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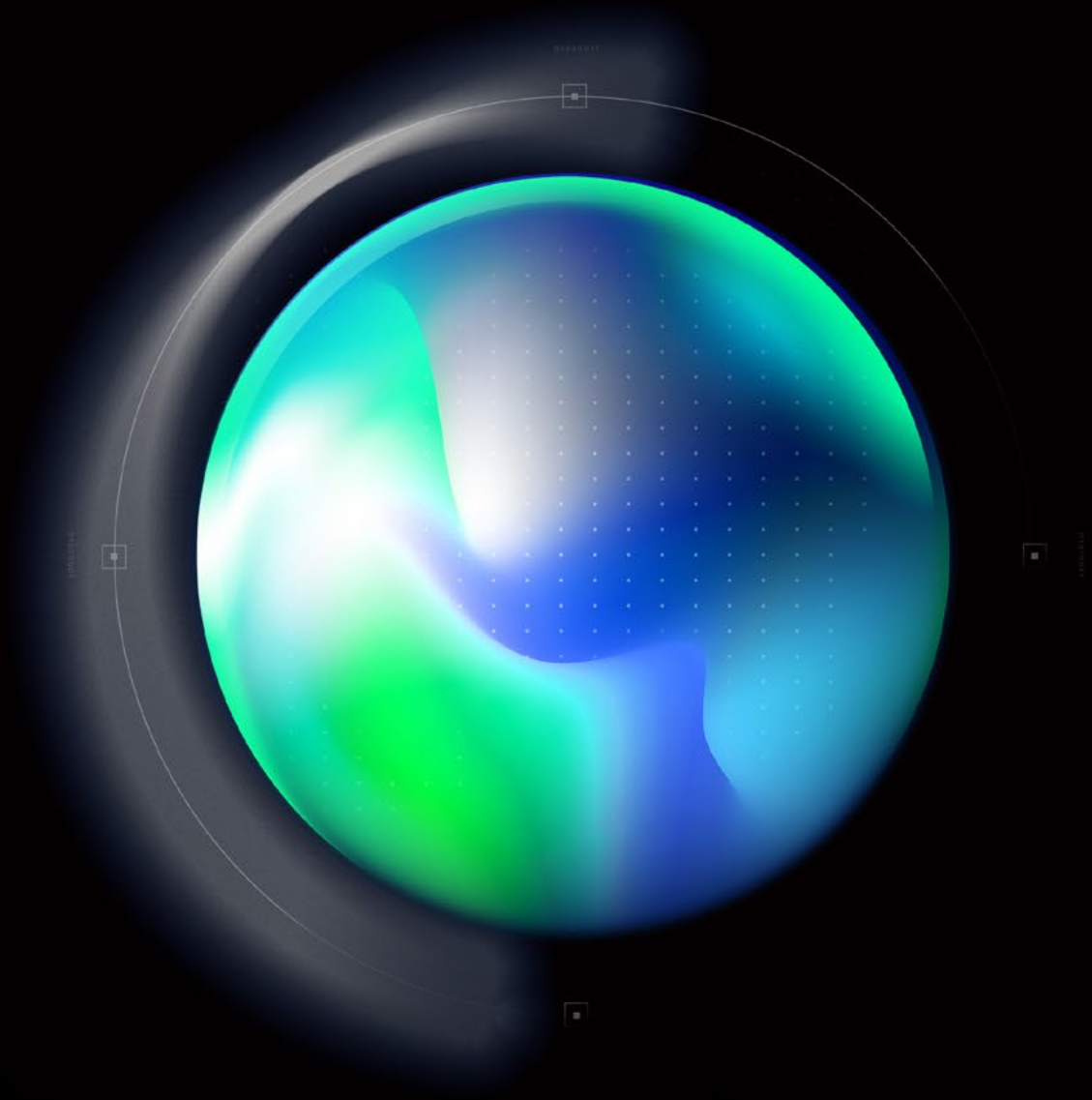


ACS Australia's Digital Pulse 2024

A decade of digital leadership

Powering Australia's technology brilliance.

ACS is the professional association and largest community for Australia's technology professionals, with more than 49,500 members across business, government and education.

As the trusted leader in the tech sector, we work to accelerate the growth of diverse and highly skilled technology professionals, equipping them with the right skills and knowledge to power Australia. Now and in the future.

We deliver value for our members, businesses and society in four ways.

Community

We foster an innovative and inclusive community that is dedicated to powering positive change through technology.

49,500+
Total number of ACS members

14,000
Event attendees a year

Career

We create career pathways to guide technology professionals and ensure Australia has a pipeline of talent with the right skills and knowledge.

46
Accredited universities

500
ACS Google Scholarships

Capability

We set the standard for assessing, developing and recognising the skills and experience of technology professionals.

11,128+
ACS Skillsoft unique users

35,000
ACS Skillsoft digital resources

Migration

We assess and support skilled technology migrants to address critical skills shortages, improve diversity and enrich Australia's workforce.

38,188
Supported migrating professionals

6,086
ACS Professional Year graduates

ACS foreword

This year's edition marks a decade of ACS Australia's Digital Pulse. This important milestone is a cause for celebration and reflection. ACS Australia's Digital Pulse has become the definitive source of insights into the rapidly growing digital economy and workforce for both government and industry. The publication has also been the mouthpiece to highlight issues holding the industry back and calling for change.

The importance of the publication has only been elevated in recent years. Australian businesses are falling behind in the global AI adoption race and the need for strong cybersecurity capabilities is greater than ever, highlighted by recent breaches experienced by businesses with household names.

Growing a skilled digital workforce is synonymous with globally competitive businesses and Australia's future prosperity.

This year's edition focuses on four key areas to transform Australia's tech workforce and catalyse further growth in the digital economy: Revitalising Australia's sources of tech talent, increasing diversity, engaging the next generation of tech talent and closing Australia's AI adoption gap.

This report issues an urgent call to action: Australia needs 1.3 million technology workers by the end of 2030 to meet industry demand. This will require 52,000 additional workers per year.

Yet our traditional sources of technology talent are under threat with reductions in the skilled migration program and international student caps making it harder to keep up with growing demand.

All pathways into the tech workforce need to be revitalised and made more accessible. From students studying tech and workers making mid-career moves to positioning Australia as a leading destination for global tech talent.

This edition of ACS Australia's Digital Pulse identifies 1.1 million Australian workers who have similar skills and capabilities to technology workers. Yet a lack of digital skills remains the largest barrier to making the switch.

The technology workforce is also underrepresented when it comes to women, age diversity, people living with a disability and First Nations people. Even more alarming is the lack of progress in representation throughout the past decade. Without more action now, we could face another decade of missed opportunities.

When considering the long-term pipeline of tech talent, an often overlooked influence is parents. Lingering sexist attitudes and a lack of information may prevent parents from recommending tech as a viable career pathway.

As the peak professional body, ACS has a clear responsibility to help solve the challenges facing our profession. We can be proud of the success of our education and training programs such as the Queensland ICT Gateway to Industry Schools Program, partnerships with Indigenous organisations like Goanna, Indigital and through the ACS Indigenous Scholarship. Going forward, we will work to deliver similar programs to further the development of the profession.

Yet we cannot solve the systemic issues alone. ACS Australia's Digital Pulse calls on businesses, government and education providers to collaborate on twelve key actions designed to equip the tech workforce with the skills needed to thrive in a competitive global environment. The prosperity of our country depends on it.

Helen McHugh
ACS President

Josh Griggs
ACS CEO

About this report

This is the tenth edition of ACS Australia's Digital Pulse. It is written by Deloitte Access Economics for ACS (Australian Computer Society). To celebrate a decade of analysis and workforce growth, this edition showcases cutting-edge insights and urgent lessons for the future of Australia's digital economy.

ACS Australia's Digital Pulse 2024 issues an **urgent call to action** through 12 key actions designed to transform Australia's tech workforce and catalyse growth in the digital economy.

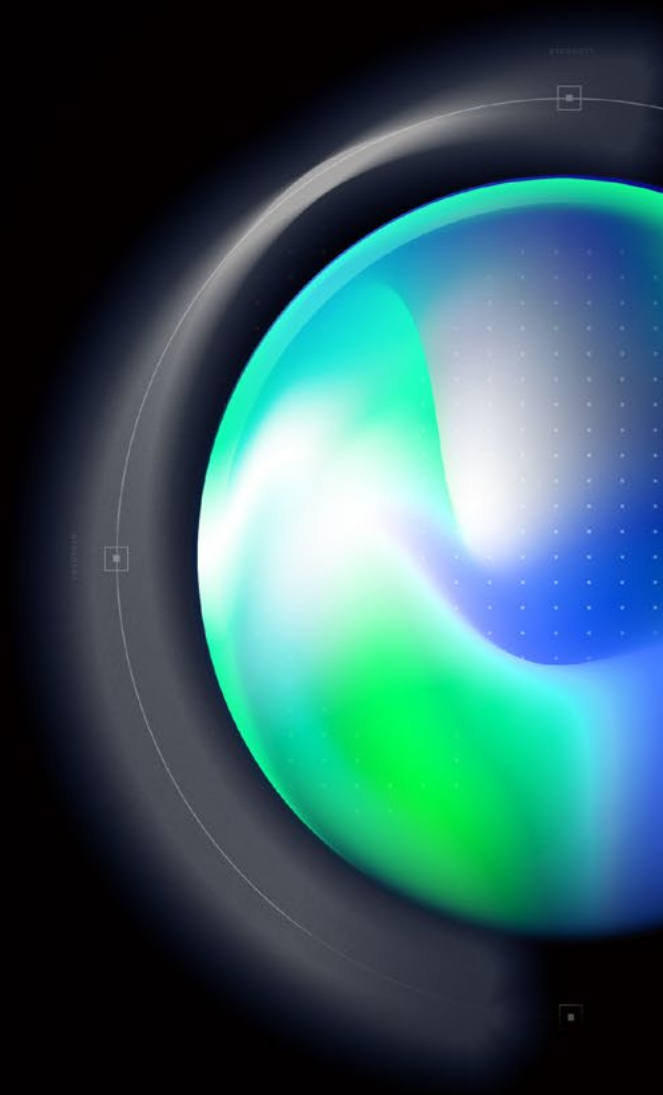
This year's edition focuses on four compelling areas of analysis: **Revitalising Australia's sources of tech talent, boosting diversity in the tech workforce, engaging the next generation of tech talent and closing Australia's AI gap**.

The analysis in this report is informed by four key sources:

- A bespoke survey of nearly 1,900 Australian workers across a range of relevant industries.
- Case studies featuring leading industry players including Google, Salesforce and Commonwealth Bank.
- Lightcast data on 265,000 technology worker job advertisements in Australia, from 2012 to 2024.
- Customised data from the Australian Bureau of Statistics and other Australian government sources.
- Data from the Australian Bureau of Statistics, both publicly available and from a customised data request, as well as other reports and statistics from Australian government sources.

The analysis around the workforce and digital indicators is contained in the statistical compendium.

Contents



ACS Australia's Digital Pulse 2024

Australia's future prosperity depends upon the success of the digital economy.

We need more than **1.3 million tech workers by 2030** to steer the sector but we are not on track to meet this need. This report identifies **12 key actions** to support the growth of a skilled tech workforce ready to harness the opportunities and challenges of AI and other technologies.

Revitalising Australia's sources of tech talent

Reskillers account for over half of incoming talent into the technology workforce. **There are over 1.1 million workers who have very similar skills and complete similar tasks to tech workers who could support workforce growth**, yet the proportion considering moving into technology is slowing while others lack the digital skills to make the move.

Actions: Motivate workers to reskill through paid incentives and connections with education providers.

Closing Australia's AI gap

Despite generative artificial intelligence (gen AI) being quickly adopted by workers, Australian businesses in **are lagging behind in gen AI adoption and only half of workers believe their workplace can identify and address risks related to AI.** Confidence in addressing ethical issues is a key concern holding many workers back from suggesting AI solutions.

Actions: Support responsible use of AI through industry specific training and integrating AI into curriculums and business advisory services.

Engaging the next generation of tech talent

Only 10% of school-aged students are interested in technology careers. While many parents are supportive of tech careers, **one third lack the skills to support their child's decisions. Outdated sexist attitudes may be stopping girls from considering pursuing tech education options or careers.**

Actions: Empower the next generation of tech talent through mentoring and helping parents to become advocates for tech careers.

Increasing diversity in the tech workforce

Compared to the Australian workforce, tech has lower gender diversity and a lower representation of people with disability and people living in regional areas. **There has been little change in the past decade, which suggests there may be structural barriers to entering the tech workforce for some people.**

Actions: Increase support for women-led tech start ups and boost digital inclusion in regional areas.

Australia's tech challenge

312,000

additional technology workers needed by 2030 to meet industry demand

1.1 million

workers have similar skills and tasks to tech roles, but fewer are willing to make the move

52%

of parents who work in industries outside tech would consider promoting tech as a viable career to their children

45%

of tech workers believe their workplace has appropriate settings to identify and address ethical issues related to AI

$12,600

less for women annually in tech compared to men, adjusted for seniority

Executive summary

A decade of ACS Australia's Digital Pulse

For the last decade, ACS Australia's Digital Pulse has tracked trends in the technology workforce and produced cutting-edge insights to help Australia harness the power of digital technologies.

Now more than ever, **Australia's future prosperity depends upon the success of our digital economy.** Cybersecurity, AI, and virtual reality will continue to rapidly transform our economy. Our ability to leverage these technologies will shape our competitiveness in the global economy.

This edition of ACS Australia's Digital Pulse focuses on four key areas of compelling analysis and issues an **urgent call to action to unlock Australia's technology workforce and catalyse future growth in the digital economy.**

Australia struggling to find cyber and AI skills

The tech sector's operations contributed over $124 billion in value added to the Australian economy in FY23. The sector also produces technologies and delivers services critical to enabling productivity growth across industries.

Embracing new technologies like generative AI will be critical to future prosperity, yet we find that Australia is falling behind in the global AI adoption race.

Cyber incidents and data breaches involving well-known businesses has led to rapidly increasing demand for cybersecurity skills. Demand for these skills has increased by 80% since 2020 as reports of cybercrime increased by 60% over the same period.

Uncovering where we can find and develop people with these skills is the focus of this edition of ACS Australia's Digital Pulse.

1.1 million 'near tech' workers identified as potential reskillers

The technology workforce is the key driver behind Australia's digital economy, fueling growth and serving as the nation's most powerful resource. **The Australian technology workforce will reach 1 million people by the end of August 2024,** representing 60% growth over the last decade.

While the technology workforce has grown strongly over the past decade, **Australia is not on track to meet industry demand.**

By 2030, Australia will need 1.3 million technology workers based on current business demand, equating to 52,000 tech workers per year.

Traditional sources of tech talent are under threat. People transitioning into technology roles, migrating from overseas and finishing tech qualifications are facing new pressures which could jeopardise Australia's ability to keep up with rising industry demand.

Reskillers are a crucial pipeline of potential tech talent. **Our analysis identifies 1.1 million Australian workers who have similar skills and capabilities to technology workers.** This includes mathematicians, electronic engineers, and marketing professionals, among others. Over half of tasks completed by these workers are similar to tasks completed by technology workers every day.

Yet the share of professional workers who are considering a move into tech has fallen in the past two years, with lack of digital skills being cited as the main barrier to making the transition (38%).

KEY FIGURES FOR THE TECH SECTOR

Economic contribution

$124 billion in economic activity to the Australian economy in FY23

Workforce

1 million tech workers will be reached by August 2024 and 1.1 million additional workers identified in 'near tech' roles

Exports

400% growth in the past decade to reach $8 billion worth of tech exports in FY23

Research & Development

Over 40% growth in ICT business expenditure to reach $8 billion in FY22

Increasing diversity in the technology workforce

Improving diversity in the Australian tech workforce is essential for supporting workforce growth and extending opportunity to fresh talent.

Yet the tech workforce remains underrepresented for some cohorts, with little or no progress made over a decade. **The share of women in tech has increased by just 1.2% since 2013 to reach 29% in 2023.** The share of people with a disability and First Nations representation has grown at similarly sluggish rates.

This suggests underrepresented cohorts continue to face structural barriers preventing them from entering and thriving in technology careers.

Our report attempts to interrogate these statistics and understand the root of the issue. We find that 1 in 4 Australian parents believe tech careers are better suited to boys than girls, **suggesting outdated sexist attitudes are holding back more women and girls from entering the profession.**

Those entering the tech workforce face significant pay and leadership gaps. Just 43% of women are in managerial positions compared to 50% of men. There is also a $12,600 pay gap per year between male and female tech workers, when adjusted for seniority.

For people living with a disability and migrants who arrived in Australia in the past five years, the pay gap is $7,300 and $4,600 respectively, adjusted for seniority.

Urgent action is needed to accelerate change and welcome badly needed tech workers from all communities and backgrounds into our workforce, but we cannot solve systemic pipeline issues alone.

Engaging the next generation of tech talent

Young Australians today are more digitally literate than any generation before, with access to new technology platforms, skills and trends emerging every day.

Despite this immersion in a digital environment, only 10% of school aged children are interested in technology careers, with boys over four times as likely to be interested than girls.

An often-overlooked factor in shaping a child's interests is the influence of parents, who can spark curiosity and engagement in areas of study and future careers. This edition of ACS Australia's Digital Pulse focuses on the role of parents and carers in supporting the next generation of technology talent.

We find that **half of parents working in roles outside tech or professional services are not advocating children to explore tech study options.** Failing to provide these young people with information about tech careers represents a significant missed opportunity, both for them and for the future of the sector. **One third of parents responded that they lack the skills to support their children's education and career decisions.**

DIVERSITY CHALLENGES FOR THE TECH SECTOR

Women in tech

Current share: 30% of tech workforce
Growth (10 years): 1.2%
Leadership gap: 43% in managerial positions compared to 50% of men
Pay gap: $12,600 per year compared to men, adjusted for seniority

Migrants in tech

Current share: 49% of tech workforce
Growth (10 years): 8%
Discrimination: 77% of migrants have experienced discrimination
Pay gap: $4,600 per year for recent migrants compared to Australian born

Regional tech workers

Current share: 14% of tech workforce
Growth (10 years): 1%
Digital inclusion: 66% in outer regional areas compared to 74% in metro areas
Pay gap: $15,400 per year for regional workers compared to metro workers

First Nations

Current share: 0.8% of tech workforce
Growth (10 years): 0.28%
Digital inclusion: 7.5% gap between First Nations and non-First Nations

Tech workers with a disability

Current share: 0.6% of tech workforce
Growth (10 years): 0.2%
Discrimination: 82% of tech workers with a disability experienced discrimination at work
Pay gap: $7,300 per year for workers with a disability compared to workers without a disability

Age in tech

Current share: 20% (aged 55+) and 15% (aged <25) of tech workforce
Growth (10 years): +4% (aged 55+) and -4% (aged <25)

Closing Australia's AI gap

Generative AI is rapidly transforming the world of work. There are already 5.4 million Australians using generative AI at work, representing a 20% increase in gen AI usage in less than a year.

Despite this growing adoption, Australia faces a generative AI gap with international peers. Across four key areas – workforce talent, workforce adoption, business adoption, private sector investment – Australia is middling or falling behind the majority of peers. For example, 15% of Australian workers consider their business to be an innovator or early adopter of gen AI. This is the second lowest out of 13 markets across Asia Pacific.

Action is needed now to close this generative AI gap or Australia could risk falling further behind international competition.

One of the areas of greatest need to support growth in the digital economy is ensuring the responsible and safe use of AI. Developing skills and awareness of potential risks will not only be important for tech workers, but all Australian workers.

Safe and responsible use of AI is a major challenge facing the industry. The majority of tech workers, 55%, do not believe their workplace has appropriate settings to identify and address ethical issues when using gen AI.

This is despite many workers encountering ethical issues in their day-to-day work. **In fact, 2 in 5 technology workers and 1 in 3 professional workers report that they have encountered an ethical issue when using generative AI in their own workplace, with the most common issues including factual errors, bias, and outdated information.**

This highlights an opportunity to upskill and empower workers through further ethics systems and training, which will be required to realise the full potential of AI for Australia.

Those employees who are proactively engaging with AI are twice as likely to feel confident addressing risks, and twice as confident about suggesting solutions using AI. This illustrates the value of developing AI skills for integrating the technology in business operations.

HELPING PARENTS GUIDE THE NEXT GENERATION OF TECH TALENT

62% of parents would encourage their child to pursue a technology career

1 in 4 parents believe a career in tech is better suited to boys than girls

TOP ETHICAL ISSUES WHEN USING GEN AI IN THE WORKPLACE

Lack of accountability

Outdated information

Poor perceptions from clients and managers

55% of tech workers do not believe their workplace has the required settings to identify ethical issues

Employees who proactively upskill in AI are:

2x as likely to feel confident identifying and addressing ethical issues at work

Actions to support the tech workforce and catalyse growth in the digital economy

This edition of ACS Australia's Digital Pulse identifies **12 key actions** to support the growth of a skilled tech workforce to achieve the goal of reaching 1.3 million technology workers by 2030:

Revitalising Australia's sources of tech talent

1. **Earn While You Learn.** Reduce the barriers to reskilling by paying workers a wage subsidy ($24,000) to gain technology skills while working, with the onus shared between business and government.
2. **Paid work placements.** Increase the number of paid work placements for IT students that generate credits towards their educational course, setting a new government target for tech graduates.
3. **Skills certification for migrants.** Many tech workers born overseas come from outside the skilled migration program. Recognition schemes to certify existing skills would help to reduce barriers and connect employers with talent.

Increasing diversity within the tech workforce

4. **Commonwealth support for women-led tech start ups** Empower more women-led tech start ups and scale ups through a new Commonwealth grant program, building on existing state-based initiatives.
5. **Increasing digital inclusion into regional areas.** Invest in digital infrastructure and opportunities to build digital skills, with a focus to increase inclusion for Aboriginal and Torres Strait Islander peoples.
6. **Removing unconcious bias from hiring and promotion decisions.** Commit to adopting best practice amongst tech employers to address these issues in their decision making.

Engaging the next generation of tech talent

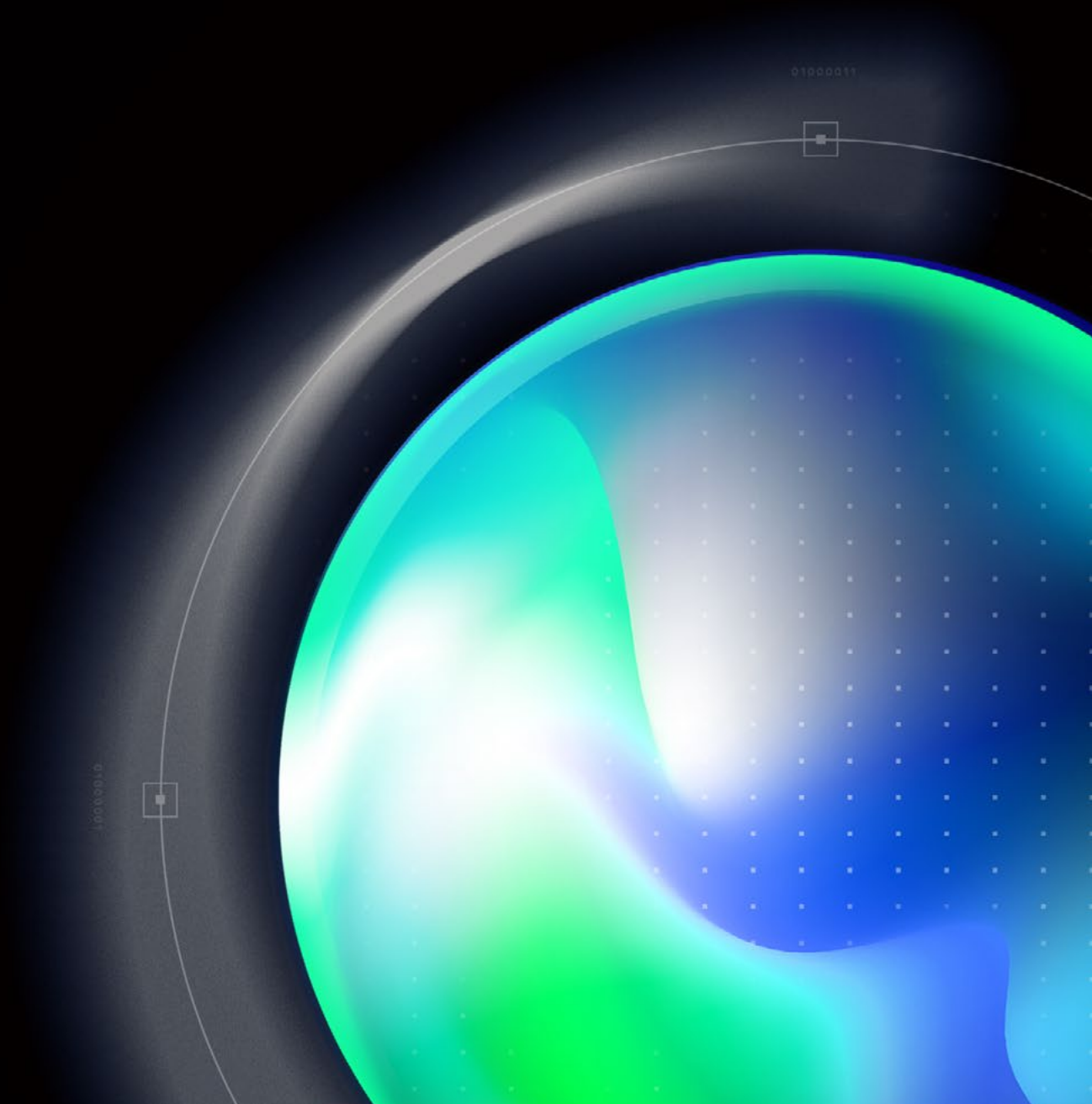
7. **Parents information campaign.** Empower parents through a targeted campaign to build understanding about careers in tech and encourage digital skills to unlock the next generation of tech talent.
8. **Greater guidance on use of devices and promoting safe use.** Provide the evidence base around learning outcomes and other impacts related to age of children's access to devices.
9. **Mentoring schemes.** Enable early connection to future tech talent through presence at school and tertiary education provider events, as recommended in the Diversity in STEM Pathways review.

Closing Australia's AI gap

10. **Support development of industry specific generative AI training.** Establish industry association led training programs to help workers develop AI capabilities supported by Jobs and Skills Australia and for businesses to address skills gaps in their workforce.
11. **Identify and implement AI skills into the curriculum for relevant tertiary training programs.** Encourage education departments and providers to integrate AI skills development within tertiary curriculums across highly impacted fields of study.
12. **Support responsible use of AI through business advisory networks and services.** Help businesses navigate AI governance requirements through supporting advisory services and networks.

01

A decade of digital impact



A decade of digital impact

The tech sector contributed nearly $124 billion to the Australian economy in FY23

The importance of digital technologies for the Australian economy cannot be overstated. As the capabilities of technologies such as AI, big data analytics and cybersecurity, Virtual Reality (VR) and Augmented Reality (AR) have grown, so has our reliance on them for modern work, the economy and our daily lives.

In FY23, the technology sector contributed $124 billion to the Australian economy, as measured through total value added. This estimate is based on modelling using Deloitte Access Economics' Regional Input Output Model, and includes the direct contribution from tech sector operations ($78 billion) and purchases these businesses made to suppliers (nearly $46 billion).[1]

This value is partly a result of Australia's tech sector becoming increasingly recognised internationally. Technology exports reached over $8 billion in FY23, with tech services growing at 14% per year on average over the past 5 years while exports of tech goods grew by 10%. Australian imports of Information and Communications Technology (ICT) services reached $6 billion in FY23, leading to a trade surplus of $2 billion in FY23.[2]

Beyond economic activity supported by tech sector operations, the use of digital technologies contributes significantly to productivity growth by driving efficiency and creating new products and services. Since 1980, 66,000 ICT related patents have been issued in Australia, accounting for 11% of all patents issued in that period.[3]

The importance of tech will continue to grow with the adoption of new technologies by Australian businesses. One estimate suggests generative AI would contribute $115 billion each year to the Australian economy by 2030.[4]

More generally, these technologies offer a way to address the low productivity growth in the Australian economy, which has halved in the most recent decade compared to the early 1990s.[5] In an increasingly competitive global economy, ensuring the adoption of cutting-edge technologies will help Australian businesses to compete and thrive.

Beyond productivity, embracing technologies is critical for solving pressing challenges. With the Australian Government's aim to achieve net zero targets by 2050, the climate tech sector has driven technological innovation in agrifood, carbon markets, renewables, and the circular economy, resulting in 2 million tonnes of CO^2 reduced or removed from the atmosphere to date.[6] Technological solutions also reduce carbon emissions by eliminating the need for physical travel through telehealth consultations.

Digital technologies also help to support households through lowering costs and enhancing competition. Over the past 20 years, technology has played a significant role in reducing core inflation as technology inputs lower final product prices by 0.5% each year.[7]

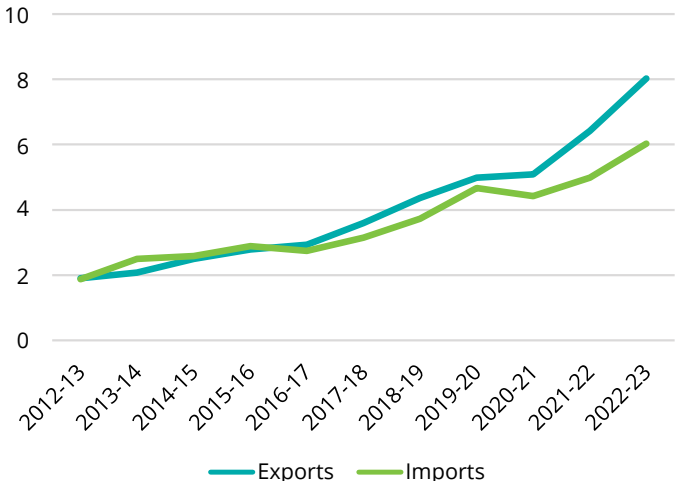
Digital platforms also help to enhance competition by providing consumers with the tools to shop around for the best deals, supporting with cost-of-living pressures.

Size and impact of the digital economy

$124bn	in value added to the Australian economy in FY23.
$8bn	in international technology exports in FY23.
66,000	ICT patents issued in Australia since 1980.

Source: Deloitte calculations (2024)

Tech exports and imports, FY14 to FY23, $billions



Source: Australian Bureau of Statistics (2023)

The 1 million tech workers driving the digital economy

An additional 300,000 workers are needed by the end of the decade

In the 10th edition of ACS Australia's Digital Pulse, the technology workforce has reached more than 1 million people, up from just over 605,000 people in 2014.[8]

With an annual growth rate of 5%, the technology workforce has grown at twice the speed of the broader workforce (2%) over the past decade.

New South Wales has experienced the highest increase in additional workers in the last decade, with 135,800 new entrants into the technology workforce, while Victoria's tech workforce has grown by 113,700 over the same period. Smaller jurisdictions have had some of the highest growth rates in the technology workforce, with the ACT at 6%, followed by Tasmania at 5%.

A key trend identified across the ACS Australia's Digital Pulse is the distribution of technology workforce across the broader economy. This message is reinforced by the strong growth across industries outside of the traditional tech sector (including computer system design, telecommunication services and internet service provision).

The industries with the strongest growth in technology workers over the past decade included Accommodation and Food Services (16%), Agriculture, Forestry and Fishing (12%), Mining (11%), Arts and Recreation Services (10%), and Financial and Insurance Services (9%).

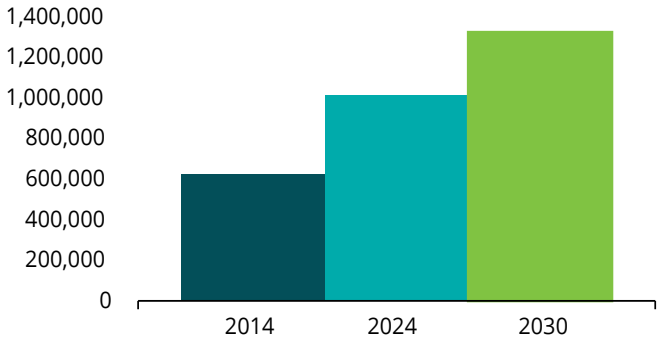
By 2030, there will need to be approximately 1.3 million technology workers based on industry demand. That is equivalent to almost 52,000 technology workers each year or a 4% increase on average per year.

We know that digital skills across the entire workforce need to develop. Based on analysis from the previous edition of ACS Australia's Digital Pulse, 11.2 million workers across the economy are expected to have at least 20% of their work time replaced, augmented or otherwise impacted by the adoption of critical technologies. This will impact nearly three quarters of working hours across the Australian economy as a whole.

Growing the level of technology workers and skills will be critical to effectively deploying technologies across Australian businesses. Adopting digital technologies helps businesses respond to longer term structural change and changing market conditions.[9]

Defining the tech workforce
The workforce analysis contained in ACS Australia's Digital Pulse uses ABS occupation and industry classifications and draws on the methodology developed by the Centre for Innovative Industries Economic Research (CIIER) lead researcher Ian Dennis FACS. It was used in the ACS's 2008 to 2013 statistical compendiums and other CIIER analysis. This analysis is foundational to understanding trends in the Australian technology workforce.

Technology workers in Australia, 2014-2030



Source: Australian Bureau of Statistics custom data request (2024), Deloitte

Top 5 industries with the fastest growth in tech workers, 2014-2024

Industry	Average annual growth rate
Accommodation and Food Services	16%
Agriculture, Forestry and Fishing	12%
Mining	11%
Arts and Recreation Services	10%
Financial and Insurance Services	9%

Source: Australian Bureau of Statistics custom data request (2015 and 2024), Deloitte calculations

Cybersecurity skill shortages must be addressed to meet business and government need

The barriers to growing the technology workforce are more pronounced in cybersecurity

The demand for cybersecurity skills has grown rapidly in recent years, with the number of job advertisements requesting cyber and information security skills increasing by more than 80% compared to 2020.[10] This demand seems to be a response to increasing cybercrime reports, which have increased by almost 60% since over the same period.[11, 12]

The rising incidence of cybercrime has made cybersecurity an important core enabler of the digital economy's growth, with approximately 10,000 cybersecurity workers across Australia.[13]

The average cost of a cybercrime incident to Australian businesses is also growing. The Australian Signals Directorate estimates the costs have increased between 10% and 16% for Australian businesses in FY23. Medium-sized businesses face the largest average cost of an incident at $97,000.[14] However, the costs and brand damage of large-scale data breaches can far exceed these figures with recent incidents in Australia costing well known companies hundreds of millions in costs dealing with breach, compensation and lost consumer confidence.[15,16]

Cybercrime also poses a risk to Australian critical infrastructure with the Australian Signals Directorate responding to 143 cybersecurity incidents related to critical infrastructure in FY23.[17] In response to this emerging threat, government sectors including healthcare and public administration agencies have the largest requests for cybersecurity professionals in recent years.[18]

The increased need for cybersecurity expertise across Australia is contributing to a shortage of cyber talent. The shortage is likely to grow by more than 20,000 cybersecurity skilled workers by 2030 and result in a substantial skill gap of almost 80,000 individual soft and technical skills.[19] Even now, the shortage in cybersecurity skills has translated to a wage premium of 27% for professionals with cybersecurity skills compared to professionals with comparable skill levels.[20]

Growing the number of people with cybersecurity skills is a key priority in the Australian Government's Cyber Security Strategy.[21]

While traditional education pathways are an important channel, the technical and quickly evolving field of cybersecurity makes alternative pathways such as microcredentials and bootcamps an essential complement to the skills development mix.[22]

The cybersecurity workforce is even more gender unequal than the technology workforce more broadly with just 17% of cybersecurity professionals identifying as women.[23] One likely factor in this outcome is gender biases and structural barriers among employers.[24, 25] For example, recent research found that only 0.1% of job advertisements in Australian cybersecurity explicitly offer part-time positions and that cybersecurity advertisements were the most likely to use stereotypically masculine language of any occupation.[26] As such, the onus should also be on employers to model inclusive practices.[27]

Average reported cost of corporate cybercrime in 2023

$45,965	for small business
$97,293	for medium business
$71,598	for large business

Source: Australian Signals Directorate (2023)

Emerging technology is essential for enabling a Future Made in Australia

The centrepiece of the Australian Government's plan for long-term economic prosperity is the a Future Made in Australia Act.[28] This plan is also supported by the Critical Technologies Statement.[29] These plans set a direction for green opportunities including critical mineral, solar, batteries and hydrogen, and for emerging technologies such as AI, quantum and advanced data analytics.

Technology has an important role to play in supporting and enabling these policies. For example, Internet of Things (IoT) and robotics will play an important enabling role in improving sustainability of business and government operations. For example, AI-enabled IoT devices installed in smart cities can enable more optimised energy based on use of infrastructure.

The technology workforce will be essential for advancing technologies on the government's List of Critical Technologies in the National Interest.[30] Research from the 2023 edition of ACS Australia's Digital Pulse found that by 2030 Australia will require 134,000 people skilled in advanced data analytics, 129,000 skilled in AI and 48,000 skilled in cybersecurity. Further, Australia does not currently have skills to meet this demand with a projected skills gap of 290,000, 496,000 and 78,000 people with a range of technical and people skills in those respective technologies.[31]

Commercialising research and innovation has long been a challenge for Australia who, despite making a outsized contribution to academic publishing and innovative ideas, fails to translate this into creating and selling Australian-invented products and technologies.[32] The technology workforce is one essential prerequisite in trying to reverse this trend with nascent technologies including quantum, AI and advanced manufacturing having the potential to place Australia at the leading edge and create knowledge spill-overs. Already we have seen government take steps to promote the development of quantum technology with the Australian and Queensland government providing almost $1 billion grants, loans and share purchases for the company PsiQuantum.[33]

The quantum opportunity

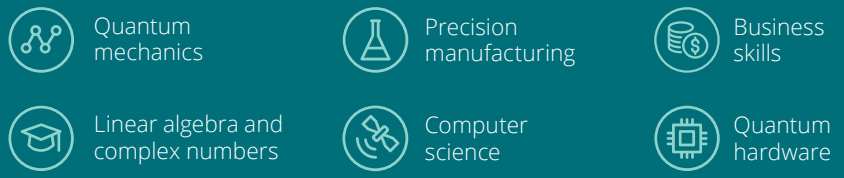
Quantum computing has the potential to transform our tech industry. A fault tolerant quantum computer could help answer questions more efficiently and solve questions we do not currently have the power to solve.

The power of quantum is a significant opportunity with the CSIRO estimating that the quantum computing industry in Australian could be worth $5.9 billion by 2045 and contribute $6.1 billion to GDP in that year.[34] These benefits include how the development and use of quantum technology has the potential to improve the productivity of other industries such health, transport, space, mining and defence. The CSIRO estimates these spill-overs could contribute $2.4 billion of the GDP uplift by 2045.[35]

The quantum technology industry requires a highly skilled workforce to operate. Some of the key skills required for quantum computing are quantum mechanics, quantum hardware, linear algebra and complex numbers, precision manufacturing, computer science and business skills.[36, 37]

There is significant investment being made globally in quantum computing by governments and private investors. Australia is now aiming to be at the forefront of quantum computing by supporting and providing investment, as well as research and development. Existing initiatives include the Australia's Centre for Quantum Growth, Quantum Technologies Future Science Platform and the investment in PsiQuantum.

The quantum opportunity



The digital defence workforce is here – and it's growing to meet Australia's challenges

Technology workers are over-represented in defence, relative to the broader economy

Defence needs digital skills

Defence and security are increasingly digital. While the military has always leveraged cutting-edge technologies, the modern battlefield has seen technology shift from a force multiplier to the primary predictor of success in many of the conflict scenarios faced today. Central among these technologies are the digital systems that now underpin the leading defensive and offensive capabilities which is enabled by a growing cohort of digital workers.

Exemplifying the unique advantages conferred by technology readiness and adaptability is the army of Ukraine, which has achieved effective results through low-cost platforms. With the adoption of first-person-view (FPV) drones, Ukraine has applied a civilian technology for surveillance and strike, revolutionising the tactics and economics of war.[38]

In the Indo-Pacific, digital skills are also gaining prominence, as countries seek to counter grey zone activities such as cyber warfare. The workforce implications are profound – not only must defence and security agencies develop offensive cyber capabilities to deter and respond to these attacks – but the broader economy, especially operators of critical infrastructure, must invest in the skills and systems that are needed to defend a newly-vulnerable class of assets.

Australia is investing in a digital defence workforce

Australia's defence force structure is undergoing major and rapid change in response to the 2021 AUKUS Partnership and the 2023 Defence Strategic Review. Digital skills are now essential to the transformation set out in the National Defence Strategy, Integrated Investment Program, and Defence Digital Strategy and Roadmap, which will create an "integrated, focused force", linked by a "digital backbone" of interoperable platforms.

In 2023, defence already employs over 5,200 technology workers – or 8% of its total workforce, putting defence ahead of the broader economy for digital skills. This figure is set to grow further with the planned $36 billion investment in cyber, space and electronic warfare over the next decade.[39]

The national security community is also doubling down on digital, with the Australian Signals Directorate expected to create an additional 1,900 new jobs through Project REDSPICE. This represents a three-fold increase in the ASD's offensive cyber capability and is the single largest investment in signals intelligence over the ASD's 75-year history.[40]

5,200+ Defence technology workers

Case study: Saab Australia

Saab is a global defence and security business that has operated in Australia for over 35 years. It started by supplying the base design for the Collins-class submarine and the Combat Management System for the Anzac-class frigate.

Over this time, Saab has taken an increasingly digital focused offering to market, enabled by an Australian workforce that has grown to over 1,000 people. Among Saab's staff are over 60% technical specialists, including software engineers, systems engineers, hardware engineers and integrated logistics support specialists. Together, these workers deliver a range of digital and technology products including AusCMS – Saab's flagship Combat Management System that is installed across Australia's surface naval fleet.

Saab's other products and services include combat systems integration, autonomous systems, land and aerospace, and civil security systems spun out of the company's core defence capabilities. The availability of skilled workers has strengthened Saab's presence in Australia – coupled with a research sector and defence industry that is ready to partner on digital solutions to pressing problems – including filling skills gaps where these exist.

The newly built Sovereign Combat System Collaboration Centre, hosted by Saab Australia, brings together university and commercial partners to develop the next generation of naval combat systems within a collaborative ecosystem. This includes a dedicated Combat System School, which provides specialist courses and micro-credentialling in Combat System Engineering to uplift Australia's sovereign digital workforce.

As Saab looks to the future, its greatest defence and civil opportunities will stem from offering sophisticated technologies to its users, as part of an integrated system. In designing, developing and commercialising these technologies, dgital workers will be essential in bringing the next wave of opportunities to life.

02

Revitalising Australia’s sources of tech talent

Revitalising Australia's sources of tech talent

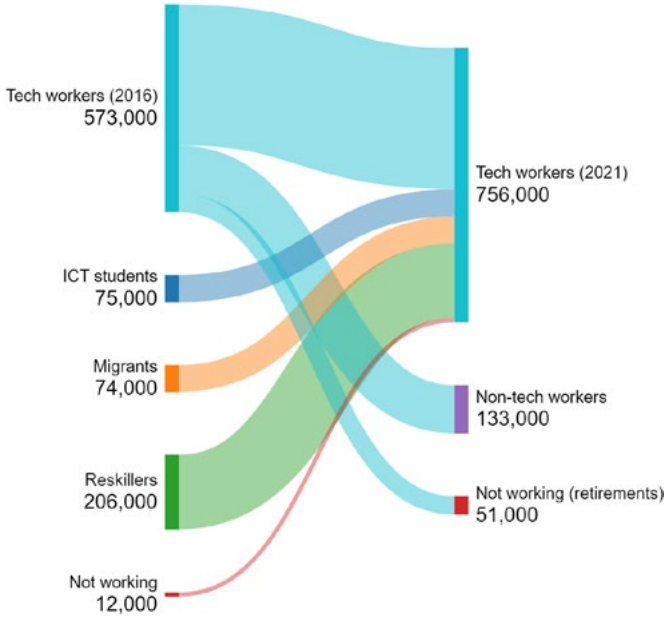
Traditional sources of talent are increasingly under pressure

While the technology workforce has grown strongly over the past decade, **the traditional sources of technology talent are facing new pressures.** Pressures include changes in preference towards a career in the technology workforce, proposed changes to the migration intake and caps to the number of international students. The impact on traditional workforce sources are explored below.

- **Reskillers:** People transitioning into technology careers from other occupations make up over half of the incoming talent.[1] Some of these workers are in closely related fields while others likely undertake reskilling. However, there are warning signs that the pace of transition may slow as existing professional service workers show less interest in moving into tech with the share considering a move falling from 47% in 2022 to 40% this year.[2]
- **Migration:** Half of the technology workforce is born overseas.[3] Skilled permanent migration has been a key source of this talent with a number of technology occupations listed on the Skilled Occupation List (SOL). Yet proposed changes to Australia's skilled migration intake could reduce this source of talent. The growth in temporary skilled ICT visas granted over the last decade has also remained largely stable with around 13,800 temporary ICT visas granted in FY23.[4]
- **Tertiary education:** Formal IT education through Australia's university and Vocational Education Training (VET) institutions are an important source of Australia's tech talent, making up nearly 10% of people entering the workforce between 2016 and 2021.[5] However, despite an increase in the number of domestic students choosing to study IT over the pandemic, enrolments have begun to fall away, with a 10% decline in 2022.[6] Proposed caps to the number of international students announced in the FY25 Federal Budget may also pose risks to the future flow of workers with international students accounting for 65% of annual IT completions.[7] These traditional learning pathways are also struggling to produce job-ready workers. In fact, a 2023 survey found that only 3% of businesses surveyed saw IT university and VET graduates as being job-ready.[8] Additionally, IT graduates are considered the least employable with 80% of IT graduates rated high on employability according to the *2023 Employer Satisfaction Survey*.[9]

With Australia needing almost 52,000 additional technology workers each year through to 2030 to meet forecast demand, the pressures on key sources of talent are likely to create additional challenges. **We must revitalise Australia's sources of tech talent to meet demand for technology workers.** This means attracting more workers to the sector and ensuring they are equipped with the required skills.

Technology worker transition, 2016-2021



Source: Australian Bureau of Statistics (2023), Deloitte calculations

There are 1.1 million 'near tech' workers who could transition into technology careers

Lack of digital skills are a barrier to half of workers considering to move into tech

Reskilling is critical to continue to build the technology workforce in Australia. If current trends continue, Australia will need 26,000 workers reskilling into technology occupations each year for the rest of the decade.[10] However, the reported slow down in the share of professional service workers interested in moving into tech suggests this may be more challenging in the coming years compared to recently.

To offset potential declines in reskilling, the sector could look to new sources of workers who have the foundational skills that are transferable to the technology workforce. Bespoke analysis for this report suggests there is a significant number of potential reskillers that could help grow the tech workforce. **In fact, there are more than 1.1 million workers with skills similar to those of tech workers.***

These workers include scientists, engineers, professional workers and data intensive administrative workers. Importantly, **almost 60% of workers in these 'near tech' roles are women**, representing an opportunity to increase the diversity of the technology workforce more broadly.[11]

A lack of digital skills is a barrier for 38% of workers considering a career move into the tech sector. When it comes to developing their digital skills, these workers report a lack of time and the cost of training as the largest constraints.

Technology employers need to consider alternative pathways into tech. **In fact, analysis of online job advertisements found that 80% of advertisements required a university degree.[12] This is despite only half of surveyed tech workers considering university as the pathway most likely to lead to a successful career.**

If these formal education requirements remain, the cost and time commitment of a full degree or VET qualification could discourage many potential reskillers coming into tech.

To address the barriers faced by workers considering reskilling, **more consideration needs to be given to the role of shorter, cheaper and more targeted courses to build digital skills or recognise prior experience developing these skills.**

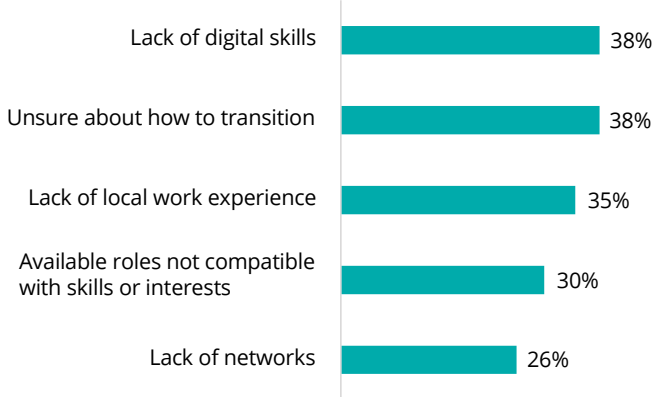
This should include greater promotion of microcredentials to workers as a valid pathway to transition workers into a technology career. Alternative pathways may be especially important for helping 'near tech' workers transition given that they already have many of the fundamental skills required to be a technology worker. Employers also need to be more accepting of the alternative pathways workers might take to acquire digital skills.

Select 'near tech' occupations

Occupation	Number of people employed
Mathematical Science Professionals	8,751
Electronics Engineers	6,134
Advertising and Marketing Professionals	100,466
Social Professionals	20,072
Research and Development Managers	18,260
Accounting Clerks	153,127

Source: Jobs and Skills Australia (2024), Deloitte analysis

Main barriers to transitioning into the tech workforce among workers considering moving into tech



Source: Deloitte workforce survey (2024), n=293

*The identification of 'near tech' workers is based on tasks undertaken by worker with comparisons made to technology workers. The analysis assumes that any task that makes up more than 5% of the average technology worker's work is a core task.

Case study: Changing the face of the technology workforce with Google Career Certificates

Flexible study pathways enabling greater diversity in the tech workforce

As a major tech employer, Google is helping to build digital skills across the Australian workforce through ten Google Career Certifications in areas such as AI, data analytics and cybersecurity.

Scott Riddle, Head of Partnerships, and Keira Spencer, Marketing Manager explain how the idea of Google Career Certificates arose from an internal business need to develop digital talent, but have since become a tool to help build the digital skills of the broader workforce. The genesis of the idea came from a shortage of IT support staff for Google in the San Francisco head office back in 2018. Scott explains that Google team members themselves were well positioned to help upskill or reskill recent hires or potential hires. The flexible nature of the training courses also had an unanticipated benefit of drawing from a more diverse talent pool.

The success of the training courses led to the development of Google Career Certificates with the content developed in close collaboration with other major employers and education providers to ensure the digital skills being offered are in high-demand from businesses. To ensure relevancy, the content is updated annually for each of the Career Certificates.

Since their launch in Australia in 2022, over 7,000 Australians have successfully completed a Google Career Certificate. Keira notes the flexible study arrangements of Career Certificates have lowered the barriers to the technology workforce for many people who would be otherwise excluded, with data suggesting many graduates having completed Career Certificates with no prior tertiary education in tech. Notably, there is a growing interest from small business owners looking to enhance their skills in generative AI. Additionally, the Cybersecurity Career Certificate, in particular, has seen a notable increase in completions, reflecting a rising demand for these skills across various industries.

Looking ahead, Keira explains that while current Google Career Certificates focus on specific career paths, such as User Experience (UX) or IT support, there's a growing trend towards skills-based certifications applicable across various industries. Google's latest launch, the AI Essentials short course, exemplifies this shift.

> "We quickly realised that the Google Career Certificates were not just for people working in other tech companies. We have people enrolling from banking, construction and the resource sector to learn skills they need for the modern world of work."
>
> **Scott Riddle**
> Head of Partnerships, Google

Future trends for microcredentialing

- Growth in skill-based credentials like AI, Data Analytics and Cybersecurity
- Improving accessibility to tech careers for those who haven't studied IT in university
- Flexible study enabling greater diversity in the tech workforce
- Collaboration with industry and education providers to update course content

Case study: Promoting alternative pathways into tech through Salesforce microcredentials

Salesforce is forging partnerships with industry and education providers in Australia to build industry-ready digital skills by embedding their microcredentials into tertiary education courses

Leanne Bamford Barnes, Salesforce Ecosystem Skills Manager, ANZ, and Nada George, Vice President Employee Success, APAC, explain how Salesforce is partnering with education providers like Western Sydney University to embed microcredentials on digital skills within course curriculum. The Salesforce microcredentials embedded in tertiary education courses contributes towards larger industry certifications while also providing students with credit included in their degrees.

Leanne explains the benefits from incorporating microcredentials in this way are two-fold. The inclusion of microcredentials can help ensure students are more work-ready with experience using applications commonly used by businesses. In addition, the self-guided nature of microcredentials also saves lecturers and teachers the time in gaining certifications themselves before teaching students, allowing them to focus on other content areas.

While there is increasing recognition of microcredentials, **there is still a need to shift perceptions around alternative pathways into technology.** Leanne explains there are some employers, parents and peers who consider microcredentials as less valuable than a degree. Yet this perception is slowly changing, particularly as the concept of **lifelong learning journey** creating space for microcredentials to be used to 'top up' training or enable specialisation in specific digital skills. Leanne suggests that there is a need to educate parents and careers advisors on the use of microcredentials so they can be more informed to guide the next generation of tech talent.

AI is a key focus for future training needs and presents an exciting opportunity to tailor the user's learning journey with content based on their needs and capabilities. Leanne recognises this can significantly improve the outcomes coming from digital education to help build skills across the Australian workforce.

> "I'm really excited about the future of education and the role AI can play in creating personalised learning plans and recommending credentials tailored to training needs. Salesforce has great opportunity to be leading in this area."
>
> **Leanne Bamford Barnes**
> Salesforce Ecosystem Skills Manager, ANZ

Future trends for microcredentialing

- Tertiary training collaboration
- Skills orientated training lens
- Shifting perceptions through storytelling
- Employer-provided pathways
- AI opportunities to transform training

Actions to revitalise Australia's sources of tech talent

Earn While You Learn

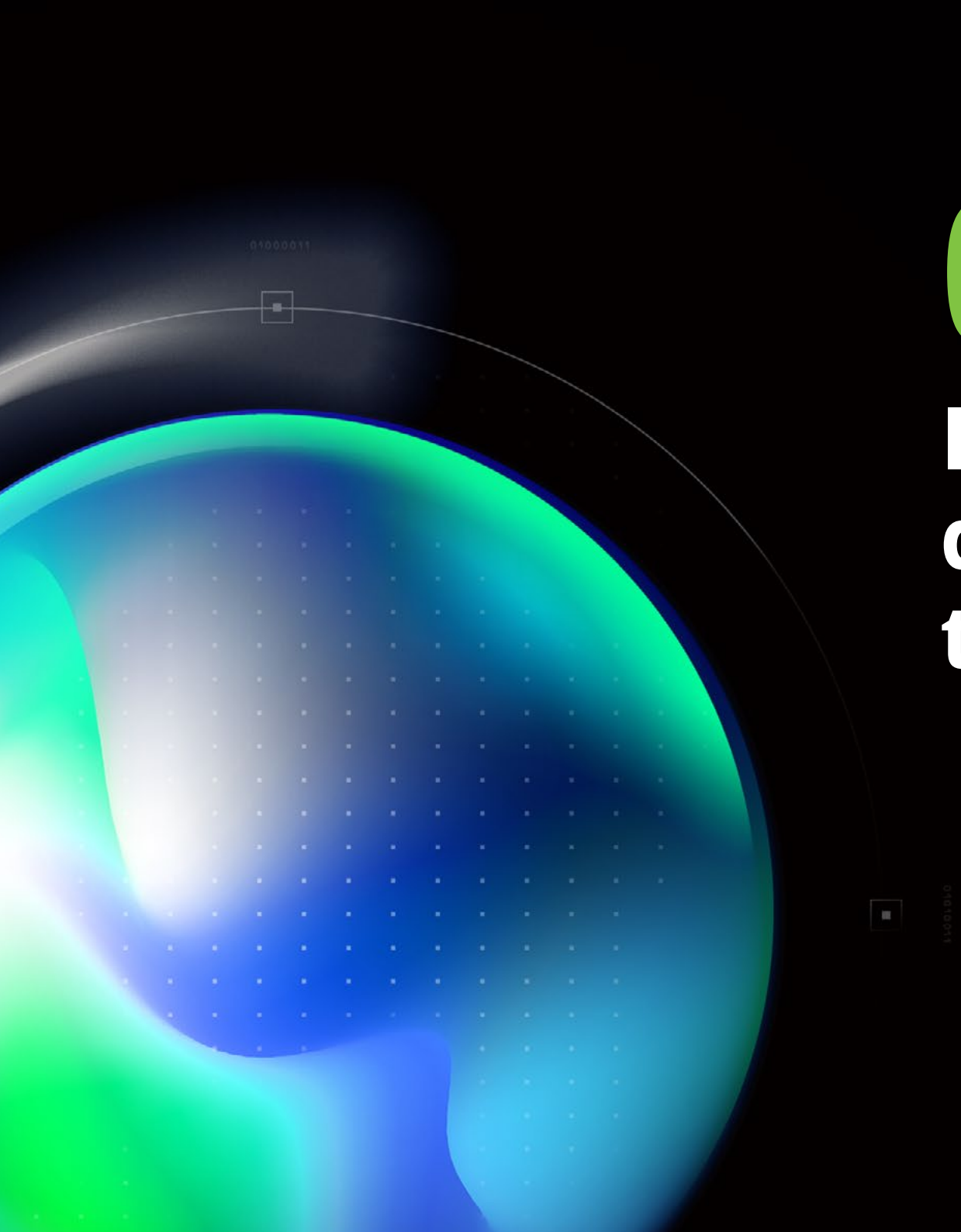
Reduce the barriers to reskilling by paying workers a wage subsidy ($24,000) to gain technology skills while working, with the onus shared between business and government. Half of workers considering a move into the tech sector report a lack of digital skills as a barrier to changing career, which this initiative could alleviate.

Paid work placements for students

Set a new government target for technology graduates supported by increasing the number of paid work placements included in tertiary IT qualifications. This will encourage more students to consider technology qualifications, increase job-readiness and provide students insights about what a tech career can look like.

Skills certification for migrants

Reduce barriers for the tech workers born overseas who come from outside the skilled migration program through recognition schemes to certify existing skills in our migrant workforce. The Australian Government is currently reviewing the skilled migration program, which has been a key source of tech talent for Australia. Any reforms should consider how best to position Australia as a leading destination for technology talent.



03

Increasing diversity in the tech workforce

Strengthening workforce diversity is key to growing the technology workforce

Workforce diversity has not significantly improved for specific groups

This edition of ACS Australia's Digital Pulse provides an update to over a decade of data on diversity in the Australian technology workforce.

The Australian tech workforce **has higher levels of cultural diversity** when compared to the Australian workforce. In the tech sector, 49% of employees were born overseas, compared to 38% in the broader Australian workforce. Additionally, 36% of tech workers speak a second language, which is 7% higher than the national average. **The technology sector also has greater levels of representation when it comes to neurodivergence (10%) and sexual orientation other than heterosexual (11%).**[1,2]

Despite this important progress, the technology workforce has **lower levels of representation across gender, age, disability and First Nations representation compared to the Australian workforce.** In the past 10 years, the share of women in the tech workforce has grown by only 1.2% while First Nations representation has increased by just 0.28%.

Persistent structural and cultural barriers are likely preventing underrepresented groups from entering the technology sector and impacting their ability to have successful careers in tech. These barriers can range from unconscious bias in recruitment and hiring processes, a lack of representation and visible role models in decision-making positions, unequal pay and a lack of supportive policies for underrepresented groups in technology workplaces.[3]

Addressing the barriers to increased diversity must be an immediate concern for the sector, with **64% of technology workers considering improving diversity representation in the workforce as an industry priority.**

There are significant economic benefits associated with strong workforce diversity. **Businesses with higher levels of workforce diversity had 19% higher revenue from new sources** and experience increases in productivity.[4] Modelling by Deloitte Access Economics for ACS Australia's Digital Pulse found that increasing the share of women, people aged 55 years and over and people with a disability in the tech workforce would lead to over $21 billion in additional economic activity over the next 20 years in net present value terms (NPV).[5]

It is important to recognise the forms of diversity explored above. There are many other diversity groups and ways to measure workforce diversity. This report has sought to include those diversity groupings that are most commonly measured in workforce planning and diversity efforts. It is also essential to recognise that many employees who identify with a particular diversity definition are likely to also identify with other diversity definitions. The intersectionality of diversity creates overlapping and interdependent systems of discrimination or disadvantage.

	TECH	AUS	TECH	AUS	
Female	30%	48%	12%	20%	Aged 55+
Regional	14%	31%	7%	15%	Aged <25
Born overseas	49%	38%	0.6%	1.1%	Has a disability
Second language	36%	29%	10%	7%	Neurodivergent
First Nations	0.8%	2.3%	11%	10%	Sexuality

Snapshot on gender diversity in the tech workforce

Addressing leadership and pay gaps is central to increasing representation

The tech workforce has performed poorly when it comes to increasing the share of women working in the sector. In 2023, the 276,000 women in the tech workforce made up only 29% of the overall tech workforce.[6] This share is substantially lower than the 44% of women employed in professional industries, and 48% of the total workforce. In the last ten years, the share of women in tech has increased by only 1.2%, suggesting significant barriers to participation remain.

The women that work in tech face significant leadership and pay gaps. Only 43% of women in the tech workforce are in managerial roles, compared to 50% of men. The average pay gap between men and women is $12,600 per year when adjusted for seniority, representing a 12% wage gap.[7] Other research in the industry reveals similar insights, including a 2024 Professionals Australia Report, which found a 14% gender pay gap and higher rates of harassment experienced by women in tech.[8]

Despite these barriers, recent developments may address these issues. The Workplace Gender Equality Agency has begun to release business specific data on pay and leadership gaps of 5,000 private sector businesses with over 100 employees.[9] This is likely to increase pressure on businesses to address these gaps.

When it comes to the most impactful initiatives for businesses to put in place to promote an inclusive workplace, **diversity policies were considered the most impactful initiative** to promote inclusive workspaces by women in tech. Despite this, less than half (43%) of tech workers say their workplace has a policy in place. Visible signs of support for diverse employees and confidential avenues to safely report harassment were also highly ranked by female tech workers.

More broadly, the increasing recognition of alternative pathways into technology careers could help more women transition into the sector. Consultations with microcredential providers indicated self-paced learning options that maximise a flexible approach to retraining can support women to re-enter the workforce or transition to a new career after a period of caring.

The expansion of female-led tech start-ups provides a further entry point into the sector. In 2023, 27% of Australian start-ups were founded by women, a substantial increase from 16% in 2014.[10] Despite this, access to capital remains a persistent barrier as private funding is disproportionately awarded to solely male founding teams, with only 4% of private sector funding being allocated to all female founding teams and 18% allocated to mixed gender teams in 2023.[11]

The above analysis focuses on women in the technology workforce. While our survey of the tech workforce found 0.5% of tech workers preferred to use non-binary or other terms to describe their gender, further analysis was not undertaken based on this cohort due to small sample size.

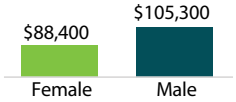
Challenges for women in technology

43% of women are in managerial positions compared with 50% of men

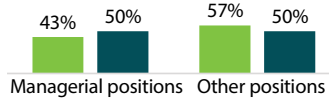
$12,600 average pay gap between men and women in technology, adjusted for seniority

2 in 3 women technology workers have experienced discrimination, compared to 58% of men

Average salary among tech workers



Share of women in managerial roles



Source: Deloitte workforce survey (2024), n=1,035

Promoting diversity in the workplace

Top 5 initiatives ranked as promoting inclusive workspaces by women in tech

- A diversity policy
- Flexible working arrangements
- Visible signs of support for diverse employees
- Promoting an internal network for diverse employees
- Confidential avenues to safely report harassment

Source: Deloitte workforce survey (2024), n=508

Case study: Actions for tech employers trying to create a more diverse workforce

The Workplace Gender Equality Agency (WGEA) helps accelerate change towards gender equality by providing evidence-based insights and practical enabling support for businesses looking to create change in their organisations. Employers with 100+ employees are required to report gender equality data to WGEA each year. In 2024, WGEA published employer pay gaps publicly for the first time.

Penelope Cottrill, Executive Manager of Education and Research at WGEA explains that we know why there are so few women in tech – it's largely a talent pipeline issue, with women underrepresented from education through to every career level in technology. There is also some evidence of discrimination in hiring. Technology employers recognise the challenge, as well as the opportunity offered by more diverse teams. The digital skills gap is leading employers to think differently about how to attract, develop and keep women in their talent pool.

Getting more women into tech partly involves challenging entrenched stereotypes around what it looks like to be a technology worker to something that resonates with a broader audience. Highlighting the breadth of opportunity available within the technology sector – including the ability to solve social and global challenges – can help to drive change. One study by the Behavioural Insights Teams found that pitching the breadth of opportunities in digital can help to reduce gender difference in technology as a career option.[12]

To improve the gender balance of their tech workforce, employers must also look at de-biasing their recruitment and promotion processes. Employers can also think more creatively about succession and workforce planning by looking at lateral moves into tech roles for women who have transferable, or complementary skills sets. For example, Westpac implemented a program to provide women in its organisation additional training across cybersecurity, data and cloud to help support their transition to technology roles.[13]

Keeping women in tech roles is also essential as women leave tech roles at a 45% higher rate than men.[14] Often this means ensuring there is an inclusive and flexible culture, and that parents are supported within tech workplaces. Penelope describes that advertising and implementing family-friendly policies is important, such as normalising flexible working patterns and take up of parental leave. In particular, it is important that men and senior leaders are encouraged to utilise these entitlements because it shapes the norm of the organisation.

> "Employers can attract more diverse candidates at the entry level by reframing why you should work in technology. Technology is part of solving all the problems you care about."
>
> **Penelope Cottrill**
> Executive Manager of Education and Research, WGEA

Evidence-based actions to drive change

Challenge stereotypes: Redefine what it means to be a tech worker, and what a career in tech looks like.[15] Employers can critically examine what is needed for a role and look for "atypical" talent within their own organisations, with transferrable skills.

Remove bias from hiring decisions: Review job advertisements – the language used, skills required and flexible work policies advertised – to ensure they are free from bias. Consider using gender-balanced shortlists, behaviour-based job requirements and hiring in batches to overcome unconscious biases in decisions.[16, 17]

Leadership Accountability: Hold leaders accountable for driving gender equality outcomes. Setting targets with clear mechanisms for accountability (i.e., consequences for non-achievement) are more likely to be achieved and can be integrated into performance rating and remuneration decisions.[18]

Flexible Work Culture: Offer flexible working by default in job advertisements to help attract and retain diverse talent. Encouraging all workers to utilise flexible options can be achieved by making flexibility available for everyone, having gender equitable parental leave policies and having leaders set an example.[19, 20, 21]

Snapshot on cultural diversity in the tech workforce

Growing cultural diversity among the tech workforce

There are many ways to think about cultural diversity. The share of people born overseas is one definition, which has increased from nearly 41% in 2011 to 49%. This is higher than the Australian workforce more generally.[22]

Another measure of cultural diversity is the identified cultural background of the person. There is a wide range of self-identified cultural backgrounds amongst the technology workforce. The most common ancestry for migrants is English (37%), followed by Filipino (13%), Irish (12%) and Indian (9%).[23]

Cultural diversity in terms of speaking a language other than English is also prevalent in the tech workforce. Thirty-six percent of technology workers speak a language other than English, which represents a 9% increase since 2011 and is 7% higher than the broader Australian workforce.[24]

However, migrants and people from a diverse cultural background do face barriers when they join the technology workforce in Australia. The average pay gap between migrants who arrived in Australia less than 5 years ago is $4,600 per year.* While analysis of the migrant wages shows that this pay gap does diminish for migrants who have been working in Australia longer, more support is needed for more recent arrivals to the tech workforce.[25]

Recent migrants are 1.2 times more likely to face discrimination compared to Australian-born workers in the tech industry.

Forms of discrimination include undervalued contributions in the workplace (29%), insufficient opportunities for a promotion/ pay rise (27%), and lower pay (27%), all of which negatively impact skilled migrant retention rates.

To foster a more inclusive workplace, 26% of recent migrants would like to see more visible signs of support for diverse employees, while 25% would prefer their workplace to introduce a diversity policy. Other initiatives prioritised by migrants include increased internal employee networks, and transparency during the promotion process.

Once in the technology workforce, migrants continue to face underutilisation. Around 91,000 migrants working in the technology workforce report being underutilised, and would prefer to work longer hours or complete tasks that are more suited to their skill level.[26]

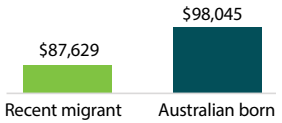
* A small sample size (n=84) for recent migrant tech workers may impact the accuracy of results

Challenges for recent migrants in technology

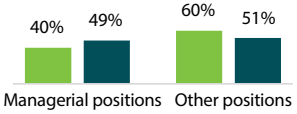
$4,600 average pay gap between recent migrant and Australian-born tech workers, adjusted for seniority

77% of recent migrant technology workers have experienced discrimination, compared to 63% of Australian-born tech workers

Average salary among tech workers



Share of migrants in managerial roles



Source: Deloitte workforce survey (2024), n=1,035

Promoting diversity in the workplace

Top 5 initiatives ranked as promoting inclusive workspaces by recent migrants

- Visible signs of support for diverse employees
- Flexible working arrangements
- A diversity policy
- Transparent and fair promotion criteria
- Promoting an internal network for diverse employees

Source: Deloitte workforce survey (2024), n(migrants)=282, n(recent migrants)=84

Snapshot on age diversity in the tech workforce

Age diversity can unlock creativity and innovation

Despite having lower levels of age diversity compared to other industries, the share of **technology workers aged 55 and over has shown modest growth since 2011** (4%), representing 44,000 additional workers.[27] The share of older workers in the technology sector is increasing at a similar rate compared to both professional services and the Australian workforce more broadly.

The share of tech workers aged under 25 has decreased by 4 percentage points, potentially demonstrating the need to promote tech to Australian youth.[28] While this decrease may be a result of formal education requirements for roles, the technology workforce still has lower levels of younger workers compared to professional services (8%) which has similar requirements for tertiary qualifications.

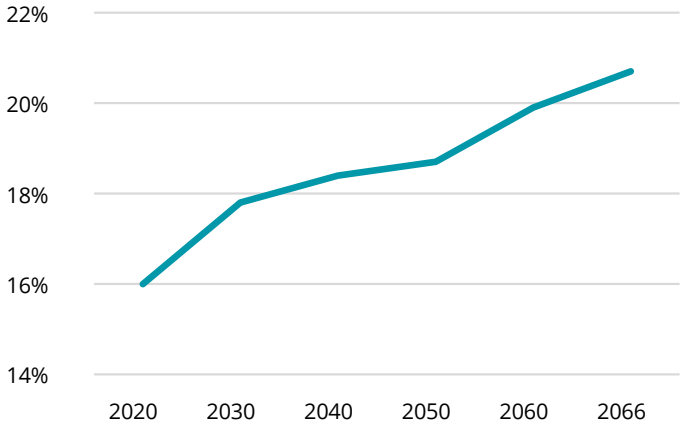
Increasing age diversity is a central driver to unlocking creativity. There are currently **five generations of people at work**, and each brings a unique range of perspectives, skills and experience. By harnessing the combined energy, expertise and knowledge of different generations, greater levels of creativity, innovation and more effective problem solving can be achieved, generating significant benefits for organisations and individuals.

Older workers in particular possess significant experience and understanding of how systems and practices connect with emerging technologies. Organisations such as PrimeL are tackling age discrimination by placing later-career Australians in technology roles with employers and government, leveraging flexible employment options such as short-term contracts, mentoring programs and technical returnships.[29]

These approaches will be even more important in the coming decades, with Australia's workforce ageing. Currently, 1 in 6 Australians are aged 65 or over (16%) and this proportion is expected to increase over the coming decades, up to 23% of the population by 2066.[30] As cost of living pressures continue to rise, and with advancements in healthcare giving people a healthier ageing experience, we are likely to see more people choosing to work into their 70s.

Diversity policies are consistently regarded as the most effective strategy for promoting inclusive workspaces according to 38% of tech workers under 25 and 28% of people over 55 years old. Flexible working arrangements were more highly regarded by tech workers over 55 years (18% compared to 7% of under 25s), while visible signs of support for overall workforce diversity in workplaces were more valued by younger cohorts (19%).[31]

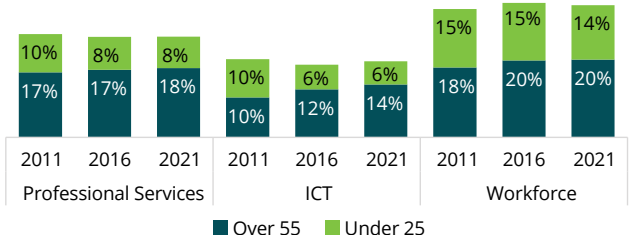
Projected share of Australian population over 65



Source: Australian Institute of Health and Welfare (2023)

Age diversity by industry

Share of employees under 25 and over 55 across industries



Source: ABS Census data (2021)

Promoting age diversity in tech

Top 5 initiatives ranked by tech workers as promoting inclusive workspaces

Under 25:

- A diversity policy
- Visible signs of support for diverse employees
- Confidential avenues to safely report harassment
- Promoting an internal network for diverse employees
- Flexible working arrangements

Over 55:

- A diversity policy
- Flexible working arrangements
- Confidential avenues to safely report harassment
- Visible signs of support for diverse employees
- Return-to-work policies

Source: Deloitte workforce survey (2024), n(under 25)=164, n(over 55)=194

Snapshot on people with a disability and neurodivergence in the tech workforce

Improving accessibility and eliminating discrimination are key to promoting inclusion

According to the Census, the proportion of technology workers needing assistance with core activities has grown from 0.4% in 2011 to 0.6% in 2021. This is low compared to the national workforce at 1.1%.[32] When expanding the definition to include all types of disability regardless of assistance needs, survey results indicate that 1 in 10 (11%) technology workers have a disability, including non-apparent disabilities.[33]

A lack of inclusivity in technology workplaces may be preventing more workers with a disability from entering the sector. The vast majority of workers with a disability, 82%, have experienced discrimination in the workplace compared to 60% of tech workers without a disability. The most common forms of discrimination experienced by workers with a disability were not having their contributions and capabilities recognised as equal to others (39%) and being paid less than someone in an equivalent position (34%). Physical workplace accessibility is also a concern, with 1 in 5 tech workers with a disability reporting their workplace has insufficient accessibility accommodations.

These barriers appear to have financial implications for the individual. Workers with a disability are paid on average $10,400 less, and $7,300 less when adjusting for job position.*

The initiatives considered most effective in promoting workplace inclusivity by technology workers with a disability include a diversity policy (37%), visible signs of support (19%) and promoting a network for diverse employees (14%).

Survey results indicate that the technology workforce in Australia has a relatively high proportion of neurodivergent workers at 10%, compared to 6% in professional industries and 8% in other industries.

Despite this representation in the workforce, neurodivergent tech workers are nearly 1.7 times more likely to have experienced discrimination in the workplace (86%) compared to neurotypical tech workers (59%). Neurodivergent workers were most likely to have experienced a lack of support from leadership (35%) and insufficient opportunities for a promotion and pay rise (35%).

These barriers manifest in a significant average pay gap between neurodivergent and neurotypical tech workers of $18,100, and $16,200 when adjusting for job position.* Neurodivergent tech workers are also less likely to be in senior positions, with 41% in managerial roles compared to 46% of neurotypical tech workers.

Neurodivergent respondents were more likely to be younger, and as a result some of the pay gap can be explained by time in the workforce. However, a pay gap of $9,200 persists when adjusting for age, suggesting additional barriers exist.

To promote workplace inclusivity, neurodivergent tech workers valued a diversity policy (31%), a network for neurodivergent employees (16%), and visible signs of support (15%) as the most effective initiatives.

* Caution should be taken when interpreting the results due to smaller sample sizes for tech workers with a disability (n=114) and neurodivergent tech workers (n=103).

Challenges for people with a disability in technology

$7,300 average pay gap between tech workers with and without a disability, adjusted for seniority

$16,200 average pay gap between neurodivergent and neurotypical tech workers, adjusted for seniority

82% of neurodivergent tech workers experienced discrimination in their workplace

86% of disability tech workers experienced discrimination in their workplace

Average salary among tech workers

Source: Deloitte workforce survey (2024), n=1,035

Promoting diversity in the workplace

Top 3 initiatives ranked as most impactful in promoting inclusive workspaces

Tech workers with a disability

- A diversity policy
- Visible signs of support for diverse employees
- Promoting an internal network for diverse employees

Neurodivergent tech workers

- A diversity policy
- Promoting an internal network for diverse employees
- Visible signs of support for diverse employees

Source: Deloitte workforce survey (2024), n(disability)=114, n(neurodivergence)=103)

Snapshot on First Nations peoples in the tech workforce

The tech workforce has lower First Nations representation than all other industries

First Nations Australians are underrepresented in the technology workforce. In 2024, an estimated 6,800 workers were First Nations peoples.[34] In the broader workforce, First Nations peoples account for 2.2% of workforce.

In tech, they account for just 0.8% of the workforce, the lowest proportion among all other industries.[35]

The number of First Nations peoples in tech, 6,800, represents a doubling of the number over the decade to 2021. The technology occupations experiencing the greatest growth in First Nations employment are Software and Applications Programmers, Database and Systems Administrators, and ICT Security Specialists, ICT Support and Test Engineers. However, representation remains well below 1% in all these occupations.[36]

The number of First Nations students commencing IT university study has also doubled since 2014, with around 200 students.[37] Despite this growth, **there is a disconnect between studying IT and working within the sector for First Nations students.** Only 21% of First Nations students who study a university or vocational qualification in IT end up working in the field, compared to 46% of non-Indigenous IT students. This is the largest gap across all subject areas.[38]

Alternative pathways into the tech sector will be vital to improving opportunities for First Nations peoples in the sector. Microsoft and the Queensland Government have partnered on the *First Nations Digital Careers Program* to support up to 300 paid employment placements over three years for First Nations peoples interested in beginning or transitioning to a digital career.[39]

While low representation of First Nations peoples in the sector is a serious concern, there are broader issues related to First Nations access to engagement with technology. **According to the 2023 Australian Digital Inclusion Index (ADII) there is a 7.5% gap in digital inclusion between First Nations and non-Indigenous Australians**.[40] The cybersecurity industry has indicated that inadequate access to digital infrastructure in First Nations communities and poor digital literacy hamper efforts to attract, train and retain First Nations peoples into the cybersecurity workforce. Thus, improving access and inclusion opportunities for First Nation peoples will be foundational for increasing their representation in the tech workforce.[41]

The Australian Government has made a commitment to ensure that First Nations peoples have equal levels of digital inclusion by 2026.[42] The *First Nations Digital Inclusion Plan* (2023-26) identifies that **working with the private sector to develop pathways for First Nations peoples to pursue emerging opportunities in digital technology** as a priority.[43]

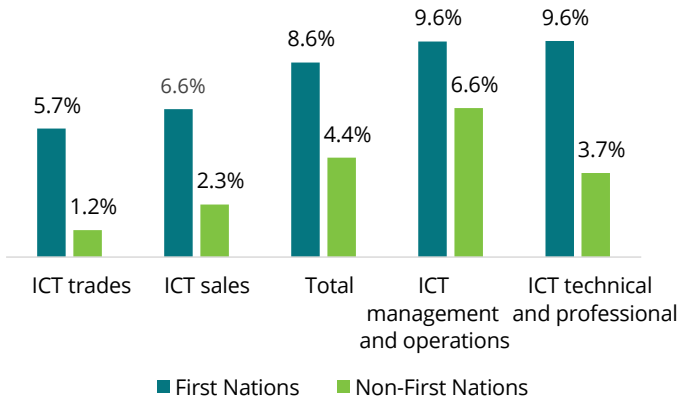
Regional tech workers

0.8% of technology workers are First Nations peoples, the lowest of all industries

21% of First Nations students who study a university or vocational qualification in IT end up working in IT

7.5% gap between the digital inclusion of First Nations and non-Indigenous Australians according to the 2023 ADII

Annual growth in technology employment by occupation groups, 2011 - 2021



Source: ABS Census data (2021), ABS Census data (2011), Deloitte calculations

Snapshot on regional diversity in the tech workforce

Regional hot spot analysis and change over the last ten years

Over the last ten years, Australia's regional technology workforce has grown at 6% annually to reach 123,000 in 2023.[44] The share of tech workers grew from 2% to 3% of the regional workforce.[45] This growth is partially attributable to COVID-19, which has changed remote work patterns.

There is strong demand for tech workers in regional areas, particularly in high-growth regional areas. Data shows that demand for tech employees has doubled in the last year for Western Australia (Pilbara and Goldfields), as well as Launceston and North-East Tasmania.[46]

Queensland's Gold Coast and Sunshine Coast have the highest concentration of technology workers in regional Australia. Newcastle and Illawarra have the most tech workers in regional NSW. Other regional hotspots that we have identified include the South-East and Barossa in South Australia, Launceston in Tasmania, and Bendigo in Victoria.

The data also highlighted the concentration of particular tech occupations in certain regions, with an increased concentration of graphic designers in specialised tech industry hubs in the Gold Coast and Sunshine Coast.[47]

Small businesses and regional economies will require technology workers with more general skillsets applicable to a range of functions, rather than deep specialisations.

Growing the tech workforce in regional areas requires targeted action. Inadequate infrastructure and lower levels of digital inclusion likely hinder regional migration and disrupt tech growth in regional areas. Regional areas lag behind capital cities for digital inclusion, and improvements to access and affordability have been insufficient to effectively close the gap. In 2023, the ADII index was 71% for inner regional and 66% for outer regional areas, compared to 75% for major cities.[48]

Areas that have received investment into digital infrastructure have experienced higher growth in tech workers. The Gold Coast, Sunshine Coast and Murray have become more digitally inclusive at a faster rate and have also experienced greater growth in tech workers.

While regional tech workers have the advantage of a lower cost-of-living and lower housing costs, this is also reflected in their own pay packets – with regional tech workers earning $15,400 less per year than those employed in capital cities.[49]

Regional tech workers

14% of tech workforce located in regional areas

12% digital inclusion gap between outer regional and metropolitan areas according to the ADII

$15,400 average pay gap between regional and metro tech workers, adjusted for seniority

Regional tech specialisations

Sunshine Coast: Multimedia Specialists and Web Developers (4.4x the national share)

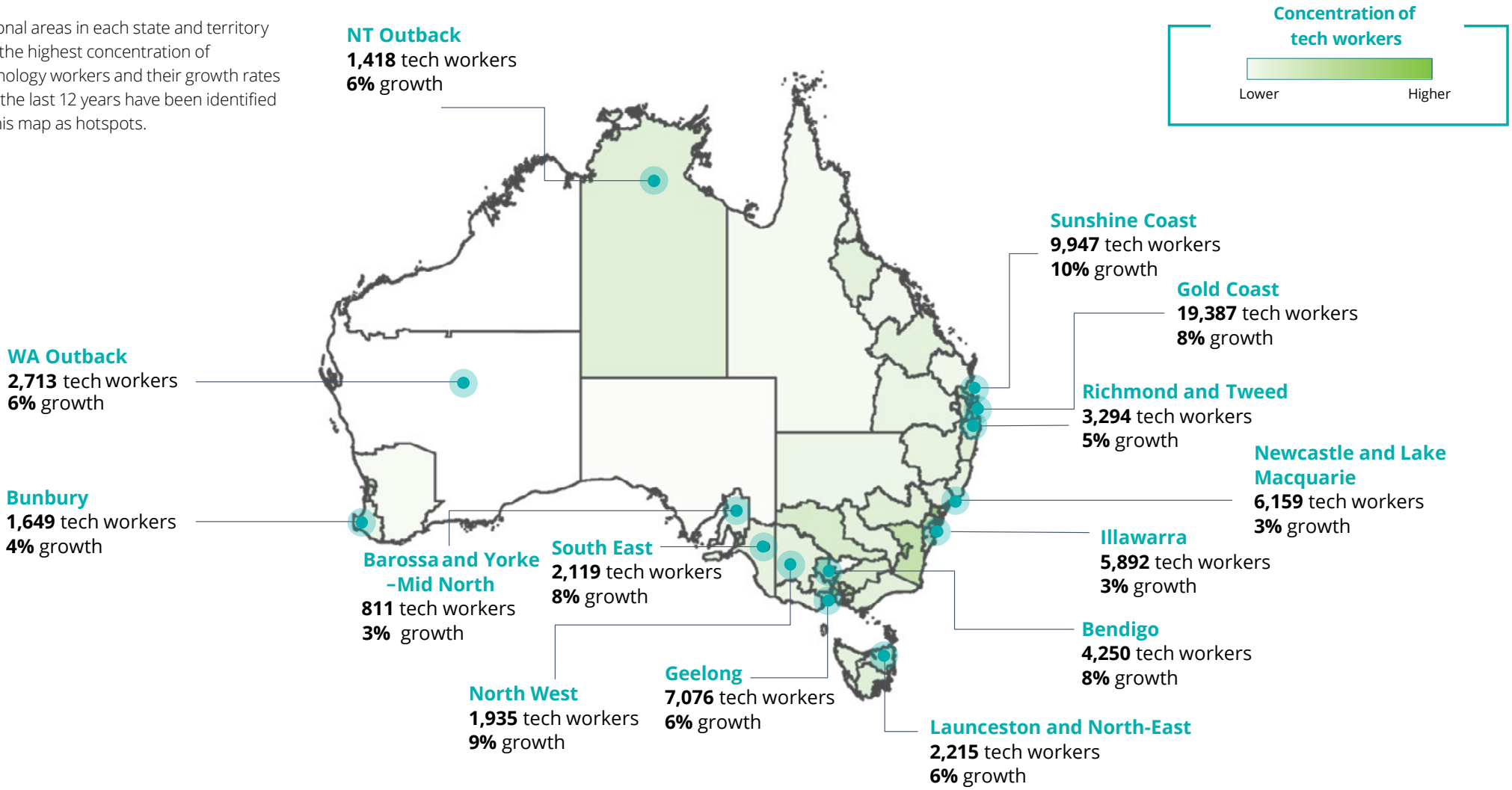
Coffs Harbour: Software and Applications Programmers (1.3x times the national share)

Townsville: ICT trainers (9.3x times the national share)

Geelong: ICT trainers (4.0x the national share)

Regional hotspots for technology workers

Regional areas in each state and territory with the highest concentration of technology workers and their growth rates over the last 12 years have been identified on this map as hotspots.



Source: ABS custom data request (2024), ABS Census data (2016 and 2021), Deloitte analysis

Case study: Developing digital skills and building tech talent at Commonwealth Bank of Australia

Australia's largest bank employs more than 49,000 people and is building its tech talent capabilities by upskilling and re-skilling its employees.

CBA relies on skilled technology talent across a range of teams to remain an innovator in financial services and provide high-quality services for customers. Jane Adams, Executive General Manager, Human Resources, Technology and Operations, says CBA has been focused on investing in its people's skills to do the most impactful work for customers.

The high demand for skills in areas such as cybersecurity and AI led CBA to look inwards for solutions and introduce initiatives that foster skills development internally and support skills development across the broader workforce and industry. As part of what it sees as a collective accountability to help build Australia's future talent pipeline, CBA also collaborates with industry and government to build future skills for school students, support small businesses to build foundational digital skills, and to deepen and explore new partnerships with tertiary education. As a member of the NSW Digital Skills and Workforce Compact, CBA is also involved in programs such as Cyber Wardens Program, which builds cyber capabilities in small businesses.

Building a culture of continuous learning and encouraging employees to lead skills-based careers helps to create an agile and future-ready workforce. CBA runs several upskilling initiatives throughout the year, including CloudUp for Her, a flexible 12-week training program provided to 1,400 women across the organisation at no cost for the participants. Adams explains that the popularity of the program was a surprise and that 900 participants came from areas of the business outside traditional tech roles. Given the success of the program, CBA is looking to create more internal pathways for employees who want to upskill or transition into a technology role.

Reducing barriers to participation and reskilling are effective in diversifying the source of tech talent. The Technology Associates Program removes friction points by providing an alternative entry pathway for tech students and people without formal qualifications who demonstrate aptitude in the area.

> "We've been anticipating the work we'll need our people to do in the future, where we'll see growth and how we prepare our people to be skills-ready. Our focus has been on reskilling and upskilling, strategic hiring and skilling Australia."
>
> **Jane Adams**
> Executive General Manager, Human Resources, Technology and Operations, CBA

Programs for building tech skills at CBA

- CloudUp for Her – a learning program to become an AWS Cloud Practitioner
- Technology Associates Program – alternative entry pathway to a tech career
- Career Transition Program – an entry pathway for people looking to reskill into tech
- Career Comeback – a program to help women re-enter the workforce

Actions to increase diversity in the tech workforce

Create a new Commonwealth grant program worth up to $500,000 for women-led tech start-ups and scale-ups

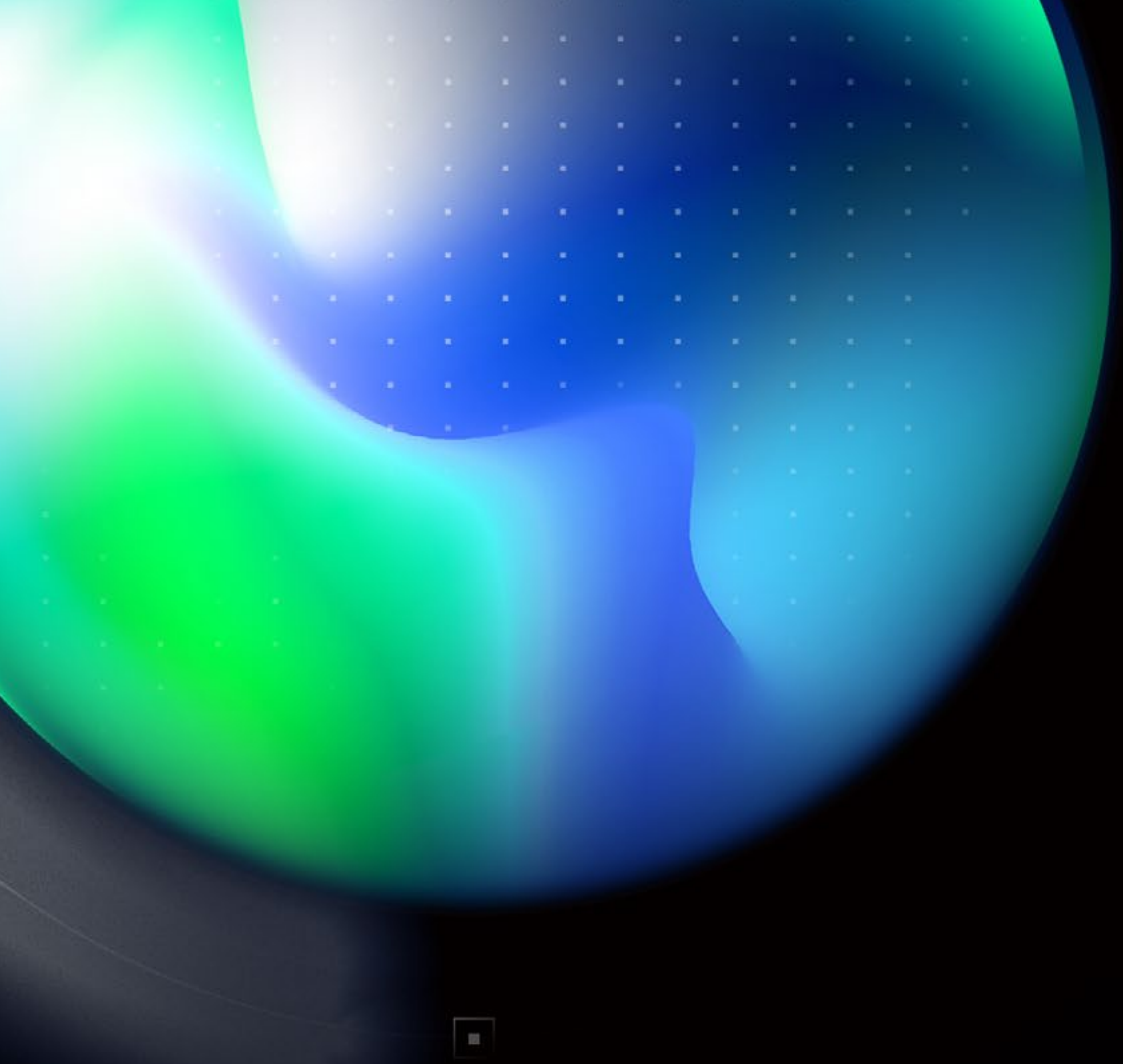
Women-led businesses win only 4% of total private sector funding. Expansion of women-led start-ups and scale-ups could provide another pathway into the sector. There are a number of successful state-based initiatives, which a Commonwealth program could learn from to ensure effectiveness.

Prioritise greater digital inclusion in regional areas

While some regional areas have experienced growth in the digital economy, many areas have remain unchanged. Greater investment in digital infrastructure and the development of regional skills hubs could attract more people into the digital workforce and contribute to regional economies and communities. This initiative should place a particular focus on better inclusion for First Nations peoples who are more likely to have lower levels of digital inclusion compared with the general population.

Remove unconscious bias in hiring and promotion decision-making

Significant leadership challenges and pay gaps for some cohorts persist within the tech workforce. Tech employers should commit to educating decision-makers on best practice techniques to address unconscious bias and implementing training, development and processes to attract, retain and develop a more diverse and dynamic workforce.



04

Engaging the next generation of tech talent

Growing the long-term pipeline of young people into tech

A lack of information and sexist attitudes amongst Australian parents may be holding back future talent

There is a lack of interest in tech education or careers among the school-aged students. Only 1 in 10 school-aged young people are interested in technology careers, with boys more than four times as likely to be interested than girls.[1] Efforts to encourage interest to date have concentrated on shifting student awareness and preferences with the idea of exposing children and young people to tech opportunities earlier in their schooling.

However, research has shown that parents and carers have significant influence and can act as a catalyst or a barrier to a young person's interest in pursuing a particular study and career path. Three quarters of surveyed parents believe they have influence over their children's career decisions, and **62% would encourage their child to pursue a technology career.**[2]

Tech is highly recommended by many parents as a career option: a career in tech was voted as third most preferred by parents for their children, ranked in the top three by 42% of parents after professional careers (62%) and healthcare (45%). Job security is consistently cited as the main reason for encouraging children to pursue careers in tech (69%), followed by income (61%).

While almost three quarters of technology workers would support their child to follow their footsteps, **just 52% of parents working in other industries are promoting technology careers to their children.**

This means almost half of parents may not be advocating for their children to explore technology interests, representing a significant missed opportunity.

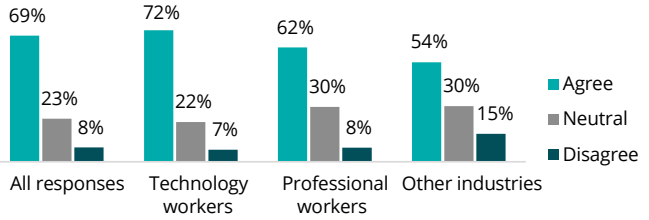
Past generations have relied on school-based career guidance advisors to support young people to choose study and career pathways. However, a shortage of career counsellors in schools, means parents are increasingly involved in helping young people choose between career options.[3] **Parents and carers who do not feel confident to talk about a career path are unlikely to be net promoters of that industry.** Over one third of surveyed parents either do not or are unsure they have the adequate skills or knowledge needed to support their children's decisions.

Parents indicated that information about the skills and capabilities that their children should be developing at each stage of schooling would be helpful (38%). Guidance on the most appropriate education pathways for certain careers was also valued highly (30%). There is a significant opportunity to provide accurate and contemporary information about the industry, training and employment pathways and career options directly to parents and carers, enabling them to better support their children to consider tech as a career option.[4]

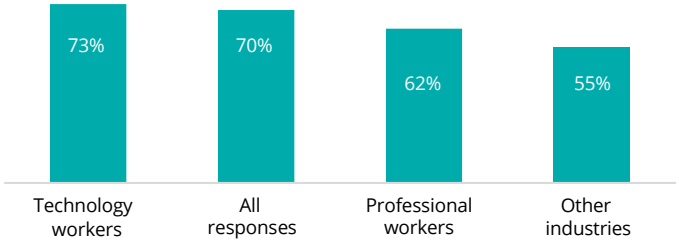
Lingering sexist attitudes among Australian parents are likely to be holding back more women and girls from entering the technology profession. Fathers are more likely than mothers to believe tech careers are better suited to boys (32% compared to 17%) but there is scarcity of evidence to suggest this is in fact the case. Materials, information and experiences that help to shift these perceptions are needed to facilitate the attraction, recruitment and retention of girls and young women into tech.

There is an opportunity to change perceptions about digital education and careers for parents and young people. A digital education equips young people with the skills required for a broad range of applications. Contemporary digital careers extend far beyond traditional STEM and software engineering roles, including commercial, industry and government pathways.

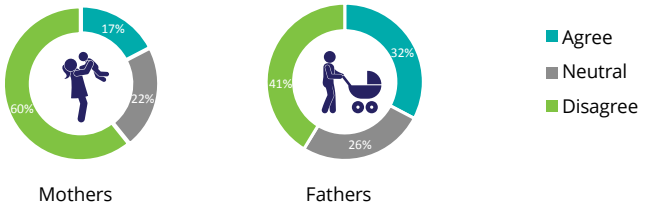
Share of parents who agree they have adequate skills to support children's career decisions



Share of parents who encourage children to pursue tech careers



Share of parents that consider technology careers better suited to boys



Source: Deloitte workforce survey (2024), n=1,157

The right kinds of access to the right digital devices can support skills-based development

Strategic use of tech can aid child development and improve access to education

Access to digital devices matters, but there is a need for parents to provide access in the right context for more skills-based development rather than simply entertainment.

The use of personal digital devices has exploded over the last two decades, with the average Australian home forecast to reach 34 internet-connected devices by 2025.[5] Parents are now raising their children in a world of constant technological immersion.

Access to digital devices can be a powerful educational tool. In particular, digital devices can serve as a tool for parents who have lower confidence levels supporting their child with STEM homework.[6]

Our survey found that 4 in 5 surveyed parents **believe the use of technology in the home or classroom is beneficial for children's development.** This is broadly consistent across parents working in different industries.

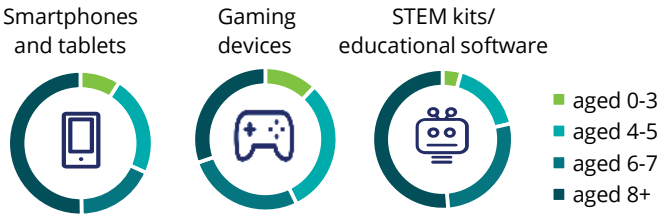
Despite this, almost **90% of Australian parents are concerned about their children's excessive screen time.**[7] There is therefore a need for boundaries around children's use of digital devices to encourage skills-development and safeguards to set them up for success. Age of access to devices and activities undertaken with devices are two such decisions faced by parents.

Technology workers have been known to be more conservative compared to parents in other industries, with half of surveyed parents who are technology workers believing children should not access technologies such as smartphones and gaming devices until age 8.[8]

It is important to note that the preferred age is lower for educational software such as STEM and robotics kits, with the majority believing children should access these from ages 4 to 5 (29%).

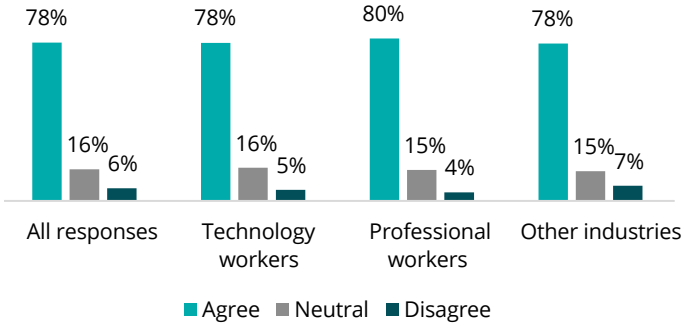
Children of 1,200 surveyed parents spent the greatest share of time using devices for entertainment purposes (33%), closely followed by school study (28%). Children of technology workers spent a higher proportion of their time using tech for personal development purposes (21%) compared to other industries (12%).

Ages parents believe children should access different technologies

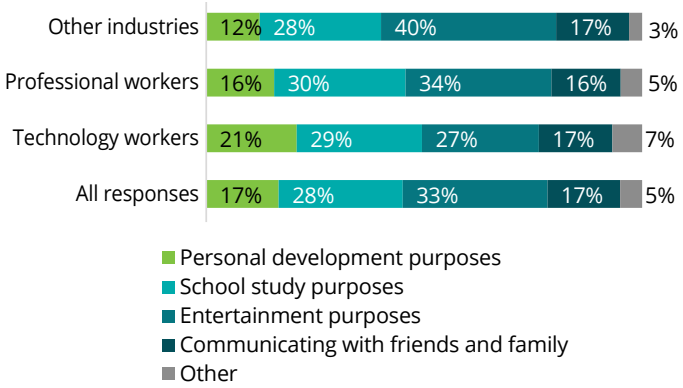


Source: Deloitte workforce survey (2024), n=1,157

Share of parents who believe technology is beneficial for children's development



Share of time children spend on devices by activity and parental occupation



Source: Deloitte workforce survey (2024), n=1,157

Case study: Finding new ways to attract the next generation of tech talent in Mansfield State High School

In South-East Brisbane, the Digital Solutions team at Mansfield State High School are experimenting with innovative approaches to open the world of technology to their students. Results have been impressive, with enrolments in Digital Solutions courses tripling over the past three years.

Driven by a shared vision to offer authentically engaging and useful tech-based learning to all students, the team have prioritised strong relationships within their classrooms and faculty to ensure a cohesive approach to high quality learning. Discovering which areas of tech interest younger students was a critical first step to sparking curiosity and boosting engagement across the school's Digital Solutions courses. Mark Redhead, Head of Students and Performance, and Digital Solutions at Mansfield SHS, explains how taking time to listen to students led to the development of robust and engaging curriculum-aligned courses, that now integrate Esports, robotics, and web app development.

Blending student interests with curriculum requirements has proven highly effective in building students' digital skills. Mark explains that Junior (Year 7, 8, 9) students begin developing computational thinking and coding skills by interacting with familiar interfaces such as Nintendo Switch and Minecraft, before applying and strengthening their capabilities in other applications. The Digital Solutions courses nurture students' creativity through web design, Esports, and 3D printing; connecting with an ever-growing number of the school's cohort. Students who might otherwise have chosen different subjects, are now curious to experience up-to-date technologies and hands-on activities, whilst cultivating a sought-after skill set.

Targeted initiatives have helped ensure female students are part of the growth in the school's Digital Solutions courses. The Digital Girls Program at Mansfield SHS provides students with a range of exciting opportunities, including talks with contemporary industry leaders such as Microsoft and Gameloft, helping prospective students better understand study and career options available.

Mark highlights the critical importance of courses like Digital Solutions to bridge the gap for these 'digital natives' between exposure to tech as a consumer, and becoming creative, effective, and safe producers of digital solutions. Digital Solutions courses can equip all students with real-world skills that will fill the gap in the tech job market, as well as prepare them for ever changing nature of all workplaces.

> "Kids just love the course we provide. In Year 8 they use Esports to set the context for developing pseudo-code; their learning is easy and fun. Before they know it, they're coding in different apps for a range of use cases."
>
> **Mark Redhead**
> Head of Students and Performance, and Digital Solutions, Mansfield SHS

Initiatives to build tech talent at Mansfield SHS

- Gamifying the delivery of Digital Solutions course
- Digital Girls Program providing access to mentors
- MyPath Conference Careers day to understand opportunities
- Industry and community partnerships to career insights

Engaging the next generation of tech talent

Parents information campaign

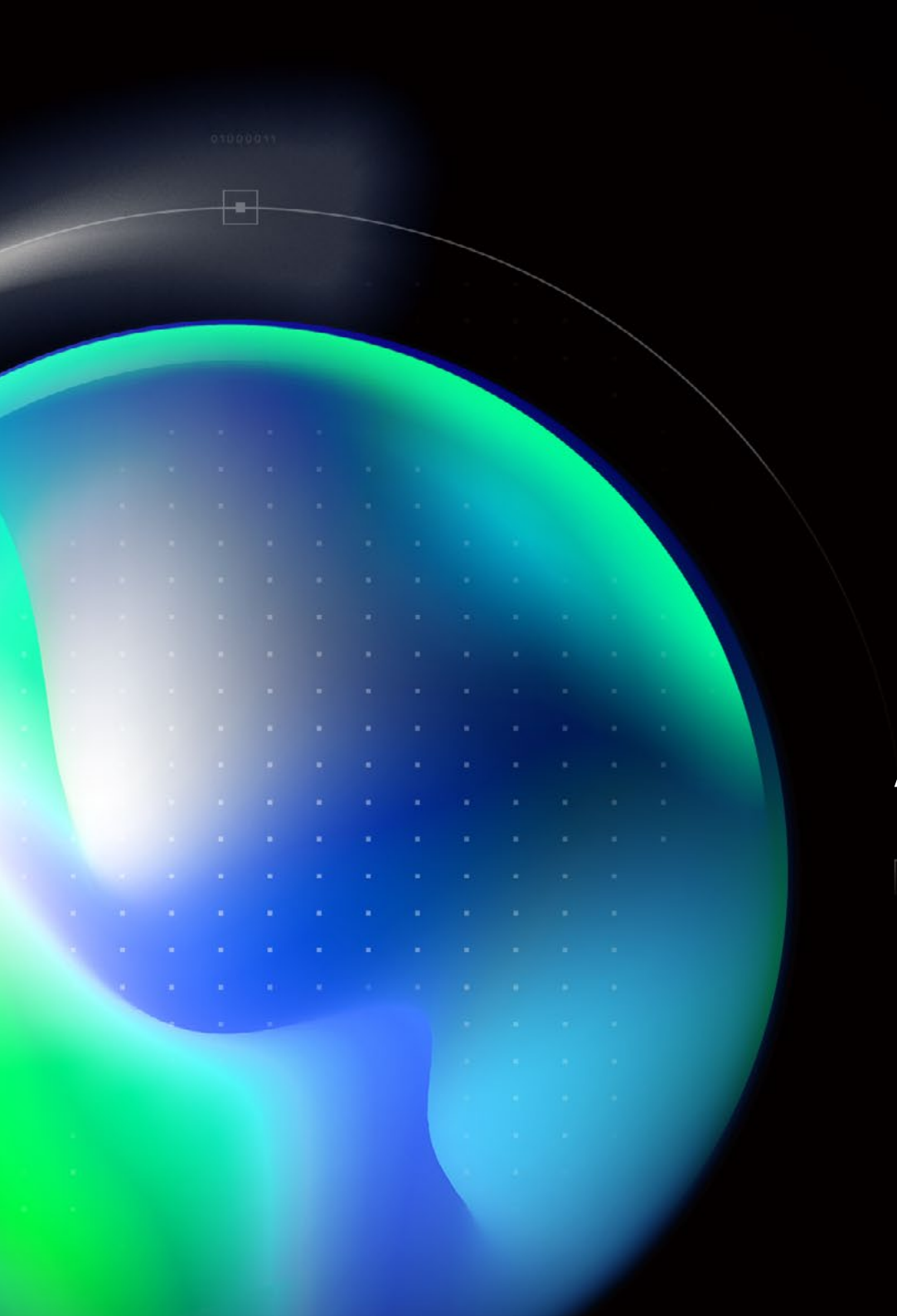
Empower parents with industry-delivered advice, resources and information to build their confidence about careers in tech. This information campaign should specifically target the 52% of parents working across the economy who are not encouraging their children to pursue tech careers.

Greater guidance on use of devices and promoting safe use

Collate and communicate the evidence base around learning outcomes and other impacts related to age of children's access to devices. This initiative should also consider safety and security for children and young people as they explore and use tech.

Mentoring schemes

Target mentoring programs to high school students and students in vocational and tertiary education. The Diversity in STEM Pathways report released earlier this year highlighted the important role of mentoring in encouraging young Australians into STEM careers. Industry presence in education settings and at career events will help to create early connections between industry and future tech talent.



05

Closing Australia's AI gap

Closing Australia's AI gap

Australia is a middling economy when compared to global markets across a range of AI adoption indicators

Gen AI is transforming the Australian economy and the digital skills landscape. Last year's ACS Australia's Digital Pulse found the share of businesses planning to adopt AI is expected to increase from 1% in 2022 to 63% by 2030. Annual investment in AI is expected to increase five-fold between 2022 and 2030.

The Australian workforce is not waiting for this investment to come online. There are already 5.4 million Australian workers using gen AI at work.[1,2] This represents a 20% increase in gen AI usage in less than a year. Technology workers are leading the charge when it comes to gen AI adoption, with over 77% (or 770,000 people) already using gen AI to do work-related tasks, compared to 57% of professional workers. The most common uses of gen AI include creating written content, generating ideas, iterating tasks and conducting research.

Yet there is a gap between gen AI adoption in Australia and other countries and action is needed now to catch up.

- **AI talent:** Even before the emergence of ChatGPT, Australia had the lowest concentration of AI talent when compared to six other developed economies.[3]
- **Workforce adoption:** Australia has the second lowest share of gen AI usage across Asia Pacific, with employees across Asia Pacific locations more likely to be actively developing AI skills by collaborating with colleagues, advancing programming skills or undertaking study associated with AI.[4]
- **Business adoption:** Australian businesses are being left behind other developed countries in terms of AI adoption. Just 15% of Australian workers consider their business to be an innovator or early adopter of gen AI. This is the second lowest out of 13 markets across Asia Pacific.[5]
- **Investment:** Private investment in AI has declined more rapidly in Australia than globally between 2022-23. In 2023, private AI investment in Australia was $0.6 billion, the lowest of 14 global markets and significantly below Sweden ($2.9 billion), Canada ($2.5 billion) and Singapore ($1.8 billion).[6]
- **Governance:** Concerns about the responsible use and accuracy of AI are holding back Australian workers. The majority of tech workers, 55%, do not consider their workplace to have appropriate settings to identify and address ethical issues when using gen AI, signaling the need for further ethics systems and training.

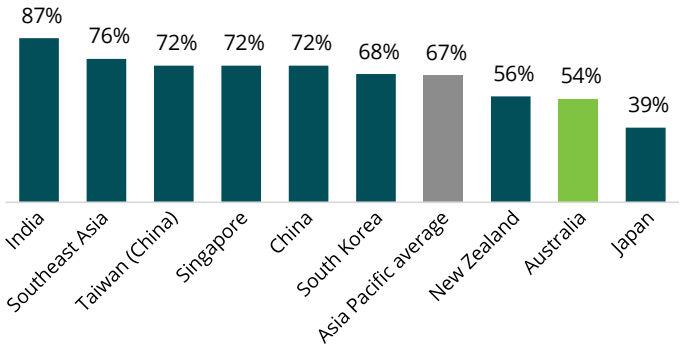
However, Australia performs strongly when it comes **Government AI readiness,** coming second out of 12 markets across Asia Pacific.[7] This relatively high score is based on public sector use of AI and the current policy environment's role in encouraging AI adoption.

The Australian Government is also investing to help close Australia's AI gap in business and public sector adoption. Its new *Policy for the responsible use of AI in government* aims to guide the safe and responsible use of AI in the Australian Public Sector. The 2024 Federal Budget committed a further $101.2 million to support businesses to integrate quantum and AI technologies in their operations.[8] This builds on the work of the National AI Centre (NAIC), established in 2021 to accelerate Australia's AI ecosystem through tailored resources and programs.

It is important that educational curriculums are updated to keep step with emerging AI needs. Workers looking to upskill in generative AI currently rely on employer or industry association-provided training, and some select short course programs by education providers.

Additional action to encourage greater development of workforce skills related to AI will be required for Australia to close the generative AI gap. The UK Government has developed a framework for the adoption of generative AI and self-paced training for government employees, to promote upskilling and adoption.

Proportion of students and employees using gen AI for any purpose



Source: Deloitte Generative AI in Asia Pacific survey (2024)

2nd in Government AI readiness out of 12 markets

6th in AI talent out of 6 markets

7th in workforce adoption out of 10 markets

12th successful business adoption out of 13 markets

14th in AI private investment out of 15 markets

Source: Deloitte Generative AI in Asia Pacific survey (2024)

Insight: The impact of generative AI on public policy makers

"The advent of gen AI is the most disruptive event in technology in the past 30 years. In my entire career in technology, I have never seen the level of anticipation, ambition and apprehension from Australia's senior public servants, like I have since gen AI went live."

Chris Fechner
CEO, Digital Transformation Agency
and Head of the Digital Profession

The changing skill needs for the AI workforce

Employers are increasingly looking for skills to implement AI rather than develop AI solutions

To understand the skill needs required for AI, we have looked to skills listed in demand by employers. Demand for AI skills has exploded in recent years, with the **number of jobs requesting core AI skills such as machine learning, natural language processing and deep learning growing from 300 in 2013 to almost 6,000 in 2023.**[9] While demand has fallen from the highs of 2021, AI is set to become a baseline skill required across the modern workforce.

The top occupations requesting AI skills are data scientists, software developers, data analysts, database architects and computer systems engineers. While these jobs account for almost half (45%) of all AI job advertisements, they have grown by just 6% over the past five years. In fact, the number of data scientist jobs requiring AI has fallen by two-thirds over this period.

Growth in AI demand has been driven instead by a broadening of the types of jobs requiring AI skills. Roles experiencing some of the greatest growth are more general in nature including cybersecurity analysts (243%), product managers (215%) and researchers (193%).

The shift in demand from being concentrated in specialised technical roles to more applied and operational roles suggests that **the AI skills are increasingly needed in the application of this tool rather than concentrated in its development.** This shift from development to application is also apparent in the underlying skills requested for jobs requiring AI. While skills such as machine learning, Python and data science remain some of the most sought-after technical AI skills, their prominence is falling.

People skills such as communication, teamwork, problem-solving and writing are becoming more important for AI roles with their share of total skills requested increasing from 23% to 32% over the past five years.[10]

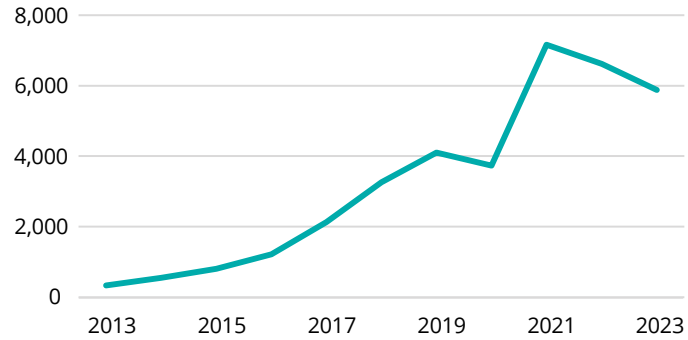
The industries seeking workers with AI skills have also broadened with the share of AI jobs ads in industries including mining, healthcare, and manufacturing more than doubling over the past five years.

Yet AI talent is not spread evenly across all industries. Further research suggests that a **small number of AI employers hire the majority of AI workers.** This creates a risk of an AI skills gaps emerging, limiting the spread of potential productivity gains for Australian businesses, particularly for smaller businesses.[11]

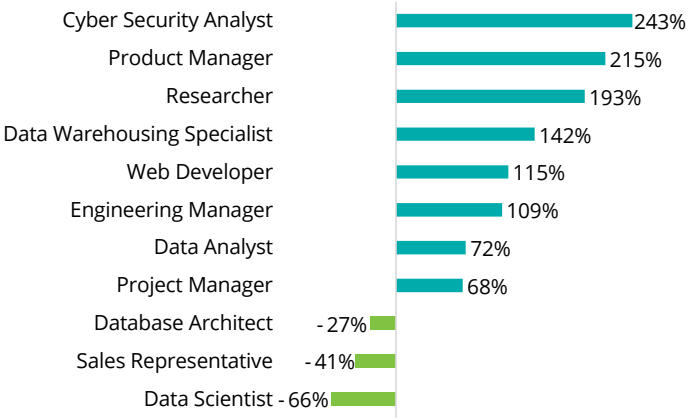
Larger businesses are more likely to have the resources required to train bespoke AI models on their proprietary data, as well as to provide training and guidance for staff. Smaller businesses rely more heavily on vendors and off-the-shelf solutions and have less time and resources to upskill staff.

Our survey found employees in businesses with 20 or more staff are more likely to believe their workplace has appropriate policies and procedures in place to identify and address risks related to AI, compared to businesses below this threshold.[12] Initiatives such as the Australian Government's AI Adopt Centres Program are important steps in the right direction to ensure that the productivity gains of AI are shared by all.[13]

Job advertisements requesting AI skills, 2013 - 2023



Change in number of AI job advertisements by occupation, 2019 - 2023



Source: Lightcast (2024)

Over half of workers do not believe their workplace is equipped to address risks with using AI

Empowering workers to upskill and address risks will be key to realising potential of AI

Lack of skills and risk concerns are holding back Australian workers from engaging with AI tools, with just 45% considering their workplace to have the appropriate policies and procedures in place to deal with ethical issues when using AI. There is a need to **lift skills and risk awareness in order to realise the potential of AI for Australia.**[14]

Technology workers are leading the charge when it comes to AI skills development, with almost two-thirds (64%) proactively seeking to develop AI skills or experience, double the share of workers outside of professional services (32%).

Developing the skills required to use AI in a secure and appropriate way will be critical to encourage business adoption. Proper use of AI is a concern for some, with 2 in 5 technology workers indicating they have encountered an ethical issue when using AI in their workplace. The most common issues included a lack of accountability (43%), outdated information (42%) and poor perceptions from clients and managers (39%).

Despite this, only 45% of tech workers believe their workplace has appropriate settings to address these issues and only 55% feel confident their company will use AI ethically. Proactively engaging with AI risks is key to effectively navigating the challenges.

Employees who are proactively engaging with AI **are twice as likely to feel confident addressing ethical issues,** and twice as confident about suggesting solutions using AI, illustrating the value of developing AI skills for integrating the technology into business operations.

Concerns about the ethical use and accuracy of technology are holding back Australian workers from acquiring further digital skills, with 28% of workers ranking concerns about the ethical use of the technology in their top 3 obstacles.

Beyond relying on employees to prepare for addressing AI risks, **industry and professional associations play a key role in empowering their members to upskill and use AI tools responsibly.** Our survey found that 70% of industry association members and 84% of ACS members have actively sought to develop their digital skills, compared to 36% of workers not affiliated with any industry association.

There is an opportunity for Australian businesses to **establish systems to manage AI risks.** Just 39% of workers know where to find information about identifying and addressing ethical issues when using AI in their work. By providing proactive guidance and formalising processes on ethical AI use, businesses can empower employees to confidently deploy AI in their roles.

Cross-functional teams can help to mitigate bureaucratic delays in AI rollout. Developing greater understanding across management teams can be facilitated by having cross-functional teams work together on policies. Working across functions such as customer service, communications, IT, HR, legal, finance and risk ensures all aspects are considered before deploying AI. **While the technology is new, adopting a pragmatic approach to work with it across organisations is key.**

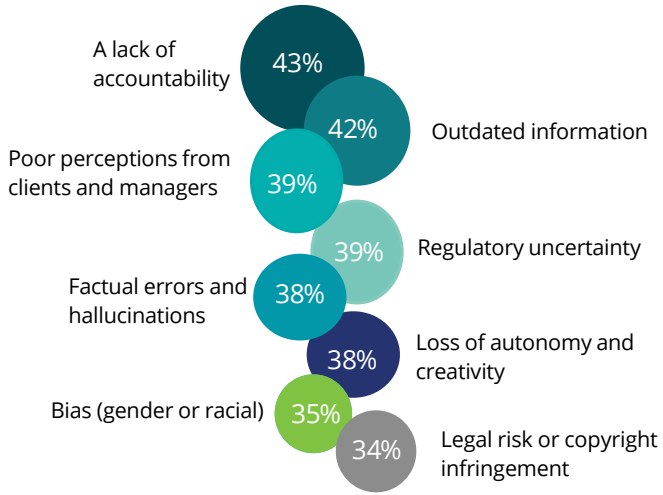
Technology workers' experience with ethical issues using AI

of technology workers **encountered one or more ethical issues** when using AI in their own work

of technology workers think their workplace has **appropriate settings to identify and address ethical issues** when using gen AI, highlighting a need for further ethics systems and training.

Source: Deloitte workforce survey (2024), n=1,035

Ethical issues encountered by technology workers when using AI



Source: Deloitte workforce survey (2024), n=1,887

Case study: Preparing an entire profession for AI at CAANZ

Reframing the role of accountants in response to emerging technologies

Chartered Accountants Australia and New Zealand (CAANZ) is a professional association with more than 138,000 members. CAANZ provides career education for members across the profession, and has expanded its offerings to build the profession's digital capabilities and confidence.

Simon Hann, Group Executive Education and Learning, and Sunny Sirabas, Strategy Lead, explains that CAANZ is responding to developments in generative AI and the implications of these developments for CAANZ members and the profession. Both Simon and Sunny explain that, rather than wait for education providers to update courses in response to generative AI, professional associations like CAANZ have a critical role in helping the profession develop the skills to navigate the changing environment.

CAANZ is **incorporating AI components into the Accounting Capability Framework used to assess the skills of their members** across multiple domains, including technical skills, business skills, personal attitude and leadership attributes. Simon explains that it was a conscious decision to include AI across the four domains as it affects multiple capabilities. This framework can act as a diagnostic tool for both individuals and businesses to identify areas where capabilities can be further developed.

CAANZ is also tailoring support for accountants employed in small- and medium-sized businesses who may not have the same learning and development resources as large accounting businesses. To drive upskilling and readiness among these members, CAANZ launched the CA Catalyst program in June 2024. **Catalyst focuses on practicality and accessibility, with short modules prioritising solutions that can be easily adopted into business practices.** This includes useful applications of AI, best practices, and customisable templates to enable members to use AI tools and implement appropriate ethical guidelines in their business.

CAANZ is also in the process of embedding AI education throughout the CA Program to recognise the broad range of AI applications within the accounting profession. As an **organisation, CAANZ views the emergence of generative AI technology as an opportunity to focus their members on tasks that add more value, and helping to solve problems with their clients.** Investing in digital skills helps equip members to utilise gen AI tools for success in their business while establishing systems and processes to prevent, identify and address risks.

> Gen AI has given us the opportunity to support our members to focus more on higher value add tasks – less compliance-type work and more advisory-type work. It's a good opportunity to reframe what accounting is.
>
> **Sunny Sirabas**
> Strategy Lead, CAANZ

Strategies to support digital skills in accounting

- Assessing the capabilities of members to identify upskilling opportunities
- Targeted support for members in small businesses
- Customisable templates to support the creation of AI usage guidelines and checklists
- Prioritising practical advice to enable members to incorporate AI seamlessly into business

Closing Australia's AI gap

Support the development of industry-specific generative AI training

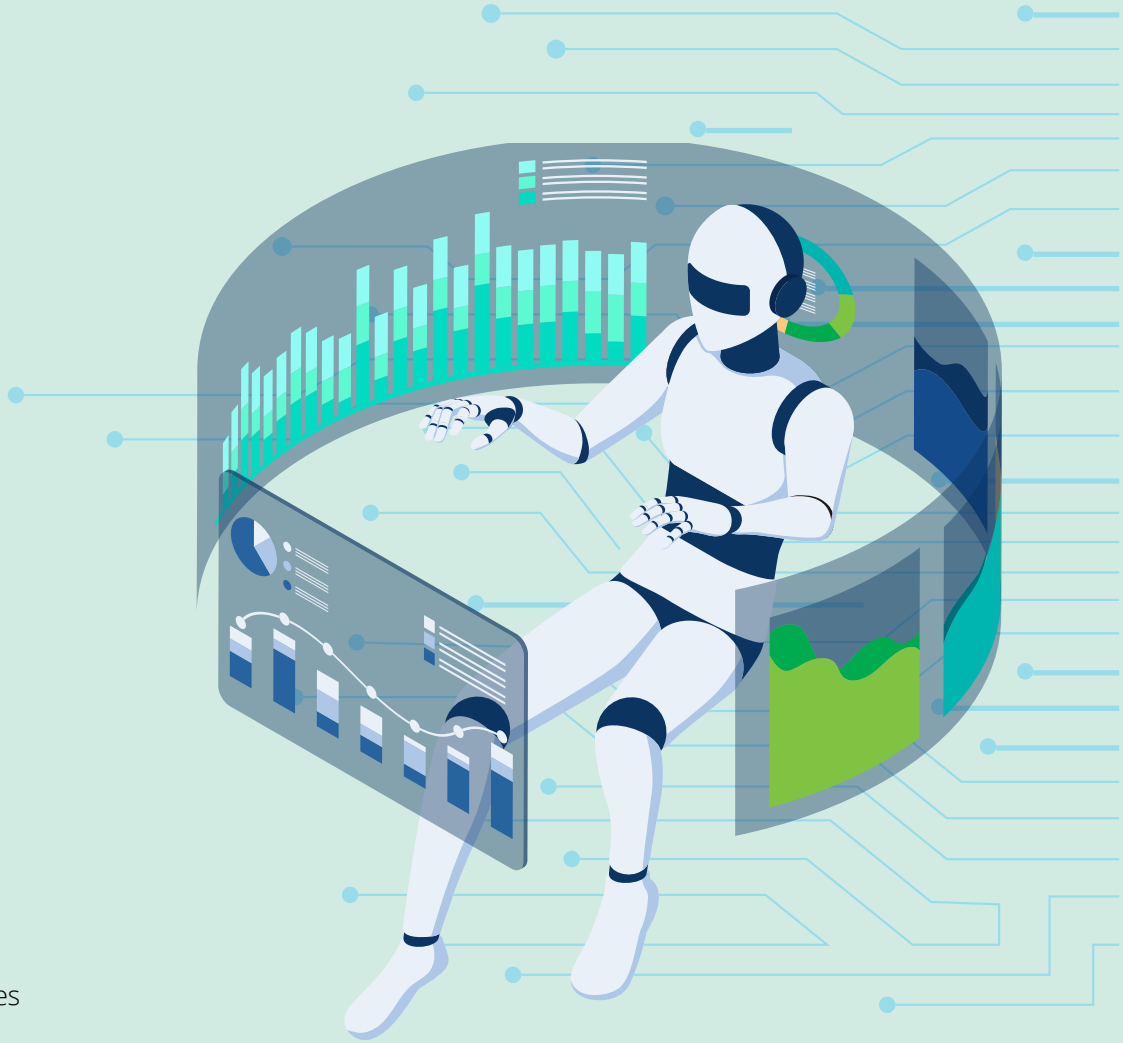
Establish industry association-led training programs to help workers develop AI capabilities supported by Jobs and Skills Australia and for businesses to address skills gaps in their workforce. This initiative would likely benefit smaller businesses across impacted industries that may not have the resources to provide adequate employee training

Integrate AI into the curriculum of tertiary training programs in highly impacted fields of study

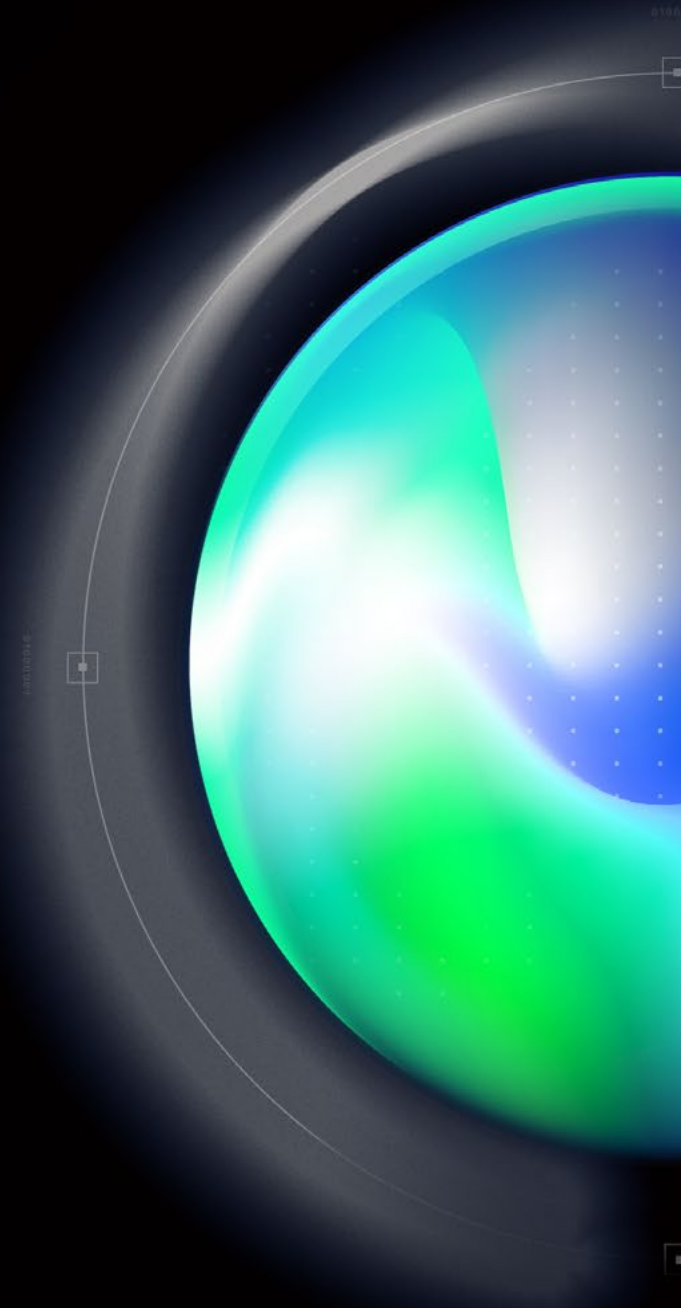
Encourage education departments and providers to integrate AI skills development within tertiary curriculums across highly impacted fields of study (such as finance, professional services and education). Education providers agree that young people require training to build workforce ready generative AI skills.

Support responsible use of AI through business advisory networks and services

Help businesses gain confidence as they navigate AI governance requirements through supporting advisory services and networks. These services provide expertise on how to integrate AI solutions and promote effective and safe adoption. Currently just 55% of employees believe their workplace has the right setting to identify and address ethical issues related to the use of AI.



Appendix A:
Statistical compendium



Statistical compendium

At a glance – Australia

Table A.1: Summary of key national statistics

Indicator	Statistic	Period
Technology workers in Australia	1,011,584	2024
Of which: ICT-related industry subdivisions	428,358	2023
Other industries	539,705	2023
Of which: Technical, professional, management and operational	734,726	2024
Other occupations (trade, sales, other)	276,858	2024
Technology workers' proportion of total workforce	7.11%	2024
Forecast size of technology workforce	1,322,905	2030
Inbound temporary migration of technology workers (457 and 482 visas granted)	13,806	FY23
Net migration inflow of technology workers	12746	FY20
Female share of technology workers	30%	2023
Older workers' (aged 55+) share of technology workers	12%	2023
Businesses' ICT research and development expenditure	7,927,016	FY22
Total ICT service exports	8.02	FY23
Total ICT service imports	6.03	FY23
IT university enrolments by domestic students	18,251	2022
IT university completions by domestic students	9,127	2022
IT university enrolments by international students	31,730	2022
IT university completions by international students	17,320	2022

Table A.2: Summary of key state statistics

Indicator	NSW	VIC	QLD	SA	WA	TAS	NT & ACT
Technology workers in Australia (2024)	365,205	306,368	153,002	48,681	78,794	12,219	46,772
Of which: ICT-related industry subdivisions	159,917	133,491	59,378	23,310	28,679	4,571	19,011
Other industries	192,514	160,867	82,788	23,825	44,303	7,648	27,761
Of which: Technical, professional, management and operational occupations	243,802	218,961	101,199	33,120	51,322	8,543	36,413
Other occupations (including trades and sales)	108,629	75,396	40,966	14,015	21,660	3,677	10,360
Technology workers' proportion of total workforce (2023)	8.0%	8.0%	5.0%	4.9%	4.7%	4.3%	11%
IT university enrolments by domestic students (2022)	7,064	4,687	2,669	1,142	1,612	382	636
IT university completions by domestic students (2022)	3,438	3,011	1,066	468	552	173	408

Statistical compendium

At a glance – Technology employment

Table A.3: CIIER classification of technology workers at the four-digit Australian and New Zealand Standard Classification of Occupations (ANZSCO) level

ICT management and operations
1351 ICT managers
2232 ICT trainers
2247 management and organisation analysts
2249 other information and organisation professionals
2621 database and systems administrators, and ICT security specialists
2632 ICT support and test engineers

ICT technical and professional
2324 graphic and web designers, and illustrators
2611 ICT business and systems analysts
2612 multimedia specialists and web developers
2613 software and applications programmers
2631 computer network professionals
2633 telecommunications engineering professionals
3132 telecommunications technical specialists
2600 ICT professionals nfd
2610 business and systems analysts, and programmers nfd
2630 ICT network and support professionals nfd
3130 ICT and telecommunications technicians nfd

ICT sales
2252 ICT sales professionals
6212 ICT sales assistants

ICT trades
3131 ICT support technicians
3424 telecommunications trades workers

Electronic trades and professional*
3123 electrical engineering draftspersons and technicians*
3124 electronic engineering draftspersons and technicians*
3423 electronics trades workers*

ICT industry admin and logistics support*
All other occupations where the employee works in an ICT-related industry subdivision (telecommunications services; internet service providers, web search portals and data processing services; and computer system design and related services)

* For these occupations, only workers employed in the ICT-related industry subdivisions (telecommunications services; Internet service providers, web search portals and data processing services; and computer system design and related services) are counted as technology workers

Sources: Australian Computer Society and CIIER

Statistical compendium

At a glance – Technology employment

Table A.4 (1): Technology workers by industry and CIIER occupational grouping, 2023

	ICT management and operations	ICT technical and professional	ICT sales	ICT trades	Electronic trades and professional	ICT industry admin and logistics support	Total technology workers
Industry divisions							
Agriculture, forestry and fishing	787	928	103	104	-	-	1,922
Mining	5,250	4,954	-	1,715	-	-	11,919
Manufacturing	11,237	9,137	1,360	3,157	-	-	24,891
Electricity, gas, water and waste services	5,980	5,912	-	1,512	-	-	13,404
Construction	4,983	2,970	-	4,559	-	-	12,512
Wholesale trade	7,033	5,515	2,218	2,984	-	-	17,750
Retail trade	7,339	14,164	5,980	5,289	-	-	32,773
Accommodation and food services	2,646	777	33	940	-	-	4,396
Transport, postal and warehousing	7,993	4,933	538	1,878	-	-	15,342
Rest of information media and telecommunications*	2,214	6,483	0	1,709	-	-	10,406
Financial and insurance services	41,399	38,840	944	5,734	-	-	86,917

Statistical compendium

At a glance – Technology employment

Table A.4 (2): Technology workers by industry and CIIER occupational grouping, 2023

	ICT management and operations	ICT technical and professional	ICT sales	ICT trades	Electronic trades and professional	ICT industry admin and logistics support	Total technology workers
Industry divisions							
Rental, hiring and real estate services	1,685	1,256	-	226	-	-	3,167
Rest of professional, scientific and technical services**	73,275	60,219	1,118	3,446	-	-	138,058
Administrative and support services	6,241	3,029	121	964	-	-	10,354
Public administration and safety	46,622	25,575	108	10,526	-	-	82,831
Education and training	11,675	10,664	131	5,320	-	-	27,790
Healthcare and social assistance	14,434	7,300	-	3,293	-	-	25,027
Arts and recreation services	3,247	5,642	132	1,642	-	-	10,664
Other services	2,502	2,652	294	4,135	-	-	9,582
ICT industry subdivisions	-	-	-	-	-	-	-
Telecommunications services	9,890	15,858	5,822	13,121	525	34,235	79,450
Internet service providers, web search portals and data processing services	1,156	2,068	371	1,385	-	3,924	8,904
Computer system design and related services	63,537	130,264	21,516	21,089	2,569	101,029	340,004
Total technology workers	**331,125**	**359,139**	**40,790**	**94,727**	**3,095**	**139,187**	**968,063**

Statistical compendium

At a glance – Technology employment

Table A.5: Technology employment forecasts by occupation grouping, 2024 to 2030

Occupation Grouping	2024	2030	Average Annual Growth (%)
ICT management and operations	352,836	495,366	5.8
ICT technical and professional	378,707	502,728	4.8
ICT sales	35,821	37,940	1.0
ICT trades	96,649	107,576	1.8
Electronic trades and professional	3,182	3,693	2.5
ICT industry admin and logistics support	144,388	175,601	3.3
Total	**1,011,584**	**1,322,905**	**4.6**

Statistical compendium

Technology worker migration

Table A.6: Temporary skilled migration (457 and 482) visa grants for technology occupations, FY15 to FY23

Nominated Occupation (ANZSCO Unit Group)	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
1351 ICT managers	939	918	852	524	708	437	258	302	545
2232 ICT trainers	10	15	22	16	28	16	13	12	17
2247 Management and organisation analysts	1,445	1,345	1,362	990	1,218	974	497	615	1,150
2249 Other information and organisation professionals	452	399	350	177	183	171	182	172	286
2252 ICT sales professionals	527	531	604	376	557	405	302	328	474
2324 Graphic and web designers, and illustrators	472	411	459	220	219	128	115	85	133
2611 ICT business and systems analysts	2,098	2,208	2,125	1,709	2,334	1,579	747	1,456	2,499
2612 Multimedia specialists and web developers	162	133	121	55	106	97	73	154	143
2613 Software and applications programmers	5,231	4,984	4,909	3,900	5,241	3,023	3,060	5,242	5,269
2621 Database and systems administrators, and ICT security specialists	383	385	424		383	267	157	342	488
2631 Computer network professionals	272	260	294	257	269	289	145	294	528
2632 ICT support and test engineers	767	854	864	829	956	705	665	673	1,180
2633 Telecommunications engineering professionals	127	99	81	48	70	71	46	67	94
3123 Electrical engineering draftspersons and technicians	351	353	305	177	234	206	155	153	316
3124 Electronic engineering draftspersons and technicians	112	91	71						
3131 ICT support technicians	320	291	273	143	176	134	101	119	192
3132 Telecommunications technical specialists	52	43	79	99	155	75	64	78	157
3423 Electronics trades workers	115	80	94	90	168	100	72	113	311
3424 Telecommunications trades workers	102	121	117	38	45	18	26	13	24
Total ICT 457 visa grants (LHS)	13,937	13,521	13,406	9,114	1,376	13	6	10	4
Total ICT 482 visa grants (LHS)	-	-	-	803	11,874	8,682	6,672	10,178	13,802
Total visas granted	**13,937**	**13,521**	**13,406**	**9,917**	**13,250**	**8,695**	**6,678**	**10,218**	**13,806**

Statistical compendium

ICT higher and vocational education

Table A.7: Domestic enrolments and completions in IT degrees, 2001 to 2022

	Enrolments		Completions	
Year	Undergraduate	Postgraduate	Undergraduate	Postgraduate
2001	12,455	7,346	5,451	2,850
2002	11,574	6,167	6,219	3,294
2003	9,968	5,039	6,580	2,588
2004	8,237	4,030	6,283	2,272
2005	7,028	3,557	5,696	1,976
2006	6,260	3,127	4,672	1,642
2007	5,930	2,926	4,185	1,474
2008	5,659	2,835	3,577	1,349
2009	6,264	3,287	3,159	1,315
2010	6,713	3,312	3,050	1,275
2011	7,361	3,607	3,266	1,353
2012	7,942	4,018	3,339	1,326
2013	8,048	4,038	3,463	1,423
2014	9,098	4,342	3,638	1,468
2015	9,504	4,528	3,949	1,491
2016	9,922	4,664	3,699	1,484
2017	11,529	5,432	4,079	1,544
2018	10,564	5,524	4,375	1,634
2019	10,516	5,970	4,633	1,890
2020	12,239	9,284	5,036	3,083
2021	13,017	10,452	5,384	4,681
2022	13,248	8,135	5,485	3,642

Statistical compendium

ICT higher and vocational education

Table A.8: International enrolments and completions in IT degrees, 2001 to 2022

	Enrolments		Completions	
Year	Undergraduate	Postgraduate	Undergraduate	Postgraduate
2001	8,587	6,482	2,993	3,558
2002	9,010	6,434	4,157	4,821
2003	8,110	5,908	5,659	4,337
2004	7,119	7,829	6,010	3,586
2005	5,905	5,984	5,213	5,428
2006	5,243	4,872	5,021	5,635
2007	5,301	5,116	4,433	4,258
2008	6,116	5,768	3,715	4,369
2009	6,169	6,090	3,851	4,009
2010	6,042	4,815	4,120	5,037
2011	6,024	4,049	3,996	4,528
2012	5,419	4,631	3,749	3,385
2013	5,330	6,105	3,673	3,223
2014	6,034	7,180	3,617	3,573
2015	5,987	6,858	3,516	4,537
2016	7,584	9,004	3,571	5,236
2017	9,527	13,317	4,017	5,604
2018	12,750	19,217	4,984	8,392
2019	15,204	20,752	5,903	12,420
2020	13,607	13,701	7,204	15,855
2021	11,926	8,892	8,134	14,624
2022	17,580	14,150	8,439	8,881

Table A.9: Government-funded VET subject enrolments in the IT field of education, 2016 to 2022

Field of Education	2016	2017	2018	2019	2020	2021	2022
Diploma or above	27,789	17,957	15,836	18,376	18,092	14,418	12,645
Certificate IV	10,769	10,863	11,159	12,308	12,974	14,830	14,378
Certificate III	14,282	14,086	12,924	12,363	12,613	14,534	14,988
Certificate II	13,307	12,962	10,422	9,732	8,611	6,436	6,372
Certificate I	16,303	14,756	12,086	11,797	10,183	7,226	91

Statistical compendium

Women in technology

Table A.10: Female technology workers by industry, 2023

Industry	Female technology workers	Percentage of female technology workers	Percentage of female workers in all occupations
Agriculture, forestry and fishing	543	28%	33%
Mining	2,517	21%	21%
Manufacturing	5,573	22%	28%
Electricity, gas, water and waste services	4,719	35%	26%
Construction	1,604	13%	13%
Wholesale trade	5,713	32%	33%
Retail trade	10,767	33%	54%
Accommodation and food services	866	20%	54%
Transport, postal and warehousing	3,351	22%	23%
Rest of information media and telecommunications	2,950	28%	39%
Financial and insurance services	29,701	34%	48%
Rental, hiring and real estate services	964	30%	48%
Rest of professional, scientific and technical services	46,522	34%	43%
Administrative and support services	4,862	47%	52%
Public administration and safety	32,125	39%	51%
Education and training	9,042	33%	72%
Health care and social assistance	11,782	47%	76%
Arts and recreation services	3,492	33%	47%
Other services	2,529	26%	43%
Health care and social assistance	11,782	47%	76%
Arts and recreation services	3,492	33%	47%
Other services	2,529	26%	43%

Statistical compendium

Older technology workers

Table A.11: Older technology workers by CIIER occupation grouping, 2023

	Number of technology workers aged 55+	Percentage of total technology workforce
ICT management and operations	52,055	16%
ICT technical and professional	35,572	10%
ICT sales	4,129	10%
ICT trades	12,289	13%
Total	**104,046**	**12%**

Statistical compendium

ICT research and development & trade

Table A.12: Business expenditure on R&D, FY12 to FY22

	FY12	FY14	FY16	FY18	FY20	FY22
Information and computing sciences	5,496,165	6,073,221	6,634,394	6,747,648	7,092,231	7,927,016
Engineering	8,686,256	7,474,231	5,538,180	4,710,279	5,268,259	5,399,774
Biomedical and clinical services	-	-	-	-	2,190,039	2,949,225
Agricultural, veterinary and food sciences	455,372	553,754	632,619	654,046	1,255,252	1,533,930
Commerce, management, tourism and services	144,273	227,088	152,082	150,551	468,221	496,011
Chemical sciences	425,941	565,758	404,003	431,150	328,353	393,013
Built environment and design	231,743	238,591	166,626	162,413	291,514	447,907
Environmental sciences	281,155	270,044	158,043	170,354	273,188	288,475
Biological sciences	112,724	150,686	88,597	231,970	252,197	344,734
Health sciences	941,159	1,123,956	1,253,415	1,958,471	212,287	250,724
Other fields of research	1,464,642	2,170,273	1,630,943	2,219,625	539,084	608,024

Table A.13: Government expenditure on ICT R&D, FY12 to FY22

	FY12	FY13	FY15	FY17	FY19	FY22
Commonwealth ICT R&D expenditure	$3,144,370,000	$240,828,000	$247,462,000	$254,504,000	$262,306,000	331,068
Commonwealth ICT share of R&D expenditure	13%	10%	11%	12%	12%	14%
State and territory ICT R&D expenditure	$8,596,000	$12,778,000	$20,882,000	$38,627,000	$2,496,000	4,489
State and Territory ICT share of R&D expenditure	1%	1%	2%	3%	0.2%	0.4%

Table A.14: Exports and imports of ICT services, FY13 to FY23 ($bn)

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Exports	1.91	2.08	2.50	2.78	2.93	3.60	4.36	4.99	5.09	6.43	8.02
Imports	1.87	2.50	2.59	2.88	2.74	3.14	3.72	4.67	4.43	4.99	6.03

Statistical compendium

Detailed state figures

Table A.15: State breakdown of technology workers by industry, 2023

Industry Divisions	NSW	VIC	QLD	SA	WA	TAS	ACT*	NT*
Agriculture, forestry and fishing	540	644	103	506	-	85	N/A	N/A
Mining	607	427	1,618	351	8,628	31	N/A	N/A
Manufacturing	11,132	7,147	2,737	1,343	1,789	374	N/A	N/A
Electricity, gas, water and waste services	1,542	6,247	2,401	829	1,027	830	N/A	N/A
Construction	5,967	2,954	1,657	562	990	154	N/A	N/A
Wholesale trade	8,597	4,134	2,494	439	1,606	226	N/A	N/A
Retail trade	12,052	12,214	3,749	1,279	2,848	379	N/A	N/A
Accommodation and food services	1,606	710	1,581	141	171	134	N/A	N/A
Transport, postal and warehousing	4,260	5,869	2,931	565	1,169	130	N/A	N/A
Rest of information media and telecommunications	4,907	3,254	937	524	175	30	N/A	N/A
Financial and insurance services	38,444	32,484	9,269	1,865	3,508	699	N/A	N/A
Rental, hiring and real estate services	900	1,226	692	281	-	-	N/A	N/A
Rest of professional, scientific and technical services	51,614	45,008	20,070	6,563	7,598	1,388	N/A	N/A
Administrative and support services	2,909	2,803	2,894	473	769	38	N/A	N/A
Public administration and safety	27,328	13,875	14,009	4,039	6,406	1,519	N/A	N/A
Education and training	7,878	6,832	6,070	2,460	2,503	745	N/A	N/A
Health care and social assistance	4,868	8,913	6,671	1,276	2,565	426	N/A	N/A
Arts and recreation services	2,840	4,075	1,967	81	1,250	184	N/A	N/A
Other services	4,522	2,050	936	248	1,304	277	N/A	N/A
ICT industry subdivisions								
Telecommunications services	25,231	28,227	11,664	5,461	6,083	959	N/A	N/A
Internet service providers, web search portals and data processing services	1,888	3,739	1,206	565	942	25	N/A	N/A
Computer system design and related services	132,798	101,524	46,508	17,285	21,655	3,587	N/A	N/A
Total technology workers	**352,431**	**294,357**	**142,165**	**47,135**	**72,982**	**12,219**	**N/A**	**N/A**

* While the 2023 labour force data from the ABS contained combined figures for the NT and the ACT for confidentiality reasons, NT employment has been separated from ACT employment at an aggregate level using the Deloitte Access Economics employment forecast model.

Statistical compendium

Detailed state figures

Table A.16: New South Wales' employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	126,068	185,015	58,947	6.6
ICT technical and professional	128,758	160,760	32,002	3.8
ICT sales	14,990	16,646	1,656	1.8
ICT trades	34,949	39,389	4,439	2.0
Electronic trades and professional	1,324	1,468	144	1.7
ICT industry admin and logistics support	59,116	73,522	14,407	3.7
Total technology workers	**365,205**	**476,801**	**111,595**	**4.5**

Table A.17: Victoria's employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	106,132	141,450	35,318	4.9
ICT technical and professional	124,815	170,386	45,571	5.3
ICT sales	10,817	11,891	1,074	1.6
ICT trades	23,400	23,085	-315	-0.2
Electronic trades and professional	885	1,155	271	4.5
ICT industry admin and logistics support	40,319	45,351	5,032	2.0
Total technology workers	**306,368**	**393,318**	**86,951**	**4.3**

Statistical compendium

Detailed state figures

Table A.18: Queensland's employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	54,717	80,634	25,917	6.7
ICT technical and professional	55,382	73,570	18,188	4.8
ICT sales	5,311	5,315	4	0.0
ICT trades	16,269	23,017	6,747	6.0
Electronic trades and professional	141	111	-30	-3.9
ICT industry admin and logistics support	21,182	24,237	3,055	2.3
Total technology workers	**153,002**	**206,885**	**53,883**	**5.2**

Table A.19: South Australia's employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	16,139	23,652	7,513	6.6
ICT technical and professional	17,765	22,758	4,993	4.2
ICT sales	1,233	1,033	-200	-2.9
ICT trades	5,411	5,047	-363	-1.2
Electronic trades and professional	196	246	50	3.8
ICT industry admin and logistics support	7,937	11,840	3,903	6.9
Total technology workers	**48,681**	**64,575**	**15,895**	**4.8**

Statistical compendium

Detailed state figures

Table A.20: Western Australia's employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	26,444	34,031	7,587	4.3
ICT technical and professional	30,010	46,010	15,999	7.4
ICT sales	2,115	1,998	-117	-0.9
ICT trades	9,996	10,059	63	0.1
Electronic trades and professional	352	300	-52	-2.6
ICT industry admin and logistics support	9,876	12,997	3,121	4.7
Total technology workers	**78,794**	**105,394**	**26,600**	**5.0**

Table A.21: Tasmania's employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	4,093	5,485	1,393	5.0
ICT technical and professional	3,583	4,965	1,382	5.6
ICT sales	227	154	-73	-6.3
ICT trades	1,930	2,298	369	3.0
Electronic trades and professional	113	222	109	12.0
ICT industry admin and logistics support	1,246	1,033	-213	-3.1
Total technology workers	**11,190**	**14,158**	**2,967**	**4.0**

Statistical compendium

Detailed state figures

Table A.22: Northern Territory's employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	2,401	3,059	658	4.1
ICT technical and professional	1,880	2,366	486	3.9
ICT sales	153	135	-18	-2.1
ICT trades	661	710	49	1.2
Electronic trades and professional	50	61	11	3.4
ICT industry admin and logistics support	576	751	175	4.5
Total technology workers	**5,721**	**7,083**	**1,361**	**3.6**

Table A.23: Australian Capital Territory's employment forecasts by CIIER occupation grouping, 2024 to 2030

	2024	2030	Change	Average annual growth rate (%)
ICT management and operations	16,843	22,040	5,198	4.6
ICT technical and professional	16,514	21,913	5,399	4.8
ICT sales	975	769	-207	-3.9
ICT trades	4,033	3,972	-62	-0.3
Electronic trades and professional	122	129	7	1.0
ICT industry admin and logistics support	4,135	5,869	1,734	6.0
Total technology workers	**42,622**	**54,691**	**12,069**	**4.2**

Statistical compendium

Detailed state figures

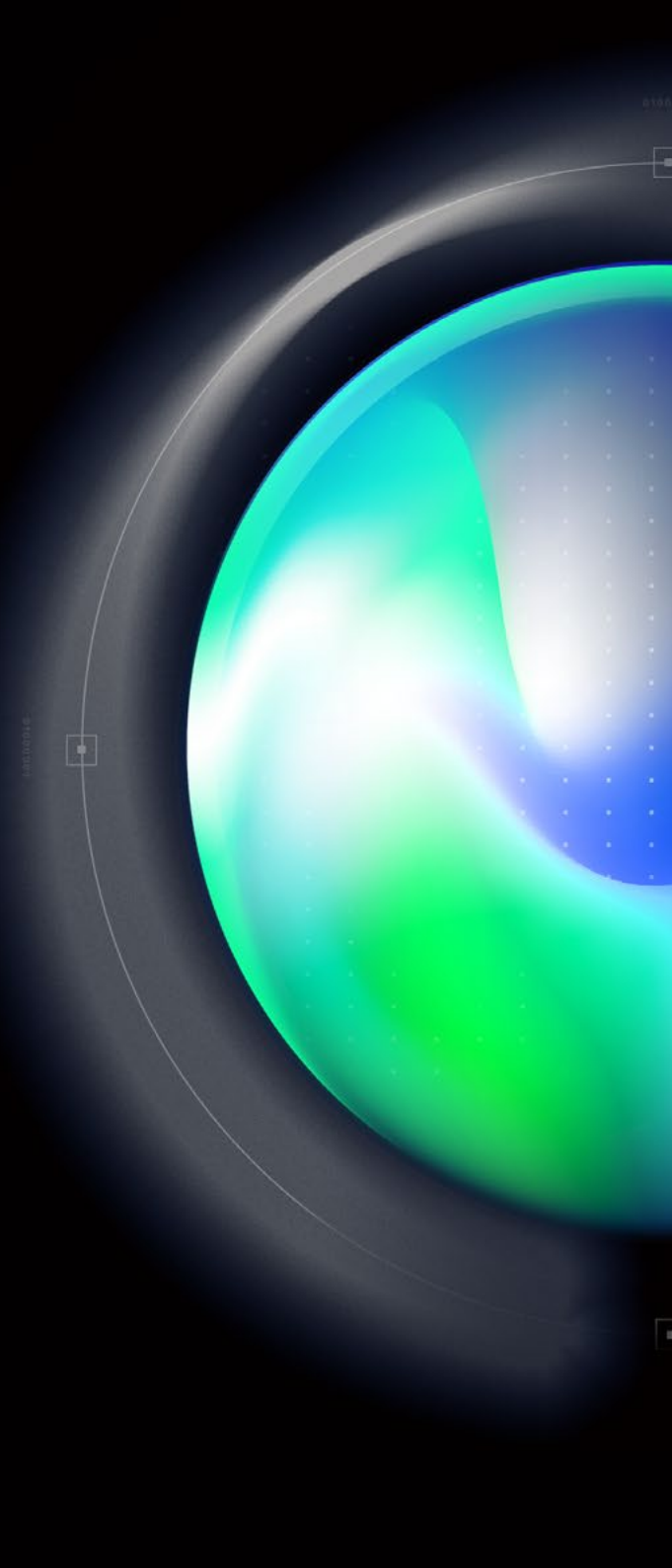
Table A.24: State breakdown of domestic enrolments and completions in IT degrees, 2022

	Enrolments		Completions	
	Undergraduate	Postgraduate	Undergraduate	Postgraduate
New South Wales	5,098	1,966	2,212	1,226
Victoria	3,041	1,646	1,547	1,464
Queensland	2,011	658	707	359
Western Australia	894	248	214	254
South Australia	1,313	299	393	159
Tasmania	374	8	165	8
Northern Territory	41	10	18	12
Australian Capital Territory	436	149	223	155

Table A.25: State breakdown of international enrolments and completions in IT degrees, 2022

	Enrolments		Completions	
	Undergraduate	Postgraduate	Undergraduate	Postgraduate
New South Wales	6,289	3,884	3,275	2,807
Victoria	6,528	5,145	3,212	3,206
Queensland	1,050	1,881	532	891
Western Australia	1,538	617	366	339
South Australia	1,376	1,544	446	1,282
Tasmania	289	225	225	219
Northern Territory	60	132	55	76
Australian Capital Territory	388	682	306	60
Multi-State	62	40	22	1

Appendix B:
Survey methodology



Deloitte workforce survey

Survey methodology

This report's analysis has been informed by a survey fielded in May 2024, receiving 1,887 responses in total.

The survey focused on three groups:

- Current technology workers
- Current professional workers
- Parents that are currently working in technology, professional services or other industries.

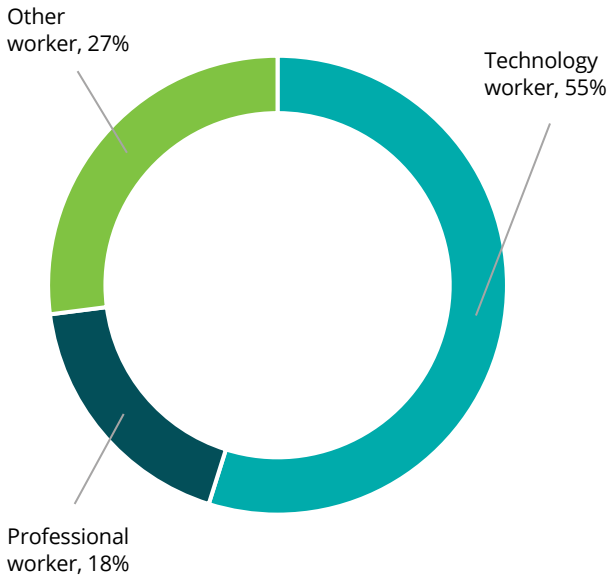
Given the focus on these groups, individuals that were under 18, not currently working, or were neither parents nor working in the professional or technology industry were excluded from the survey.

The survey was fielded to respondents sourced through the market research firm Dyanta and emails to ACS members and subscribers to ACS publications.

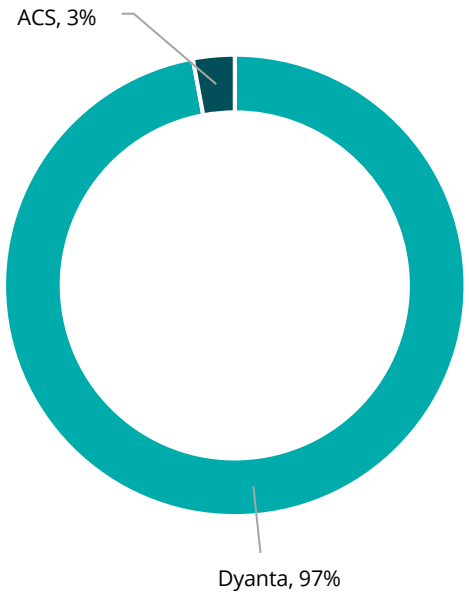
The survey aimed to investigate digital skills in the workforce, movements between industries, reskilling into technology, diversity in the technology workforce, and parental influence on children's interest in technology.

Where appropriate, other data sources, such as the Census, are used to provide a more representative breakdown of the technology workforce more generally.

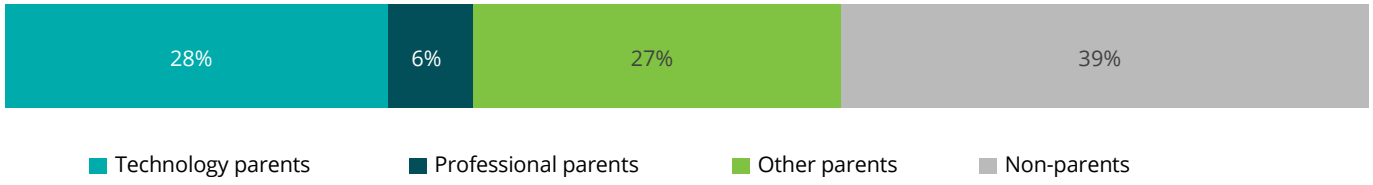
Proportion of respondents by industry cohort



Source of survey respondents



Proportion of respondents by parent cohort



Deloitte workforce survey

Demographic breakdown of survey respondents

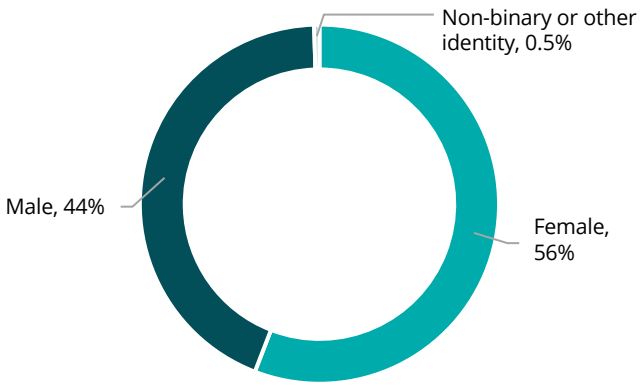
Gender
Of the 1,887 survey respondents, 1,054 identified as women, 824 identified as men and 9 identified as another gender, including non-binary.

Age
The largest group of respondents were 35-44 year olds (26%) followed by 25-34 (23%) and 45-54 (22%).

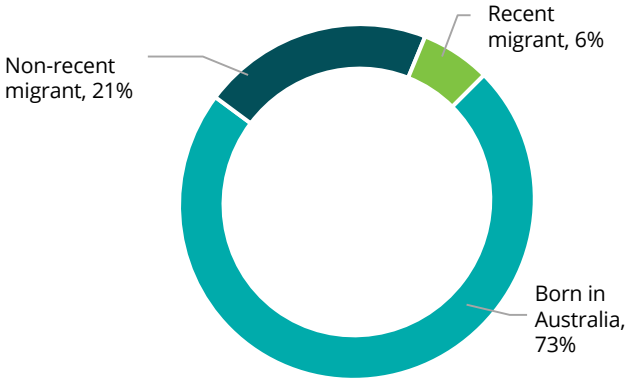
Migrant status
The majority (73%) of respondents were born in Australia. Among the 27% that were born overseas, 6% migrated to Australia within the last 5 years and 21% arrived in Australia more than 5 years ago.

Ancestry
Half of respondents were of English ancestry. Of these, 37% were Australian, including 3% with Aboriginal and/or Torres Strait Islander ancestry and 34% with Australian ancestry more generally.

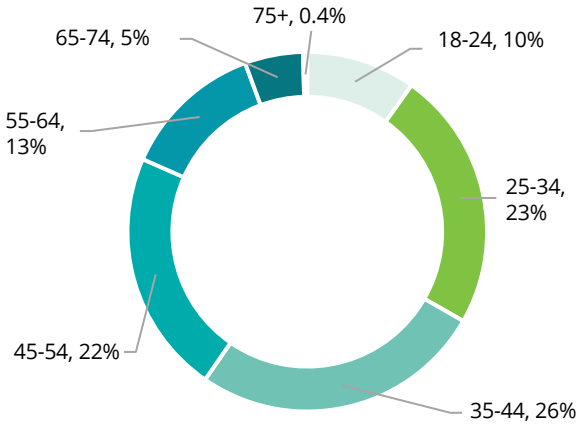
Proportion of respondents by gender



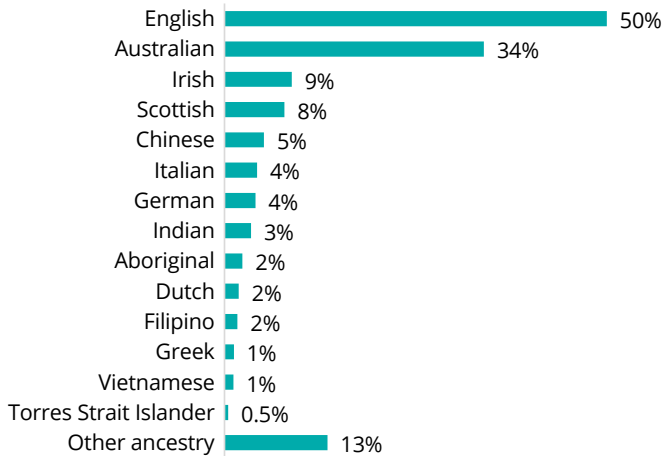
Proportion of respondents by migration status



Proportion of respondents by age



Proportion of respondents by ancestry



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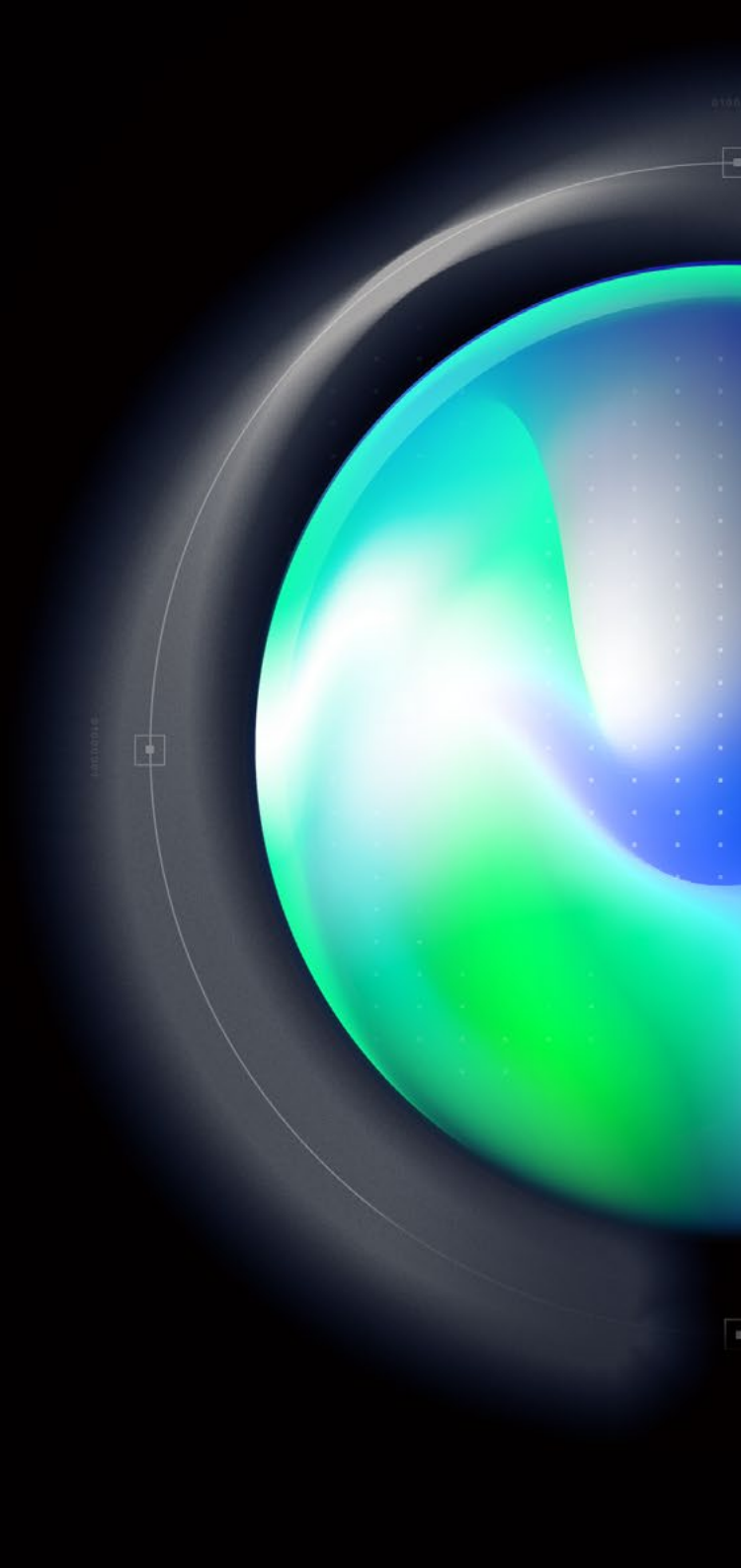

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