear – such as switchboard operators and typists - have become redundant, and new skill needs have emerged.

What has changed in recent years, however, is that the digital 'wave' has gathered speed and force. It has flooded across the global economy, inundating businesses of all kinds – from large multinationals to neighbourhood restaurants and corner shops. For many businesses, this is resulting in a true 'transformation' of what they do, or at the very least, how they do it.

'Digital transformation' is the strategic adoption of digital technologies to improve, and indeed transform, business models. More than just 'digitisation', such as collecting and migrating paper-based data onto a digital platform, true digital transformation refers to a process that leverages new technologies to provide digital solutions that can completely reshape an organisation's value proposition (Barthel, 2021).

However, this process is often characterised as a 'journey' for a reason. This 'transformation' is not a one-off event, but an evolution, whereby firms travel on a continuum, from digitally nascent to digitally mature, as they become more capable of exploiting the benefits of technology to achieve their goals.

In this sense, digital transformation is actually a story of human leadership, culture, vision, capability and management. That is why it should, and must, be examined through the lens of skills, capabilities, education and training, and national workforce development.

Drivers of digital transformation

Embarking on or continuing a digital transformation may not be the easy or straightforward option, yet many business leaders have set their firms on transformative paths – why?

The factors most often cited by businesses the Centre for Education and Training spoke with were: responding to the challenges of the COVID-19 pandemic, fending off competition, exploring new business models and optimising operations to drive cost savings.

Influence of competitors

One of the biggest factors driving individual firms to explore new digital frontiers is pressure from others in the marketplace.

A 'wave' of digital transformation across the economy forces conventional business models to be questioned, as new digital businesses place significant competitive pressure on long-standing businesses, in some cases pushing them toward redundancy.

Despite the inherent risk of embarking upon digital transformation, the risk of not doing so can be higher – as it includes not only foregoing any potential upside, but also ceding new market territory to (often larger) digitally transformed competitors (Barholomae, 2018).

New business entries and exits in an industry can affect incentives for businesses to adopt new technology. However, Australia has had declining entry rates (new business entering the marketplace), which is associated with the weakening of competition-based pressure (Andrews et al., 2022). This can affect businesses investment, such as the pursuit of digital transformation and the adoption of new technology.

Exploring new business models

The adoption of digital technologies presents an opportunity to reinvent business models, by exploring the realm of digital possibilities that can help to improve internal processes and client offering (Ziyadin et al., 2020).

The use of digital technologies can lead to immense changes in the behaviour of organisations and their processes – particularly when the data generated throughout this process is used to inform business functions like product development and customer insight (Sundaram et al., 2020).

In our case studies, we found businesses that have embarked upon a successful digital transformation have discovered new business models and markets, in some cases leading to the creation of spin off entities.

Optimisation

The initial catalyst for embarking on a process of digital transformation is often the optimisation of processes to capture cost savings. Whilst digital transformation may on the surface appear to be simply a process of implementing new technologies within business operations, it can be a much more potent and valuable process when combined with the principles of lean practices (Romero et al., 2019).

A key element of lean practices is the focus on continuous learning to empower successful process transformation. When combined with digital transformation, businesses are able to extract efficiency gains, reduce waste and add value to their customer offering (Romero et al., 2019). The result is a continuous flow of data that is processed by analysts and machines that constantly learn and improve their ability to interpret the data, identifying areas for cost reduction and increasing the agility of operations (Preindl et al., 2020).

For the businesses we spoke with, a major impact of digitalisation was a decrease in administration costs as technology streamlined business processes. There can be a significant increase in the availability of useable information managers are able to exploit for efficiency gains. Managers are increasingly using custom dashboards presenting leading indicators to inform better and proactive decision making.

One business manager explained that they were *'now looking at dashboards on a computer telling us what machine has exceeded its set up time – as a result, productivity is better monitored, and problems can be proactively dealt with. We are comparing immediate diagnosis with data 24 hours after the event'.*

This drive for optimisation, and also sustainability, in evident in Industry 4.0. Manufacturers at the leading edge are investing in new digital technologies and processes to both capture the benefits of optimisation internally and create new value externally.

The Industry 4.0 Value Proposition

Value Capture - internal		**Value Creation - external**	
Productivity Optimisation	**Risk mitigation**	**Incremental growth**	**New growth**
▷ Data Analysis ▷ Labour Efficiencies ▷ Asset utilisation and uptime ▷ Maintenance by design ▷ Energy Use ▷ Supply chain sequencing ▷ Production planning	▷ Materials as needed ▷ Inventory management ▷ Line of sight through value chain ▷ Virtual design and testing ▷ In market risk ▷ Resiliance	▷ Connected products (IoT) ▷ Service opportunities ▷ Design, R&D ▷ Aftermarket engagement ▷ End of life management ▷ Customer analytics ▷ Customer strategic lock in	▷ New products, processes ▷ New services ▷ New market (including global) ▷ Merger and acquistion

Source: Ai Group Centre for Education and Training and informed by Innovative Manufacturing CRC 2021

Responding to the COVID-19 pandemic

The effect of the pandemic over the last two years is consistently cited by businesses as having been a fundamental driver of digital transformation.

> *These changes have been changes of necessity - COVID forced changes.*

The pandemic reshaped the business environment, globally and locally, almost overnight, highlighting weaknesses, but also driving innovation.

Supply chain issues came to the fore, as the nation struggled to maintain the flow of essential goods – from basic face masks and hand sanitisers to computer chips (Mizen, 2020). Australia currently ranks last in the OECD for manufacturing self-sufficiency, with a 2021 study concluding we need significant investment to revitalise the local manufacturing sector to make it more proportionate to our consumption of manufactured goods (Worrall et al., 2021). It also highlighted our reliance on the supply of skilled labour through migration.

COVID-19 initiated, accelerated or in some cases consolidated companies' digital progress. For many companies, it forced a change in behaviour in the way they use technology to communicate and deliver services.

However, among the companies we spoke with, most of the change at this point has been at the corporate level, in management of systems and processes, oversight of efficiencies and productivity and monitoring of customer interaction. Larger organisations shared a view that this increase in communication through digital transformation is not yet where it should be – in the frontline workplace. The challenge for the ongoing success of digital transformation was seen to be how technology is used to talk to workers on the frontline, to engage them in efficiency and productivity gains.

> *COVID provided the perfect storm for this digital transformation push.*

Other businesses cited the uptake of tools such as Microsoft Teams and SharePoint (a necessity during periods of working remotely) as pivotal to the ongoing success of their businesses during COVID, and something that will continue to be central post-COVID.

For one company, 'SharePoint led an evolution of getting a very diverse team of 180 staff to engage with the virtual world.' Through implementation, training and embedding, this company led its team to meet customers' changing needs. It needed to move staff from legacy behaviours in warehouses, transport and manufacturing to meet business and customers' needs for accurate product data to be obtained quickly and efficiently.

Microsoft data collected from the Microsoft 365 cloud platform services over the year from February 2020 to February 2021 (spanning the period of the initial impact of COVID-19 restrictions) found that the digital intensity of the average worker's day changed dramatically.

Over this period, Microsoft Teams users' time spent in online meetings more than doubled, and the number of people working on Office documents went up by up 66 per cent over the year.

Collaboration activity across Microsoft 365 tools

27%

Weekly meeting time has more than doubled for Teams users and is still rising

45%

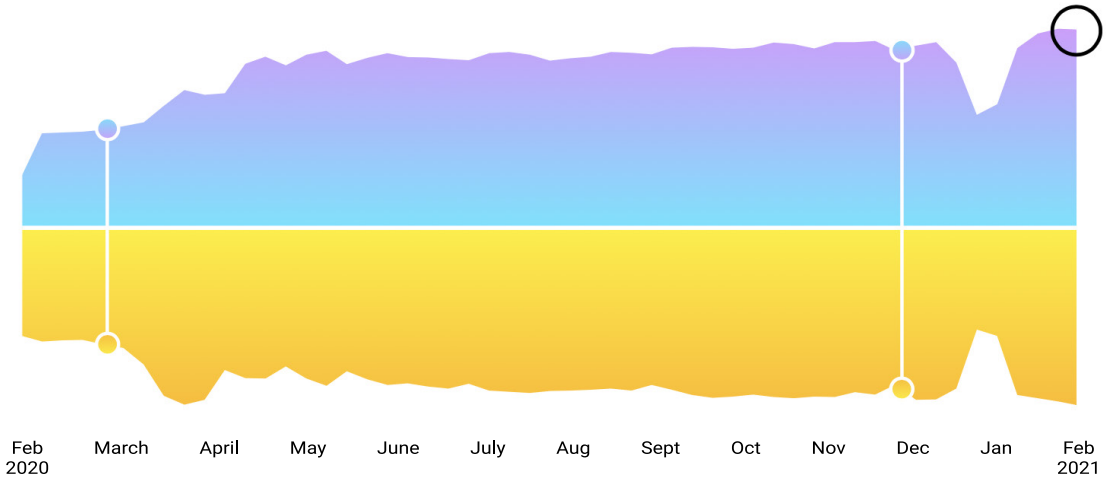
Weekly Teams chats per-person are up 45% and still rising

40.6B

Increase in number of emails delivered in February 2021 vs. February 2020

66%

Number of people working on Office documents is up 66% year over year



Blue = Meeting minutes per person. Yellow/gold = Chats per person Source: Microsoft

The digital skills opportunity and challenge

So what does all of this mean for individual workers, and the value they bring to enterprises undergoing this type of transformation?

Most agree it means what we need from humans in the workplace is changing – fundamentally, and relatively quickly. This 'digital wave' is sparking a skills disruption.

On one hand, many jobs and tasks previously done by humans can now be done by machines - and more jobs and tasks will inevitably fall into this category in future. On the other, there are many things that people can do that are inherently 'human', and which machines are a long way from replicating. Indeed, may never replicate. Capabilities such as inspiring a team, fostering trust or creating a successful collaboration fall into this category.

The breadth and scale of the digital disruption is also requiring a higher level of digital literacy across the entire workforce, as digital tools are increasingly being used to perform everyday tasks across all industries and occupations.

In addition, this phenomenon is creating many entirely new jobs and tasks, as we need people to develop, apply and service digital technology. These are the opportunities, and challenges, of digital transformation.

Strong growth in non-routine, digitally enhanced cognitive work

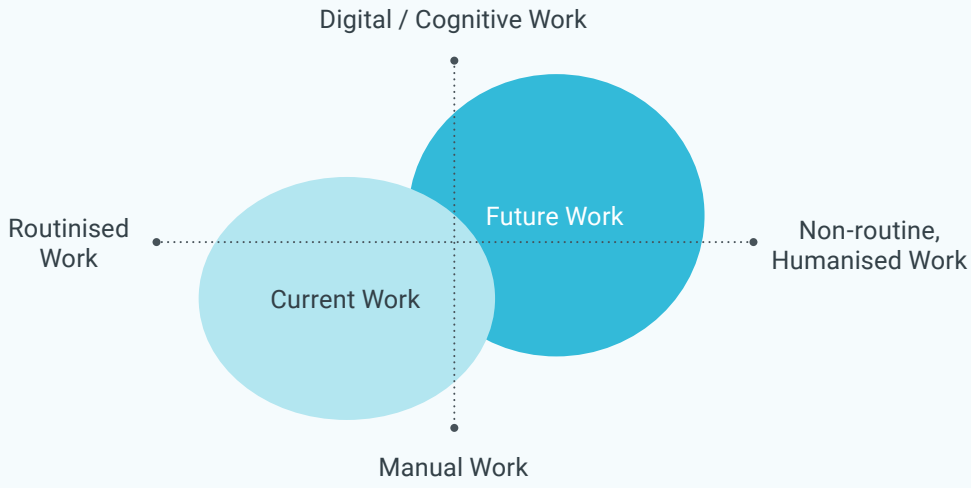


Chart by Ai Group Centre for Education and Training and informed by Heath (2017)

The opportunity

This transformation is also generating many new jobs, and significantly expanding the technology sector's role as a facilitator of digital transformation through its supply of equipment and digital services. The Tech Council of Australia (2021) has provided a roadmap for growing direct and indirect employment in technology sector jobs to 1 million by 2025, and to over 1.2 million jobs by 2030.

The Australian technology industry has grown exponentially over the past decade on the back of a number of successful home grown start-ups which have evolved into 'unicorns' with multibillion dollar valuations (Sharples, 2021). Developing a locally produced, tech savvy workforce skilled to power the growing digital technology sector is a significant short-term challenge. The Tech Council estimates that higher-skilled technology roles, such as roboticists, cyber security professionals and developers can take up to 44 per cent longer to fill than economy-wide averages for conventional roles like receptionists, business analysts and support workers (Tech Council of Australia, 2021).

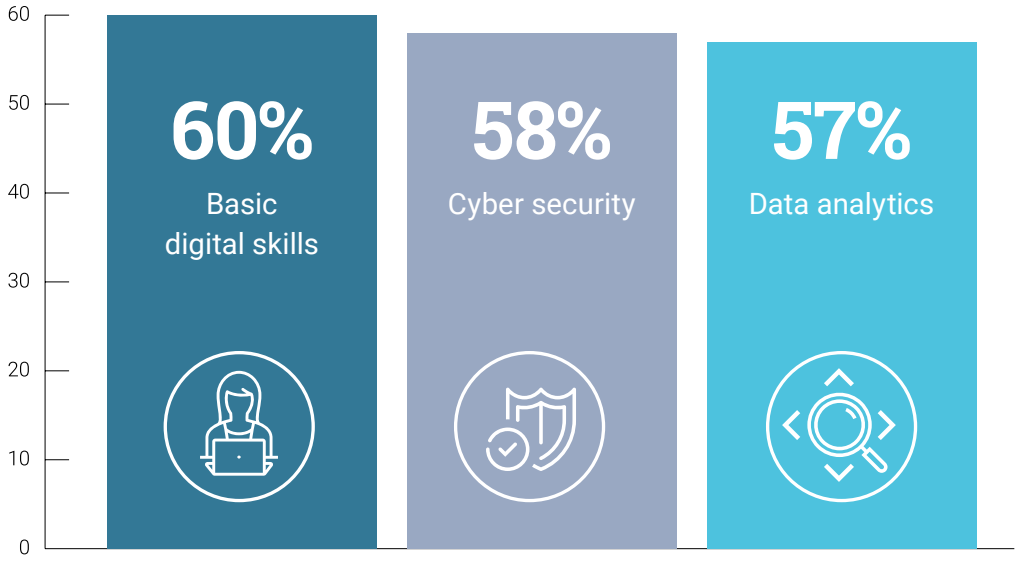
Beyond the higher skilled technology sector, RMIT Online and Deloitte (2021) estimate that 87 per cent of Australian jobs require digital literacy skills, and this is expected to grow.

As a result, existing workers (and new workers) will need to upskill and acquire digital skills to participate in the increasingly digital Australian economy. One analysis suggests that digitally skilled/upskilled workers moving from professional services to a technology role are able to access wage increases of $10,000 per annum (RMIT Online & Deloitte Access Economics, 2021). Moreover, the Tech Council believes that technology sector roles attract wage premiums and are more flexible and stable – particularly for women. This is critical – we are not going to compete as a nation at the current minimum wage, so we need to upskill to a level where we are competitive as a nation based on skills and high wage jobs.

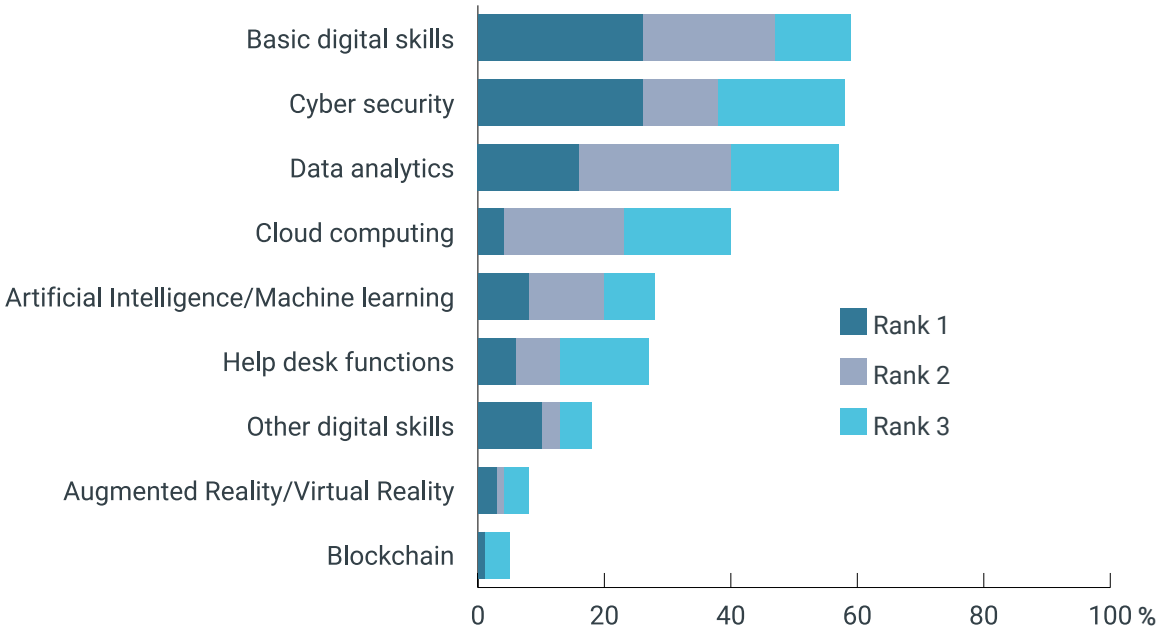
Despite the obvious benefits of expanding digital skill sets, current modelling suggests that there is a shortfall in the supply of digitally literate workers ready to fill the 156,000 new digital technology roles created to 2025 (RMIT Online & Deloitte Access Economics, 2021).

Ai Group survey research (2021) shows that industry demand for digital skills is broad and deep, and ranges from basic digital skills to specialist technology skills.

Top three reported digital skill demands



Digital areas in which employee capabilities most need to increase



Source: (Australian Industry Group, 2021b)

Out of necessity, the disruption of COVID-19 accelerated the redundancy of many highly automatable and at risk roles (*Business Indicators: Business Impacts of COVID-19*, 2020) such as cashiers and betting clerks. The Australian Computer Society (2020) estimates that a further 2.7 million Australian jobs are at risk of automation over the next 15 years to 2035.

While this is a confronting estimate, there is still a world of opportunity in the digitally enabled economy. The same ACS report estimates that over 5 million jobs will be created, requiring significant education and training support to upskill displaced workers and prepare them for the secure, flexible and well-paid work of the future (Australian Computer Society, 2020).

The risk of displaced workers

Digital transformation is driving significant structural change, with many workers needing to upskill in search of alternative employment.

As Australian businesses intensify their investment in digital technology and digitalisation of their business processes, there will be changes to the structure of organisations and the skills within them.

A longitudinal study of the first automotive manufacturing sector exiting Australia paints a disturbing picture. 70 per cent of the laid off workers remained underemployed with casual work and 28 per cent of those that retired reporting they had done so because they were unable to secure employment (Stanwick et al., 2015). Moreover, the median wage for laid off workers who were able to secure full-time employment dropped $10,000 per annum (Beer et al., 2006).

Outcomes were better for workers retrenched in a further contracting of automotive manufacturing in 2016, where 53 per cent of workers secured full-time employment in the 12 months following the closure of the plants (Department of Education, Skills and Employment, 2019). Workers in these firms benefited from proactive management and targeted policies that delivered $380 million of support and a three year phased timeline to support their transition into new employment opportunities (Department of Education, Skills and Employment, 2019).

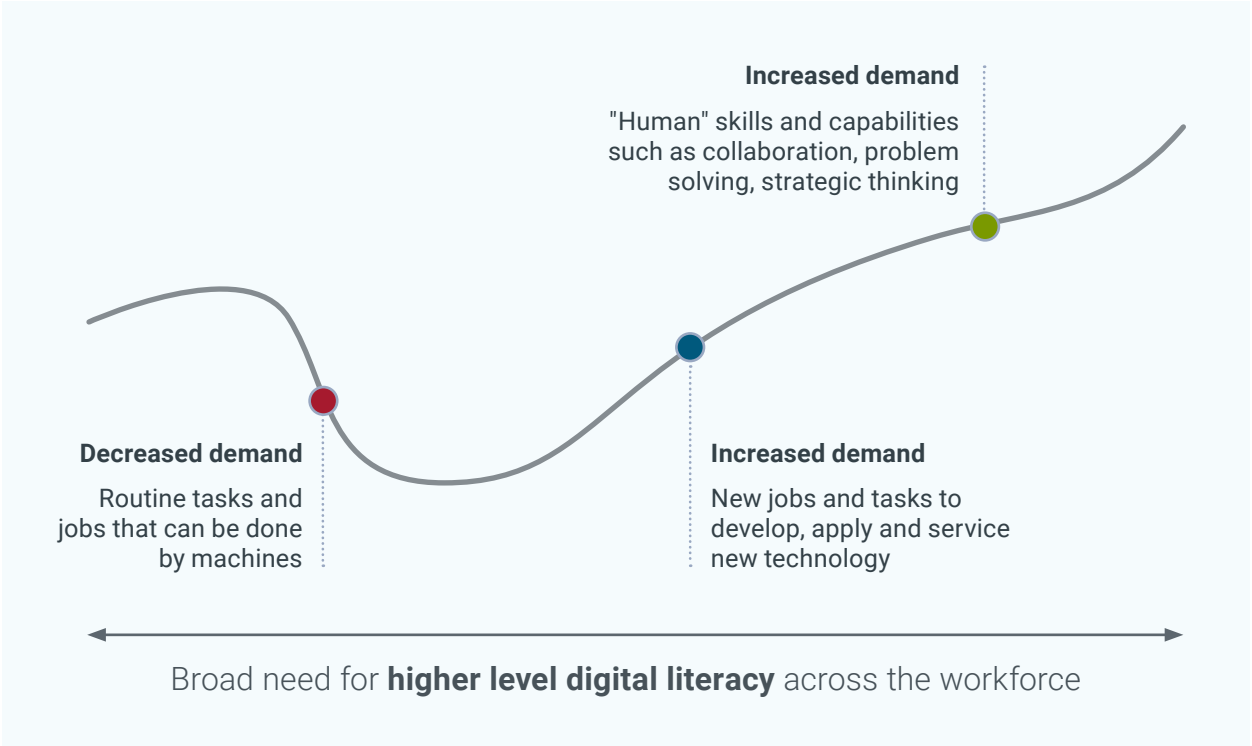
The predicted changes to the Australian workforce over the next decade will be significant and disruptive. What is different, however, is that unlike the effects of previous industry transition, the effects of digital

transformation will be fractured and non-linear. Entire industries and workforces are unlikely to become uniformly redundant overnight. Instead, we can expect workers around the nation, with varying skills and experience, to be displaced and requiring support in building a pathway back to stable employment.

For example, a large energy equipment provider we spoke with advised that the shift to renewable electrical energy production is shifting the skill demands of their workforce away from a traditional mechanical and fossil fuel technology skill set. Their existing workforce of traditional energy workers will need to rapidly reskill or be displaced by the uptake of the new technology.

Training opportunities will need to reflect the rapidly changing economy and respond to the wide age range of Australians needing to rely on reskilling opportunities to find their place in the digital economy.

In order to operate effectively in these new digitally augmented roles AlphaBeta (2019) research suggests that the most valuable skills will be those that complement automation and artificial intelligence – particularly human skills such as adaptability, creativity, integrity and team work. This research stresses that these valuable capabilities are best paired with general skills as part of a broader skill set that includes skills machines cannot replicate. Australian workers will need to build a portfolio of skills, and the ability to expand their skill sets to utilise the evolving digital tools that will augment their ability to work.



The risk of 'digital burnout'

The rise of digital work has become the norm for many occupations and enabled the hybrid 'work from home' global economy. However, as the pace of collaboration has increased, there is evidence emerging it could be leading to an overload that disrupts the productivity of workers (Bunjak et al., 2021).

In a survey of 500 participants in the US, Stanford researchers created the Zoom Exhaustion & Fatigue Scale that identified the main causes of 'Zoom Fatigue'. The way video conferencing platforms work can overstimulate users, which can accumulate and result in fatigue and burnout (Fauville et al., 2021). The researchers suggested that the digitalisation of work and the human aspects around it – such as the case in ridesharing apps – require further development and use before social boundaries and norms form, enabling us to optimise the technology to best serve our purposes.

Moreover, the rise of digital work platforms is making it more difficult for us to draw the line between work and life (Richardson, 2021), particularly as the boundary of work has expanded beyond the office walls and into our homes. There is a good reason to prevent digital burnout and the mental illnesses associated with burnout more generally. The Centre for Future Work estimates that preventing mental health deterioration in the workplace will improve productivity, grow GDP by $3.5 billion per year and reduce government expenses by $2 billion per year (Carter & Stanford, 2021).

Digital transformation in Australian businesses

What does digital transformation look like in reality - in the shopfronts, offices and workshops of Australian businesses?

We conducted interviews and detailed case studies with 18 Australian companies drawn from a broad cross section of Ai Group's members. They included large, medium and small enterprises, in cities and regional areas, and spanned a wide range of industries including the Engineering Services, Manufacturing, Retail, Software Services and Trades sectors.

We asked how digital transformation is affecting their operations, and most importantly, their people.

One key insight was that the pandemic has been an incredible catalyst for change among all the companies.

For these businesses, adopting and adapting to new technologies in recent years has:

- Driven demand for entirely new skillsets in a relatively short time
- Required existing jobs to be re-designed
- Changed the role and function of managers
- Driven cost savings
- Caused shortages in 'in demand' skills
- Caused businesses to focus more on training and development.

As COVID turned more businesses towards e-commerce, many found they needed a range of new skillsets, such as marketing, distribution and logistics, website building and maintenance, and data intelligence and analytics.

Businesses also reported that digital transformation had changed the roles of managers considerably. Managers and leaders were now required to co-ordinate a range of digital activities to meet an outcome, which demanded increased levels of skill to interpret and analyse data to make timely decisions.

Some reported a lack of collaboration across internal business silos to plan the staffing needs, skills requirements and capability building to support a whole of business digital transformation.

Overall, the interviews highlighted the wide spectrum of 'digital maturity', with responses showing that strategic planning for a digital strategy was not a formalised practice outside of large corporations. Changes in smaller businesses, while they could be equally transformative, tended to be more ad hoc and reactive.

COVID-19 a key driver of change

The key drivers identified for the uptake of new technology and digital transformation in the businesses studied were business need, competitive market pressure and, overwhelmingly, the disruption of COVID-19.

COVID-19 created an environment where jobs were at risk and entire business models were under threat. In this context, technology became the best tool to survive and counter these pressures. Although for many smaller businesses this was more of an intuitive process, rather than a formally laid out plan.

All the businesses we interviewed had engaged with new technology to improve efficiencies over the past 5 years, and all nominated the period of COVID-19 restrictions as the time when uptake of technology across the business increased and became embedded.

Extent of technology uptake

The extent of digital uptake varied considerably.

Half the businesses we spoke with claimed to have 100 per cent digital transformation uptake. In the smaller businesses this usually meant that operations were on the cloud, or their business processes and systems were underpinned by technology. Most companies had not driven this digitalisation to the workshop or factory floor.

Change management

When asked about the change management required when implementing new technologies, businesses had some common responses. All were prepared to:

- **Work with the staff they had** – bringing in subject matter experts to mentor, guide and support, and work through issues of change resistance if required.
- **Provide support or training -** either formal training or one on one mentoring.
- **Understand the generational differences of staff** and their experience as either digital natives or digital visitors - in some cases providing skill gap training.
- **Recognise when a workforce is aging** and there is a need to recruit and train younger workers whilst providing opportunity and upskilling to existing workers.
- **Experiment with ways to attract a diverse range of workers** with a diverse range of skills – sometimes using world leading talent to develop skillsets and upskill in areas where Australia hasn't developed certain learning or technology products.

> *"There are pockets – departments or individuals – where handholding is necessary, or resistance needs to be addressed. Our change management is handled sensitively and patiently. Conversely there are some strong, quick, 'uptakers' in some areas."*

Changes in job function and design

Businesses also reported that as technology infiltrated their organisation, and the business environment around them, it resulted in shifts in job function and job design. For example:

- **Customer service** officers now need to think differently about their roles, by providing continuity of service for customers across a business rather than one on one relationships. Several businesses had created customer service hubs with a portfolio of customers – 'this allows for flexibility of hub members to ensure customers' needs are met from a number of perspectives.'
- **Administrative roles** had also changed dramatically, and administrative staffing levels had reduced.
- The roles of **production engineers** and **IT product managers** have expanded, and now involved co-ordinating a range of digital inputs and processes to achieve an outcome.
- The rise of **e-commerce** required whole teams to be able to identify opportunities in the use of technology.

> *Digital transformation is underpinned by the role of the production engineer. Historically, it was a role in factories to ensure lean manufacturing principles were met. In a time of digital transformation, the production engineer will lead a team which fully analyses new parts digitally. It will be responsible for quoting, quality, systems, until the part is totally right for production.*

Change in the role of managers

Discussions around the impact of digital transformation on the roles of managers and leaders were remarkably consistent. The consensus was that a manager's role is now two pronged – people management and business process management.

People management

The impact of working from home and virtual engagement, combined with the 'great resignation' means '*the market is demanding flexibility, trust, and gender diversity across leadership*.'

There is an emerging expectation from both senior staff and employees that managers will lead by example, by adopting technology, communicating effectively and managing via outcomes. Technology was allowing businesses to '*empower people, with structures in place to ensure employees have goals and can contribute feedback*.'

Operational management

Digital transformation has completely changed the other half of the role of a manager – that of managing business processes.

Respondents noted that information is now available more promptly, driving greater efficiency. Many managers now have access to real time dashboards and data feeds, allowing them to make decisions and foresee problems in new ways.

All the businesses we spoke with were looking to use digitally generated data to make business decisions more effectively. The nature of that search, the methodology to be applied and the expected outcomes varied in strategic depth, cost and complexity according to the size and nature of the business.

Finding, retaining and developing staff

The majority of businesses we spoke with reported difficulties recruiting and retaining staff with the increased digital capability now required.

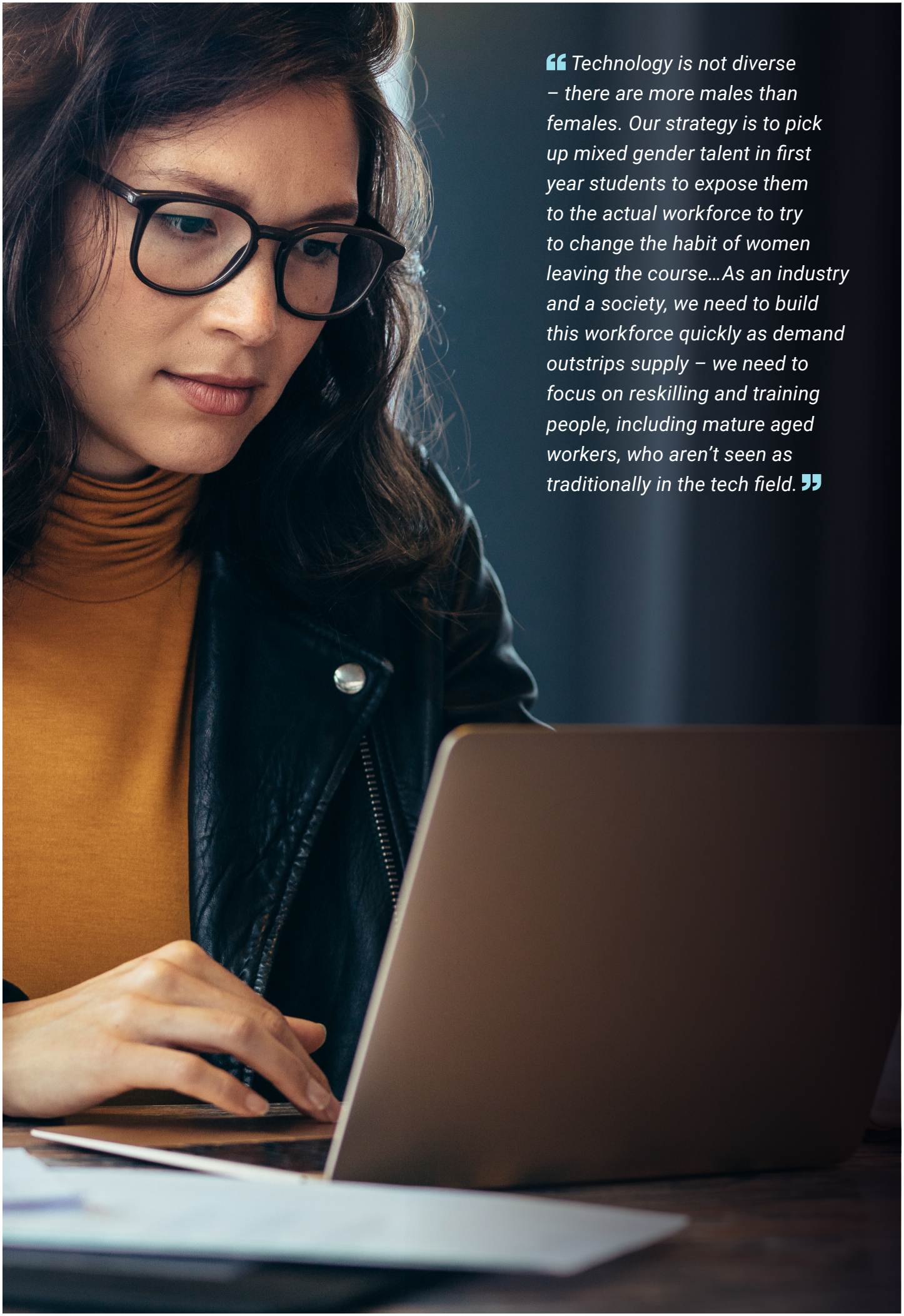
The size of the company and the geographic location appeared to influence whether '*we make do with what we've got*' or '*we identify systems and processes and analyse what skillsets we need*.'

Skill pressures were exacerbated by the last two years of digital transformation coinciding with COVID-19 restrictions to skilled migration flows. There was a particular issue with emerging co-ordination roles such as production engineers and product managers.

Many businesses advised that despite the skilled migration pipeline turning back on, they believe these new roles are yet to be added to the skilled priority lists. Companies in the technology industry recognised the lack of diversity in the workforce as an issue.

When looking to upskill and train their existing workforce, the businesses we spoke with noted that training and development activities are generally performed inhouse or through vendor training. In general, the consensus was that the public education system was not a valuable or responsive tool to utilise to plug their growing skill gaps.

The generally observed sentiment was that the current education and training system needed an overhaul. Businesses felt it needed to better reflect today's business environment, deliver workers with the capability to perform new digitally transformed roles, and prepare workers with a mindset to continually update their skills to remain productive.


“Technology is not diverse – there are more males than females. Our strategy is to pick up mixed gender talent in first year students to expose them to the actual workforce to try to change the habit of women leaving the course…As an industry and a society, we need to build this workforce quickly as demand outstrips supply – we need to focus on reskilling and training people, including mature aged workers, who aren’t seen as traditionally in the tech field.”

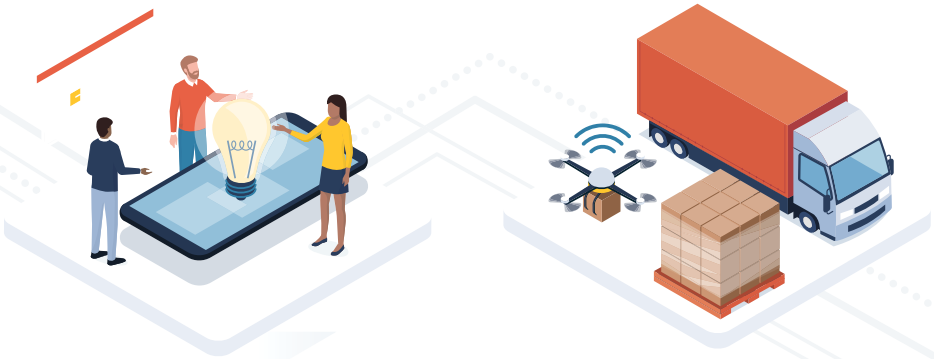
Case studies

Here we tell the stories of three Australian companies on their own digital transformation 'journey'.

Each is effectively transforming what they do, and how they do it – through the strategic adoption of technology and the pursuit of the skills they need to realise its potential.

'Digital transformation' has set each one on its own path of change and growth, and each has a different story to tell. However, the leaders of these businesses all agreed on three things:

- New technology has fundamentally changed their business offering over the last decade.
- They are not 'there' yet. They're on a journey and will continue to explore new frontiers and possibilities.
- They feel very positive about the future, and excited to see what technology and the next generation can achieve together.



Watkins Steel

Watkins Steel's story is one of an unwavering commitment to innovation and embracing new technology. The company has grown from a traditional steel fabrication business to a multi-dimensional enterprise, with a robotics department, an R&D department and a spin off company specialising in augmented reality.

The Brisbane-based steel fabrication business was started by Director Des Watkins's father in 1968 from very humble beginnings. The digital transformation journey really started in 2014, when the company received its first line of robotics.

At first, Des Watkins was quite hesitant about the digital transformation and the uncharted territory he was leading his business through. However, he quickly realised that 'good leaders need to get out of the way and give their talented staff the responsibility and trust needed to pursue innovation.' The business has now embraced a culture of change, and employees expect rapid development, but also the support they need to be part of the journey.

Prior to transforming the business, Watkins Steel found itself in competition with around 400 other steel fabricators in Queensland, all competing on price and ability to cut the number of man hours per tonne of steel quoted. Mr Watkins realised the business needed to reinvent itself and approach the market differently, to escape the race to the bottom that was driving the industry.

He took a chance and took his team for a tour of European factories to explore the technology driving digital transformation in manufacturing. The next step was an investment in its first robotics line to minimise human error and assist with the end-to-end fabrication processes.

This immediately gave them a competitive edge – due to reduced error and labour costs – leading to improved success in tender proposals. It also allowed them to expand into completely new areas.

However, the company soon realised that the technology was only as good as 'the information we were feeding it', so they needed to update all their specialist software for steel detailing. Later they introduced laser scanning, or point cloud technology. This is 'breaking down the site into billions and billions of dot points, each with a geospatial reference. Then by breaking the site down into a point cloud, you could detail steel in without the need for dimensions, and you know it's going to work'.

They realised that they could improve erection workflows by pairing the point cloud, the 3D models and a robotic total station. This equipment can shoot a laser paired with references extracted from the point cloud and direct where to drill every hole, 'without the need for a string line, tape measure or anything, minimising rework.'

The company then began to explore virtual reality and advanced animation tools.

“It enabled the simulation of the sequential construction process, giving terrific value when it comes to workplace health and safety, risk mitigation, and especially tender submission works.”

Director Des Watkins said what he loves the most is how things seem to be growing and gaining a momentum of their own.

“We invest in these young kids coming out of uni.. they’re energetic, they’re brilliant, they’re really good kids. And we buy whatever hardware they want, whatever software they want, and their position description is ‘to surprise and delight’, and they come up with humdinger ideas.”

“But I think the best thing about it is, where the secret sauce is…is that these young kids, they’ve got all the theoretical ability, but with no practical ability. So, you mix them in with some of the old boilermakers and that’s when the magic happens.”

The next frontier for the company is a robotic arm with the visualization tools combined with laser scanning so it incorporates spatial awareness. Des Watkins sees the value in continuing to play and experiment:

“The robotic arm might be a few years away, but the best thing about it is, you set these wacky ideas to the R&D team, the young mechatronics students - they may not be able to do one thing you’re asking, but there’s all this spin off work that we get value from as well.”

This has enabled the company to develop a spin off entity called Holovision, which is growing fast. ‘We’ve had substantial interest from overseas, I’ve done quite a few presentations to overseas organisations, and it’s also enabled the staff to source conferences, courses, symposium, seminars’.

Des notes that the business invests heavily in staff skills development and remarkably, ‘for every line of robotics commissioned, we have employed a further ten people’. He’s clear that:

“Robotics creates jobs. It doesn't replace jobs.”

Rockfield Technologies Australia

Rockfield Technologies is a specialist engineering firm which applies cutting edge technology to assess, maintain and optimise large scale infrastructure. The company's story is one of bridging the gap between university R&D and 'real world' problems, by successfully pursuing partnerships with university researchers as well as innovative approaches to new opportunities in the market.

Rockfield incubated within James Cook University in the 90s where it established deep linkages with the University of Wales in Swansea in the United Kingdom around computational engineering. In 2000, it spun out building digital twin models for industry (sugar, mining, ports and manufacturing).

The resources downturn circa 2010 saw the company focus its business on the world's ageing infrastructure. This was done deliberately and strategically, by assessing the company's existing skills and capabilities, with a view to matching them to new and pressing problems.

Rockfield CEO Dr Pandey says 'approximately 70% of bridges in Australia are more than 50 years old. If you look at these structures simplistically through the lens of engineering standards, most of them won't comply. This is because standards move on, traffic volume increases, and these structures deteriorate'.

The vital question was how to extend the life of such assets while keeping people safe, optimising return on investment: OPEX and CAPEX. In the words of Dr Pandey, 'the need to sweat assets safely had arrived'.

This triggered a significant technology-driven transformation of the business.

Dr Pandey says 'with so many variables at play, it quickly becomes difficult to analyse the inherent material damage in these structures. Few companies have the technical capabilities to deliver in this domain, so we work closely with universities to ensure that we can.'

Having made the choice to pursue this new frontier, the company sought deeper collaborations with university researchers, and made use of support from government, through programs and incentives – two elements the CEO describes as key enablers of the company's journey.

Rockfield pursued mutually beneficial collaborations with university researchers, a process that CEO Dr Pandey describes as a long-term investment, but one that pays dividends in the end.

"We understand universities better than many other commercial entities because of our backgrounds, so we were able to have much more meaningful and deep collaborations with them because we know exactly what they want to achieve – and not just the publications and citations, universities are interested in industry impact these days. We want to ensure that the work they do has got some purpose and 'real world' application."

The company's partnerships with universities developed over time, beginning with support to publish high quality research papers, but later assisting with lecturing and work-integrated learning opportunities for students.

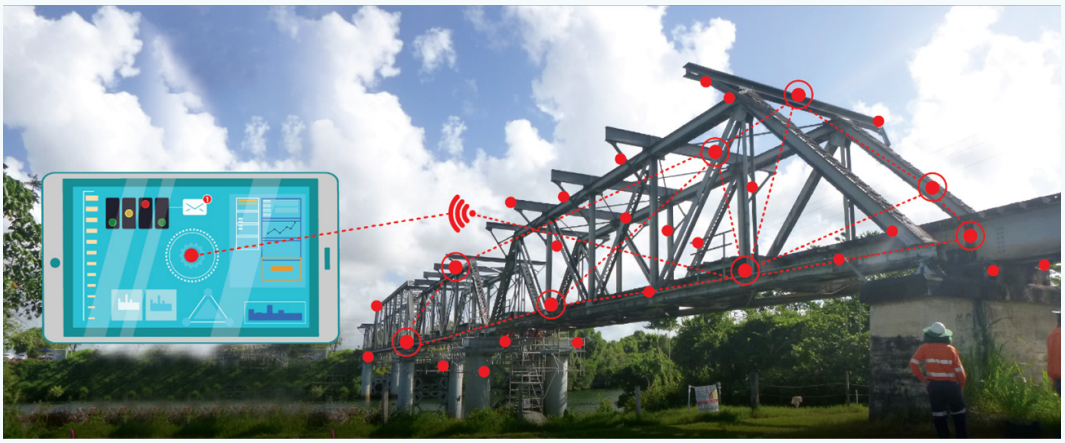
Government subsidies (particularly the R&D tax incentive) and support programs such as Innovation Connections have also been an important enabler, allowing the business to invest in its workforce and plan for the medium term.

> *"Those government incentives, they were great for a small company like us when we started…That's why I am a strong advocate of all these sort of government incentives, particularly for start-ups and businesses in the tech industry. There are lot of bright people out there in academia, they just need that enabling mechanism to get there."*

When it comes to the skills pipeline, Rockfield's CEO knows he needs to play a long game. This approach has seen the company well-placed to overcome the skill challenges associated with digital transformation, as well as the national skill shortages most businesses are up against.

Looking to the future, Rockfield sees the need for innovative education and training models that can efficiently upskill their highly trained staff. The company also sees value in expanding the incentives for post-graduate education, particularly for industry-based PhD programs.

Rockfield's CEO sees this type of integration between research and industry application as key to solving complex problems and developing new solutions that can be brought to market.



TEi Services

TEi Services is an engineering and steel fabrication company with a long history. The company's story is one of curiosity and a growth mindset, which has seen it experiment with and adopt new technology over a number of years.

It has utilised new tools to steadily improve and optimise what it does, allowing it to work more efficiently, safely and on a larger scale – effectively 'transforming' the business.

TEi Services is not a 'technology company', but a company that has very successfully sought out and utilised high technology tools in its work – mostly largescale metals manufacturing for applications in mining, agriculture, rail and infrastructure.

As Managing Director Richard Parker says, 'there hasn't been a revolution in the products, but the tools', and his staff now make use of technology such as robotics and CNC machines, AI and virtual reality are the next steps in development of their work.

"I like to continue to advance my business. Engineering at its most basic is only a few steps on from a blacksmith shop. Well, there's not many blacksmiths working anymore. I don't want to go that way… so it's about keeping abreast of new technology."

When asked about the initial catalyst for the digital transformation, Mr Parker said the availability of government grants was a factor in helping the business purchase a custom built robot.

"I guess it's something we spoke about for many, many years and, as luck would have it, the manufacturing hub was set up in town and there were some 50:50 funding grants available. So, we sort of made it a reality via that, which is something we've never done in the past, gone looking for grants, but that was timely… Would we have done it without? Possibly. Not sure when though."

TEi's Managing Director talked about the value of creativity in taking his business to the next level.

"It's a fairly rare talent, creativity, and if you find it, you've got to grab it and nurture it. I don't think you can install it either. You've either got it or you haven't. So, I look for the creative people in my workshop and invest in them."

He also cited the importance of having the time and energy to get out of the everyday work and look to the horizon, something he felt had been a critical enabler of the growth and evolution of the business.

"I'm fairly fortunate that I've got enough people working for me that I can go and explore those creative things. If I was, you know, an electrician or a plumber with one apprentice I wouldn't be able to do that. With a bit of support around you can afford to have someone gazing out the window and thinking about what's next… But you've got to get these creative people before the foreman does because the foreman doesn't like that sort of thing."

When asked about his strategies for developing and retaining talent, Mr Parker said he was working on two fronts – attracting and developing the right young people and retaining and developing his existing staff.

On one end he engages with universities and high schools.

“I never say no to kids who want to come and do work experience… Then to the good ones we say: hey, do you want to come in on the holidays and we pay them. When we get to know them, they might go down a school-based apprenticeship program, as they’re the ones that have already decided that this is where they want to be. Our completion rate on apprenticeships is well above industry standard.”

At the other end of the pipeline, he works hard to retain people, often by the clever use of technology.

“I’ve got half a dozen people in the workshop older than 55, still on the tools. We had a guy retire at 80 last week. We make sure that we give them tasks that are suitable.

One older guy, I said we’re going to get you using a buggo, a semi-automated welding process. It’s a little car that holds the welding rod and goes at the right speed. He said, ‘I’m a welder. I weld. That’s what I do’. I said ‘yes, but you’ll be able to weld more, and it’ll be more consistent, and you’re going to be less tired at the end of the day.

He carried on a bit, but two days later I went back, and he had two of these things working simultaneously, and it was all his idea. It’s like magic… So, by introducing more technology we can keep people in the workplace for longer.”

TEi is an example of a traditional Australian business embarking on a digital journey, asking questions, experimenting and adopting new tools. This has seen the skills needs change over time, but it has been managed positively and productively, maximising the benefits for the company and workers.

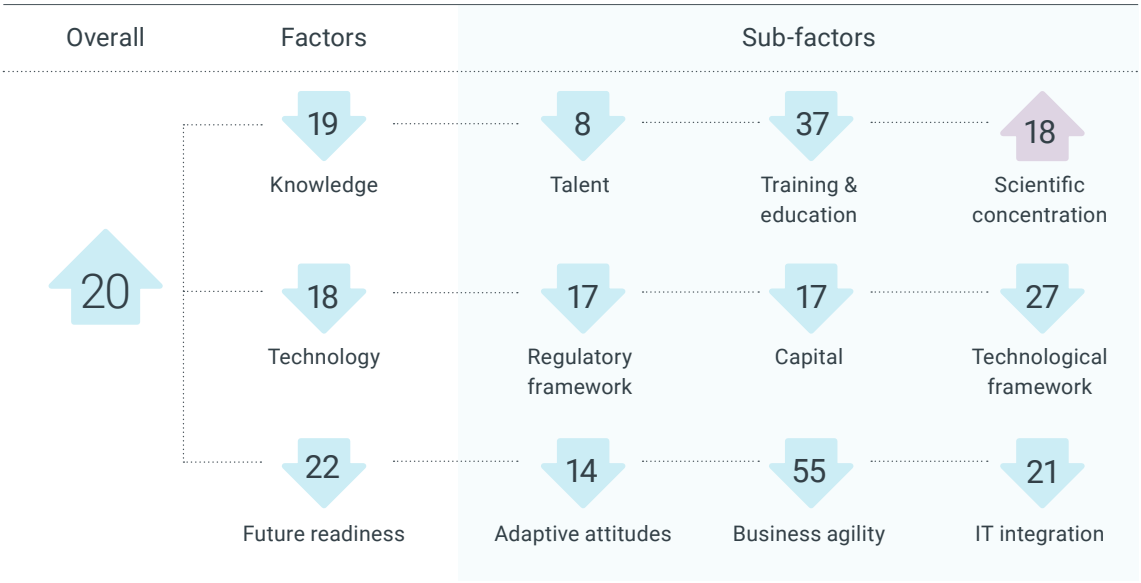
How well is Australia doing?

How well is Australia riding the digital 'wave'?

Are we on the right track or lagging behind?

When it comes to our digital progress, Australia receives a mixed report card.

In the latest *World Digital Competitiveness Rankings* Australia has year on year declined in digital competitiveness slipping from 13th in the world in 2018 to 20th in 2021.



Australia's performance over time

Overall and factors 5 years	2017	2018	2019	2020	2021
Overall	15	13	14	15	20
Knowledge	18	15	15	17	19
Technology	15	14	14	14	18
Future Readiness	14	11	14	17	22

Source: International Institute for Management Development (2021)
The Australian data partner is the Committee for Economic Development of Australia (CEDA).

The rankings measure a range of factors grouped under three headings – Knowledge, Technology and Future Readiness.

If we unpack the 'Knowledge' sub-set, Australia performs best on 'talent' which measures factors such as local and international skilled workers, digital/ technological skills and international experience. Australia ranks particularly highly on net flow of international students and foreign highly-skilled workers.

Talent

Measure	Global rank
Educational assessment PISA Math	28
International Experience	45
Foreign highly-skilled personnel	11
Management of cities	24
Digital/Technological skills	44
Net flow of international students	2

When it comes to training and education we are improving over time, rising from 51st in 2017 to 37th in 2021. However, we lag considerably on employee training and graduates in sciences.

Training and Education

Measure	Global rank
Employee training	58
Total public expenditure on education	22
Higher education achievement	15
Teacher-pupil ratio (tertiary education)	-
Graduates in sciences	58
Women with degrees	12

'Scientific concentration' looks at things like expenditure on R&D, patents, scientific and technical employment and use of robots. Australia is particularly lagging on high tech patent grants (ranked 41st in the world) but doing relatively well on scientific and technical employment (ranked 13th).

The other two major groups of measures 'Technology' and 'Future Readiness' show some clear strengths and weaknesses in Australia's ability to embrace digital transformation.

On Technology, Australia, not surprisingly, does well on regulatory framework, ranking 5th in the world for stating a business and 6th for contract enforcement, and on investment in telecommunications and mobile broadband subscribers (ranked 8th on both).

The 'Future Readiness' measures show use of technology in the general population is high, with high rates of device ownership and e-participation, and the Australian public sector doing well on e-government (ranked 5th).

However, Australia ranks comparatively poorly on most of the measures of 'business agility', such as entrepreneurial fear of failure (44th), agility of companies (56th) and ability to respond to opportunities and threats (56th). We also rank 35th on use of big data and analytics.

Taken as a whole, this analysis paints a picture of a nation making good gains towards a digital future, but with room for improvement in creating a culture of innovation, agility and education and training across the economy.

Where to from here?

The time for passively describing the phenomenon of digital transformation has passed. As a nation, we need to respond, with purpose and direction.

The events of the last two years have thrust us all further into the digital 'future' faster than we could have predicted. Our daily reality is now adopting and adapting to rapidly changing technology – at work and at home.

This has completely reshaped what we need from workers in our enterprises, making some skills redundant, while creating demand for skills we didn't know we needed even a few years ago.

It has also brought our uniquely 'human' contribution into focus like never before, as we realise that the capabilities we used to dismiss as 'soft skills', are actually critical enablers of success.

So what does this all mean for changemakers and policymakers? How do we know where to invest, what to prioritise and where to begin?

The way forward

"Everything before the pandemic is now irrelevant. We've moved into a completely different world. So even if you listen to Ted talks, or any other talks before 2020, most things just don't make sense anymore"

Manager of high technology SME

We now have an opportunity to emerge from the shock of the last two years ready to reconceive our approach to technology and workers, confidently embracing change.

To map out a plan of action, first we need to identify what we now need from the workforce in this rapidly digitalising world, and what we are likely to need more of in future. Strategic workforce planning will be important to identify what kinds of skills and capabilities we need, as well as how we bring those skills and capabilities to our endeavours.

Second, we need to work out the optimal role for government, industry, individual workers and the education and training sector as we navigate this. Then, we need to ensure these actors are, together, identifying and cultivating these skills and capabilities and new ways of working – in a timely and responsive way.

1. Ensure baseline digital literacy for all

Digital literacy is the ability to identify and use technology confidently, creatively and critically to effectively meet the demands and challenges of living, learning and working in a digital society (Coldwell-Neilson, 2021).

We know that, moving forward, meaningful participation in work (and life) will require a baseline level of digital literacy. There is therefore a strong public policy imperative for government to ensure all Australians can survive and thrive in a digital world.

Again, our approach must be dynamic and evolving. Unlike language literacy, digital skills are developed at the interface of new and constantly evolving digital tools. Australians will need to continually update and deepen their understanding and skills.

Achieving this across the population is a two-pronged task – ensuring new and existing workers have the digital capabilities they need to survive, as well as preparing them to embrace phases of upskilling throughout their working lives. This requires further acknowledgement and codification of digital skills as foundation skills, in secondary and tertiary curricula, and workplace standards.

Work is already underway on this front, with the digital technology expert panel, commissioned by the Australian Industry and Skills Committee producing the Learning Country: Digital Transformation Skills Strategy Expert Report (2021) calling for a comprehensive national lifelong learning policy to build a responsive workforce, and the vocational training system we need to rapidly upskill/reskill Australians.

To justify the significant government and private investment in lifelong learning programs, it is essential that there are clear and rigorous standards. The Digital Skills Organisation has released and will maintain an employer-led Digital Skill Standards Framework to create benchmarks for the assessment of digital skills. The standard is intended to provide employers with confidence in the proficiency of the skills, regardless of where or how these skills were developed.

This work should be progressed, with the aim of developing a nationally agreed and easy to understand benchmark for digital skills.

2. Remake the education and training system for lifelong learning

We need an education and training system that better suits where we're going, not where we've been. The current model of education and training was conceived in an era of shorter working lives and linear careers.

The model of 'one post-school qualification, work, retire' no longer applies to most.

The expected retirement age for workers entering the labour market in 2022 is 67. What's more, those new entrants are likely to have over 5 career changes (AlphaBeta & Foundation for Young Australians, 2017). Workers are now increasingly learning throughout their working lives, often making major career changes in response to a dynamic, global economy that delivers more opportunities and more disruption.

An AlphaBeta analysis (2019) predicted, prior to the pandemic, that demand for reskilling, upskilling and new skills for new workers will double the total stock of education and training required to 600 billion hours by 2040. This has only been accelerated by the upheaval of the pandemic. Now we are seeing not only the 'great resignation', but also the great 're-learning'.

As we emerge from the pandemic and technology continues to evolve, workers at all skill levels will need to continually develop and add to their skills and capabilities.

The education and training system will need to step up, and rethink how and where learning happens. With a new National Skills Agreement in development, there is an opportunity to remake the system to facilitate genuine lifelong learning. This means rethinking qualifications, funding and access to ensure we invest in workers' skills throughout their careers.

Implement the Recommendations of the Review of the Australian Qualifications Framework (AQF) ('Noonan Review') to ensure it is positioned for the future, as a flexible and responsive framework for lifelong learning.

The Commonwealth Government should review the extent to which current tertiary education funding models support lifelong learning.

3. Make work-integrated and work-based learning the norm

The higher education model of (a) study theory for 3-5 years (b) apply in the workplace, is becoming less meaningful. It was conceived in the industrial era, when education was about rote learning industry specific knowledge that would remain static for decades. Now technology specific or technology augmented skills and capabilities evolve quickly. This is heightening the need for accompanying well-developed 'human' capabilities and characteristics such as creativity, adaptability and teamwork. These changes are forcing us to rethink traditional concepts of theoretical and applied learning, and find ways for learners to practice in, and become familiar with, work environments.

The question for every education and training course now is not 'do we need an element of work-integrated or work-based learning?', but 'when, how and how much do we integrate real world learning and application into the course?'. Models long utilised in health sciences, agriculture and education, where industry integrated learning participation rates are over 50 per cent, drive better outcomes for graduates (Hurley et al., 2021) and should be extended. Broad roll-out of cadetship models and higher-level apprenticeships will help drive graduate cohorts with relevant capabilities.

In our interviews for this report, several companies expressed deep concern with the public education system and the prospect of persistent skill mismatches. There was a generally observed belief, almost resignation, about the fact that Australian businesses are likely to experience persistent shortages in the key skills needed to keep pace with digital transformation. There was also a strong appetite for reworking the delivery of education and training to meet the needs and lifestyles of current workers and workplaces.

This renewed interest in the skill pipeline by Australian business can be leveraged through the provision of incentives and support for businesses to play a stronger role in training the next generation, particularly at higher skill levels.

Ai Group (2020) found 80 per cent of employers would take on higher apprentices, cadets or interns in order to increase their employees' skill levels. However, half of these employers said they could do it only with government support.

The proliferation of online courses and digitally enabled classrooms are allowing people to learn at their own pace and schedule and develop skills and (often) earn qualifications. These new modes of learning provide an opportunity to springboard career changes and rapidly fill skill gaps, by leveraging work-based learning through cadetships and higher level apprenticeships (Bean & Dawkins, 2021).

> **Work-based learning through cadetships and higher-level apprenticeships should be scaled up across all industries and occupations.**
>
> **Provide adequate incentives to ensure companies have the resources to support work-integrated and work-based learning.**

4. Expressly develop 'human' capabilities and characteristics

As machines do more and more, a human's value to an enterprise is increasingly about the ability to spot opportunities, formulate strategies and build networks and collaborations.

An AlphaBeta analysis prepared for Google (2019) analysed changes in more than 300 jobs, more than 2,000 work tasks and more than 500 skills required to complete these tasks across the Australian workforce. It categorised the skills into three groups - knowledge, capabilities and characteristics.

The analysis found that the fastest-growing skills are in fact 'characteristics'. These skills relate to the way we execute tasks, and include creativity, integrity, leadership, persistence, empathy, and attention to detail. This is not surprising, as these are the hardest skills for machines to replicate. As more knowledge and abilities become codified, they can be mastered by machines, shifting the focus to workers' more uniquely human skills.

It follows then that these uniquely human capabilities and characteristics should be explicitly cultivated through education and training.

A capabilities-based approach to education is not new and is perhaps most developed in early childhood education. High level policy statements in school education, such as the Melbourne Declaration (2008) and the Alice Springs (Mparntwe) Declaration (2019) acknowledge schooling's role in developing 'confident and creative individuals, successful lifelong learners and active and informed members of the community'. The General Capabilities Framework (2022), part of the Australian Curriculum, seeks to build these skills across a student's breadth of learning.

However, the approach to developing these capabilities in tertiary education and training has been less unified, with great variation across institutions and courses. Work-integrated learning in university education is recognised as an effective way to develop social capital and the National Priorities and Industry Linkage Fund provides metrics that will grow this activity.

We need to acknowledge the increasing role these capabilities play in workers' careers and educate and train with this mindset across the system. Doing so is not just about productivity, but also equity. These skills are often developed in life outside of formal education, such as sporting or community activities. However as Australian education experts O'Connell, Milligan and Bentley (2019) argue, access to these opportunities can be determined by a young person's socioeconomic status, meaning disadvantaged students can miss out.

O'Connell et al., (2019) propose a nationally agreed 'Learner Profile' detailing a student's broader capabilities and skills replace the Australian Tertiary Admission Rank (ATAR) as the primary instrument for tertiary admission. For such a tool to be practical, it is important that information contained in a learner profile is relevant to employers and demonstrates competency in skills at a nationally standardised level, for example, proficiency in literacy and numeracy against the Australian Core Skills Framework. Recent work by Milligan, Mackay and Noonan (2022) proposes rethinking senior secondary certificates to better reflect the breadth of a student's learning, making them a more useful tool for tertiary selection.

> **Explore ways to continue to develop capabilities in senior schooling, as well as ways to represent them as part of admission to tertiary courses.**
>
> **Continue to explore ways to cultivate general capabilities in tertiary qualifications.**

5. Ensure no one is left behind

On our journey to a digitally augmented future of work, there are predictions that some 2.7 million jobs will be automated, and new digitally augmentable roles will take their place (Australian Computer Society, 2020) (ACS). This means some Australians being displaced, potentially relying upon the social safety net whilst they leverage the education and training system to reskill and establish a pathway back to work. The ACS warns that a failure to ensure workers embrace reskilling opportunities could create up to 400,000 new long term unemployed, unable to re-enter the workforce in any capacity.

As well as placing a significant burden on social assistance and programs, this represents a significant productivity loss to the economy, already projected to be in short supply of digitally capable workers. There is a pressing need for a concerted policy effort to equip workers with the skills required for the digitally augmented workforce of the future. Without the development of these essential skills, all Australians (individuals and businesses alike) will lose out on the many benefits generated by digital transformation (Subic et al., 2021).

It will be important to address this displacement and facilitate workers' transitions to new digitally augmented roles. However, our policy response will need to walk a fine line. We need to maximise the upside of productivity-enhancing industry transition, while also minimising the downside risks of displaced and disengaged workers. We must

guard against entrenching deep and lasting inequality between the knowledge and digital capability 'haves' and 'have nots'.

This means a policy mix that empowers the adopters and innovators to take every opportunity technology brings, but also mitigates the risks for those most vulnerable, and ensuring the benefits are shared. Older workers must be a particular focus, as should those with a disability.

Flexible, accessible training products must be developed to enable existing and older workers to develop the baseline digital capabilities they need to continue working.

Governments at the state and federal level should explore ways to support displaced workers transitioning into entirely new industries and roles.

6. Get skilled migration right

Australia has always relied heavily on skilled migration to plug skill gaps and grow the economy. However, in recent years the phenomenon of digital transformation has coincided with COVID-19 restrictions to skilled migration flows, placing additional pressure on firms, and shifting the emphasis to developing and retaining staff.

There is a need to fuel national growth and productivity through the development of both local skills and targeted skilled migration for high skill workers (Australian Industry Group, 2021a). Grattan Institute (2022) analysis found that a skilled migration program targeting young, high skilled workers earning in excess of $70,000 are the best skilled migration candidates to deliver long-term benefit to the Australian community.

However, many businesses we spoke with advised that despite the skilled migration pipeline turning back on, they believe the new in demand technology occupations are yet to be added to the skilled priority lists. There was also a sentiment that the technology occupations listed on the skilled migration priority list were based on outdated job descriptions that did not adequately finesse the differences between the range of skillsets now needed.

Australia has always benefitted from a robust skilled migration program, and it will always play a strong role – but there is no point in seeking migrants with yesterday's skills. For a nation like us, getting the skilled migration pipeline right – meaning demand driven and responsive – will be key to success. This relies heavily upon a close partnership between industry and the national skilled migration policy framework.

The Commonwealth Government should adequately resource and prioritise the provision of a timely, dynamic dataset on national skill needs and occupation classifications. This must be constantly reviewed and updated in consultation with industry.

7. Foster business certainty to drive investment

The investment needed to drive digital transformation across the economy relies on decisions at the enterprise level.

Ai Group's recent CEO Survey found staff training and development was the highest priority for business investment in 2022 – listed as a number 1 or 2 priority for 58 per cent of CEOs. To support this the policy environment needs to foster certainty, trust and optimism regarding technology and its potential.

Investing in new technology does not always yield predictable or linear results. For many businesses, the absence of proper guidelines or patterns makes the success of companies' digital transformation uncertain. The upfront costs of investing in digital transformation projects can be high and involve many simultaneous investments – the capital investment in the new technology, as a well as the development or acquisition of new skills and competencies essential to a successful transformation.

Policies need to incentivise and encourage this business investment if we are to succeed in reaping the benefits of technology across the economy.

National policy settings should be carefully calibrated to incentivise and catalyse technology driven investment in people, particularly for small and medium enterprises.

8. Create trust in technology

There may be a level of public fear and scepticism about the risks of relying too heavily on technology. If left unaddressed, these fears will hold Australia back, rendering us unable to extract the value and potential from the available technology.

Without a concerted effort to build trust, there will be employee resistance that threatens the digital transformation processes (Abolhassan, 2017). Data must be harnessed in ethical ways that will serve the interests of people and society – having this baseline of trust is critical to avoid resistance to the digital transformation.

As identified in the Ai Group (2019) Industry 4.0 report, cyber security is an evolving challenge and requires significant collaboration between industry and government to build resilient systems that preserve the reliability and strength of the digitally enabled economy.

Following this, Ai Group has been supportive of the Australian Government's revised 2020 Cyber Security Strategy, reinforced in Federal Budgets, and the investment in strengthening Australia's cyber security. With the increase in availability and value of the data collected throughout business operations, the cyber security risk equally rises. Australia will need to face this challenge head on in the coming years, particularly in the context of growing insecurity in the Indo Pacific region.

If the whole community is to embrace technology's full potential, the Commonwealth Government must ensure there are robust measures in place to protect individuals and businesses who become victims of malicious cyber attacks.

The National Artificial Intelligence Centre was established at the CSIRO last year to centralise and boost Australia's skills in this area. This is a step in the right direction, as is the planned establishment of four Digital Capability Centres, the Australian Cyber Collaboration Centre (A3C) and the Australian Cyber Security Centre (ACSC) that offer support to business.

Privacy and use of personal data is also a concern for individuals, as well as businesses, as they increasingly provide information to a wide range of organisations when they procure products or services. In this regard, we note that there are various protections in place and reforms underway.

Overall, industry recognises the importance of protecting the privacy, safety and security of the Australian community, both in the physical and online realm. Indeed, Ai Group works closely with governments in a diverse range of areas. We support a regime that benefits both customers and businesses, irrespective of the specific regime. The regulatory environment should also be conducive to the promotion of digital investment, innovation and competition that benefits industry and the community in the long term, especially as we recover from the pandemic.

The Commonwealth Government must continue to play a strong role in building an environment that fosters trust in a digitally enabled economy. This should be done in close collaboration with industry.

9. Ensure a better data picture of skill needs

The collection and analysis of comprehensive and timely data on skill needs, and data sharing between governments, the education and training sector and industry will be key to staying one step ahead of the digitally enabled economy.

By creating a coordinated map of the supply and demand for the new skills across all sectors, the education and training system can respond and deliver the appropriate mix of skills in the short, medium and long term.

This data is also beneficial to individual workers as they navigate their own careers. Today's young people know their working lives will be long and unpredictable. They also know there is more flexibility and freedom to create your own 'portfolio' career than even before. They also need access to data insights on skill needs and demands in an accessible format, and data co-ordination and publication should be for this audience also.

Explore ways to improve the quality of data provided to industry, policymakers, the education and training sector and individuals, to better understand skill challenges and demands and stimulate investment in skill pipelines.

10. Work together to step up to the challenge

As with all major economic transitions and upheavals, the transition to a digitally enabled economy will be protracted and complex, and there will be inevitable winners and losers. However, we are at an important turning point. Many experts agree that the scale of the opportunity technology presents far outstrips any fear or hesitation we may hold.

In 2022 there's an opportunity for Australia to lean in and shape our response to this opportunity. We need to recognise that the digital 'wave' is washing over every aspect of our lives – work and otherwise – and we need to embrace it, learn to ride it, and help and teach others who are falling short.

Over the next decade, it is expected that current skill shortages will blow out to 700,000 as the rapid development in technology drives demand for a digitally literate and technically skilled Australian workforce (Australian Computer Society, 2020). This is a story of immense opportunity and growth, and, if we manage it correctly, higher skilled and better paid jobs, with more flexibility for more Australians.

The gains technology brings can mean more women in the workforce, more people able to work longer into their lives, and more people able to work from outside cities and regional centres. It can also mean faster, more efficient transactions and access to limitless markets – benefitting business and consumers.

However, to step up to this opportunity, Australian businesses need the leadership, capability, and skills to seize the moment.

We need our current workforce, and the next generation, to be confident and skilled, and capable of reskilling and relearning as required.

There will be unprecedented demand for education and training. Now is the time to get the settings right, and jettison, once and for all, old models of training no longer fit for purpose in the 21st century.

We need a policy response, at the national level, to ensure Australian businesses, large and small, are able to embrace this opportunity, and Australian workers are skilled and ready to take them there.

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