

# The economic contribution of Australia's tech sector



 Tech Council

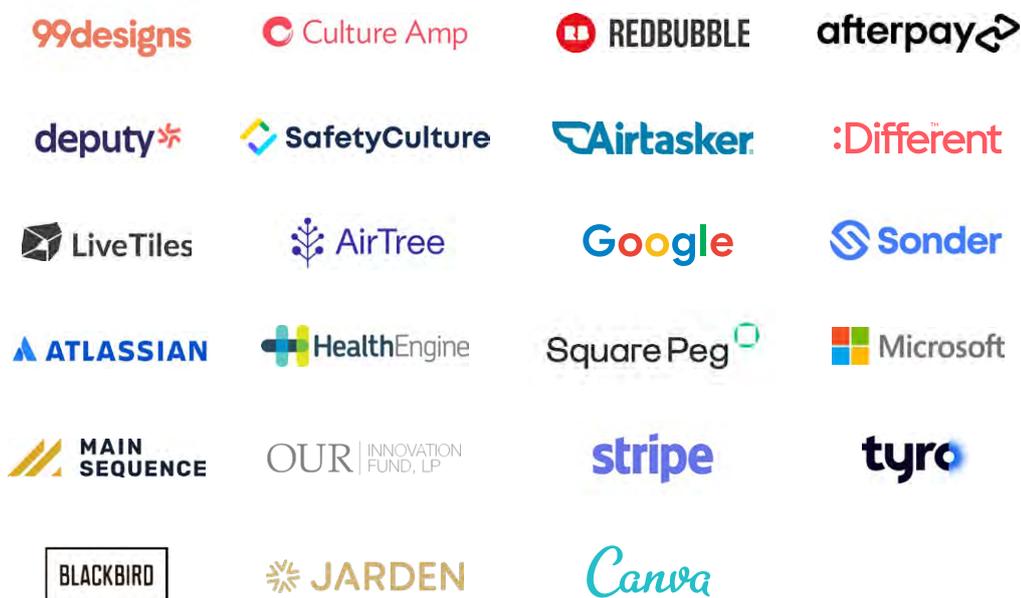
accenture

 Microsoft

afterpay 

 ATlassian

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*Note: All dollar figures are in Australian dollars and accurate as of 2021.*

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# The tech sector is equivalent to Australia's 3rd biggest industry, just behind mining and banking



The tech sector employs **861,000 Australians** across cities, suburbs and regions



**South East Queensland** is the fastest growing region for tech employment



**65,000 new tech jobs** were created during the COVID-19 crisis



The tech sector is equivalent to Australia's **7th largest employer**, employing **1 in 16 working Australians**



There are more software and application programmers in Australia than **plumbers, hairdressers or secondary school teachers**



The tech sector **contributes \$167bn to GDP**, equivalent to **8.5%**



Tech jobs grew more than **twice as fast as average employment** in the last decade



**98% of firms** in the direct tech sector are **SMEs** (measured by number of employees)

**1m**

The tech sector could employ **1m Australians by 2025**



The Australian tech sector could **contribute \$244bn annually to GDP by 2031**

# Executive Summary

**The Australian technology sector is a critical pillar of the Australian economy, and an important accelerator of jobs and growth.**

The technology sector will be a key accelerator of economic growth in Australia in the recovery from the COVID-19 pandemic and into the future. It is now a critical pillar of the Australian economy, and will surpass the contribution of the primary and manufacturing industries in the next decade.

The sector's economic contribution is not confined to the direct impact of tech businesses as a standalone industry. Instead, digital technologies are an essential part of the value chain and operations of most businesses in the economy. Technology is enabling growth in sectors as diverse as mining, banking and manufacturing. Small businesses in retail, construction and agriculture use MYOB accounting products to manage their finances and Atlassian's software to collaborate as a team, Deputy's rostering tools have been critical for businesses in aged care, retail and hospitality and Canva's digital design services enable small businesses to market their products and services to a global customer base. These technologies drive growth and productivity across the economy through this 'indirect' impact.

The combination of these direct and indirect impacts mean that the tech sector contributed \$167 billion to the Australian economy in FY2021, equivalent to 8.5% of GDP. This is made up of a direct contribution from tech-related industries of \$76 billion and an indirect contribution of \$92 billion. If the sector was classified as its own industry, it would be equivalent to the third largest contributor to GDP in Australia – just behind mining and finance, and ahead of major industries such as health care, construction, and retail. The sector's economic contribution has increased 79% since 2016 and has outpaced average growth in the economy by more than four times. This growth is highest in regional and suburban areas, showing that the tech sector is a vital partner in Australia's future prosperity for citizens and businesses.

The tech sector is increasingly an engine room of employment, generating quality jobs for people of all qualifications. It is creating employment opportunities at almost twice the average rate of jobs growth across other sectors, with tech sector jobs growing 66% between 2005 and 2021 compared to the average growth rate of 35%. During the COVID-19 crisis, the tech sector created 66,000 new jobs.

There are now 861,000 people employed in tech occupations in 2021. Software engineers are the 14th most common occupation and represent more Australians than secondary school teachers, plumbers, hairdressers and police. Nearly one third of tech workers are employed outside of major tech industries, including in public administration, finance, education and manufacturing. The number of workers in 'indirect' tech jobs is equivalent in size to the total mining sector (250,000 employees). Overall, the sector would be equivalent to the seventh largest employer in Australia, providing jobs to 6.6% of the workforce.

**If we lift our ambition, Australia can realise a tech-supported recovery, securing 1m jobs and contributing \$244bn per year to GDP**

Australia's strong rates of technology adoption have supported sector development. The direct tech sector, and the ecosystem supporting it, have also grown and matured in the last decade. This has resulted in a larger and more diverse venture capital industry, and the creation of over 50 Australian companies valued at \$100 million or greater.

However, despite this progress, Australia's tech sector is still smaller than peer economies such as Canada. Evidence has shown that limited access to talent, limitations on business and managerial capability around technology, challenges in accessing the internet in remote and regional areas and lower than average R&D incentives may be leading to an inability to fully capture the opportunities of the digital age.

If Australia's tech sector matched global peers, it could contribute at least \$244 billion annually to GDP in the next decade and reach one million jobs by 2025.

**Australia can deliver a tech-supported recovery by taking action across three key areas to accelerate job and business creation**

There are several barriers to growth that Australia needs to address in order to capture the full opportunity of a tech-supported economic recovery. To do so, Australia can focus policy actions across the three components of the tech ecosystem:

- **Growth:** Incentivising growth and investment by addressing early-stage funding gaps, incentivising R&D and encouraging digital adoption.
- **Talent:** Supporting businesses and educational institutions to attract, train and retain talent, providing pathways into tech sector jobs and improving skilled migration pathways.
- **Regulation:** Bringing a whole-of-government approach and collaborating with industry to develop fit-for-purpose regulation that considers the far-reaching impact of the tech sector.

# 1.

**The Australian tech sector has become a critical part of the economy, contributing \$167bn to GDP per year and 861,000 jobs**



## 1.1. Australia's tech ecosystem creates value throughout the economy

The tech sector is now a critical pillar of the Australian economy. The contribution of the tech sector is not confined to the direct impact from tech businesses as an isolated industry. Instead, digital technologies are a strong part of the value chain and operations of most businesses in the economy from traditional areas such as agriculture, retail and manufacturing, to service businesses such as finance and professional services. Technology is fundamentally enhancing how businesses operate. This has been amplified throughout the COVID-19 pandemic as social distancing measures have forced many people to work, connect and buy goods and services online. For example, online sales in Australia grew 28% per annum on average between 2013 and 2020, increasing by more than \$1 billion during the COVID-19 pandemic. In addition, the proportion of businesses using cloud computing rose from 42% to 55% in the past four years.

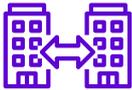
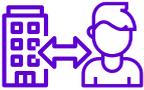
The direct tech sector (see Exhibit 1) is defined by three major categories, which include:

- **Software, analytics, business applications and intelligence:** this includes services and intelligence like software programming, cloud computing, search engines, computer system design and software intellectual property. These types of services tend to have B2B application, like Atlassian's software for product development or advertising on search engines like Google.
- **Technology enabling infrastructure:** this includes the hardware and structures required to support technology use such as telecommunications, data storage and the Internet of Things (IoT).
- **E-commerce and media:** this largely includes consumer-facing technology applications such as social and digital media, online payments solutions and e-commerce.

**" The contribution of the tech sector is not confined to the direct impact from tech businesses as an isolated industry. Instead, digital technologies are a strong part of the value chain and operations of most businesses in the economy from traditional areas such as agriculture, retail and manufacturing, to service businesses such as finance and professional services."**

## EXHIBIT 1

The direct tech sector is defined to include technological services and intelligence, technology-enabling infrastructure and e-commerce and media platforms

Direct tech sector	Tech components	Examples
 <p>Typically more B2B</p> 	<p><b>Software, analytics, business applications and intelligence</b></p> <ul style="list-style-type: none"> <li>• Analytics and intelligence</li> <li>• Technology consulting services</li> <li>• Search engines</li> <li>• Software programming &amp; engineering</li> <li>• Data management</li> <li>• Cloud computing providers</li> <li>• Digital business mgmt. applications</li> </ul>	
	<p><b>Hardware, robotics and telecommunications services</b></p> <ul style="list-style-type: none"> <li>• Computer hardware</li> <li>• Telecommunications services</li> <li>• Internet of Things (IoT)</li> <li>• Robotics, drones and AVs, machines</li> </ul>	
 <p>Typically more B2C</p>	<p><b>E-Commerce &amp; Media Platforms</b></p> <ul style="list-style-type: none"> <li>• E-commerce and E-services</li> <li>• Digital payments</li> <li>• Online media platforms</li> <li>• Social media</li> </ul>	

## Indirect sector impacts



### Productivity improvements

as firms use better data to improve decision making, streamline their back office activities and improve collaboration and project management



### Job creation

as firms hire more web-based designers, software engineers and data scientists



### Innovation

as digital platforms and tools enable development of new products and services and new forms of business processes



### Increased exports

as digital business models enable small firms to access global marketplaces



### Economic growth

as new products, productivity, jobs and exports result in increased profits for Australian firms and increased wages of Australian workers

**SECTION 1**

The tech sector has a significant ‘indirect’ impact across the economy through the development of new products and services, providing access to new and global markets, better targeting of consumer needs through use of data and AI, improving productivity and reducing costs. For example, Australian farmers are using satellite and drone technology to manage livestock and improve their yields as well as blockchain for supply chain management. In the mining, oil and gas sectors, drones, sensors and data analytics are used to collect real time data, often in dangerous or inaccessible areas, to support better planning and management of mining and rig operations. Financial

services firms are making transactions safer and more secure by using big data and machine learning to detect fraud.<sup>1</sup> These interactions between the direct and indirect components of the tech ecosystem are a critical driver of growth in the economy, driving jobs, profits and productivity.

The tech sector contributed \$167 billion to the Australian economy in FY2021, equivalent to 8.5% of GDP. This is made up of a direct contribution from tech-related industries of \$76 billion and an indirect contribution of \$92 billion.

**EXHIBIT 2**

**The tech sector contributed \$167bn to the Australian economy in FY21 and is the third highest contributor to GDP**

**Tech sector contribution to Australian GDP**

\$bn GVA, FY20-21

		% of GDP	Description
<b>Direct contribution</b>	\$76B	3.8%	Gross value added in tech-related industries, including the value of e-commerce (proportion of retail and wholesale trade which occurs online)
<b>Indirect contribution</b>	\$92B	4.6%	Value-added output of the tech sector embedded in other industries
<b>Total contribution</b>	\$167B	8.5%	Total contribution (direct + indirect)

Note: Please refer to Appendix for method  
 Source: ABS (2021), see Appendix for relevant ABS catalogues used.

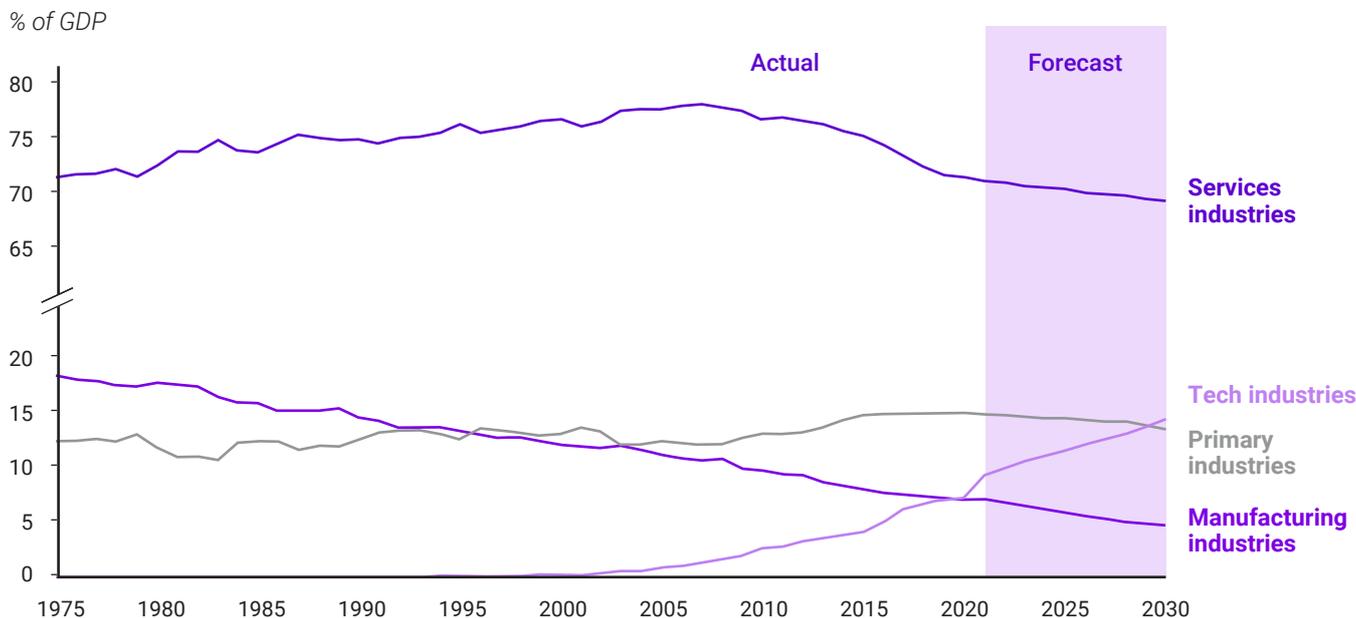
The growth potential of the sector means that it will actively cement its place as a pillar of the Australian economy over the next decade, surpassing the contribution of the primary and manufacturing industries (see Exhibit 3).

1 Australian Government 2018, ‘Australia’s Tech Future’

## EXHIBIT 3

## Technology will be the new sector, driving the Australian economy into the future

### Australian economy by sector



Source: Accenture analysis of ABS 5204.0 Australian System of National Accounts, 2021

### 1.2. Australia's direct tech sector is diverse and largely comprises of small businesses

Australia's direct tech sector has been growing rapidly and has begun to mature as many of Australia's startups evolve into global 'unicorns'.

Many of Australia's tech successes have been in designing fintech and B2B software-as-a-service applications. This includes Atlassian's software and development tools, Deputy's rostering tools, Canva's digital design services and MYOB's accounting software. Often, this success comes from experienced Australian business owners designing

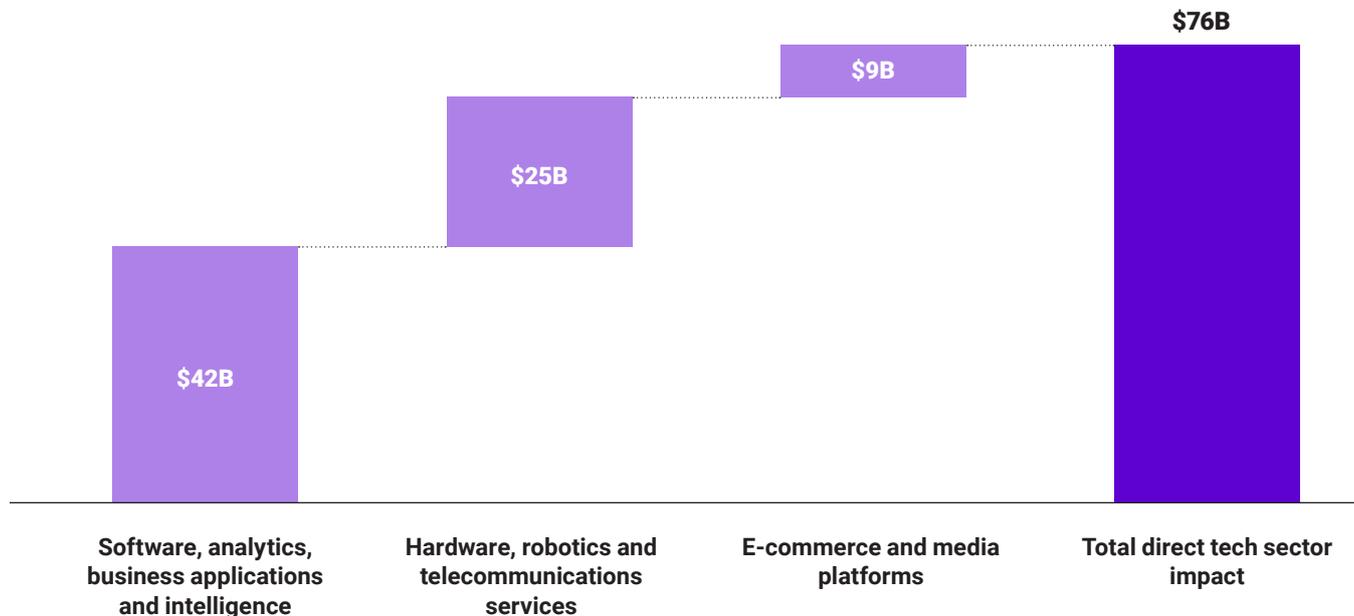
entrepreneurial solutions to their own business challenges. For example, the co-founder of Kaddy, an Australian B2B platform for hospitality businesses to order beverages, worked in several beverage businesses before starting his own online platform. Other strengths include smart farming, quantum computing, drone technology and industrial automation through firms like AgriDigital. Around \$42 billion of the direct tech sector's \$76 billion contribution to GDP is derived from technology services and intelligence (see Exhibit 4).

EXHIBIT 4

The majority of Australia’s direct tech contribution is derived from technology services and intelligence

Economic contribution of Australia’s tech sector

\$B gross value added, direct economic contribution



Source: ABS, Accenture analysis  
 Note: These categories are approximated by ANZSIC subindustries.

The number of Australian tech firms developing successful B2C applications is also picking up pace, with payments platforms like Afterpay and marketplaces such as Seek and Redbubble expanding into global markets. The expansion of these platforms creates new sales channels, facilitates more efficient matching between buyers and sellers, and provides better choice and access to products and services.

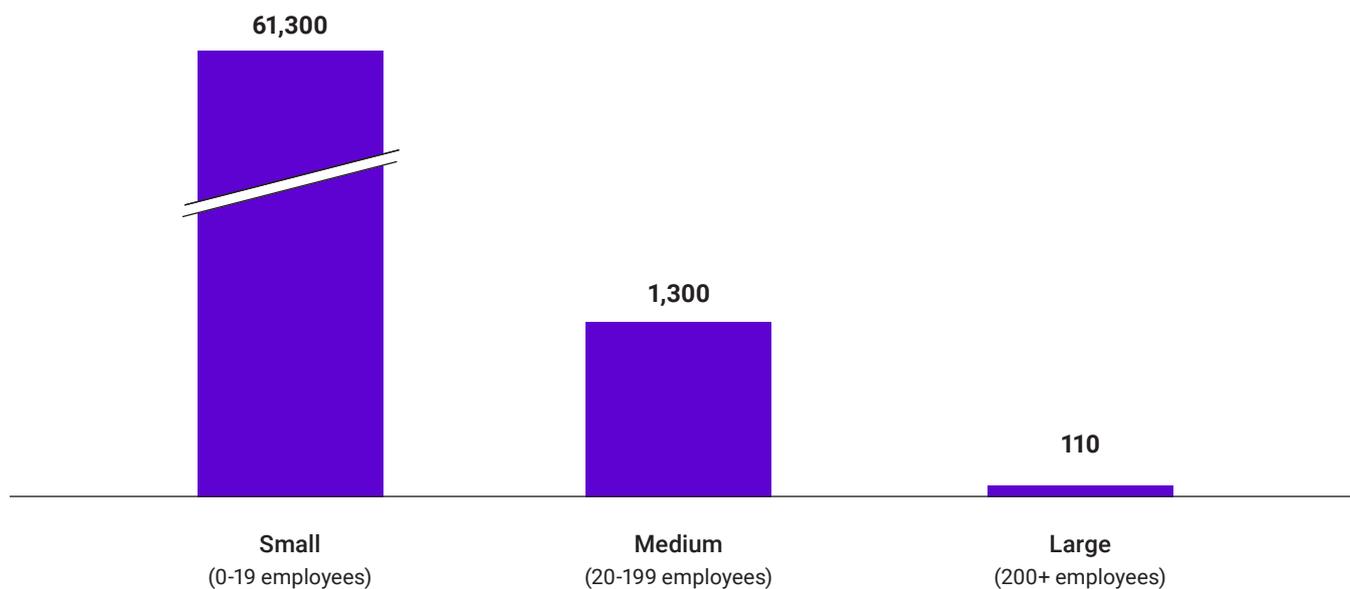
Australia’s tech sector is diverse. Around 98% of Australian tech firms are small businesses (61,300) compared to just 110 large firms (see Exhibit 5).<sup>2</sup> The majority of these small businesses are in computer systems design and include young startups as well as sole traders, operating as ‘tech tradies’.

2 ABS (2021), Counts of Australian Businesses as at June 2020; Accenture analysis.

## EXHIBIT 5

**Most firms in the direct tech sector are small businesses or sole traders****Size of firms in the direct tech sector**

Count of businesses in direct tech sector by employment, 2020



Source: ABS (2021), Counts of Australian businesses, including Entries and Exits.

Interactions between established and small or startup tech businesses are vital for entrepreneurship, knowledge transfer and building talent. The agility of small businesses enables rapid development of ideas and inspires growth, while larger businesses often bring expertise and knowledge, and have the resources to scale and deliver products to the mass market.

## CASE STUDY: 99DESIGNS

## 99designs helps small businesses bring brands to life

**FUNCTION:** Global creative platform for designers and clients to collaborate

**INDUSTRY:** Arts and recreation

**SIZE:** 160 employees

**HEADQUARTERS:** Melbourne

**FOUNDED:** 2008

Founded and headquartered in Melbourne, 99designs is a global creative platform that makes it easy for designers and clients to work together to create designs they love. With a million projects completed on the platform since 2008, 99designs has become the go-to solution for connecting customers and designers at scale. This includes assisting more than 500,000 small businesses bring their brand to life and grow.

99designs originally spun out of a SitePoint forum where participants engaged in friendly online 'design contests', often posting briefs, exchanging ideas and collaborating on projects for fun. Since then, the company has continued to create opportunities for freelance designers around the world through contests and project work, and has paid out more than AUD\$430 million to its creative community. In 2020, 99designs was acquired by Vistaprint and has continued to grow significantly - creating more than 50 full time roles in the 99designs team over the past six months alone.

99designs benefitted from being early adopters of products from other tech companies such as Campaign Monitor, Segment and BuildKite. It also received strong support from US VC fund Accel and the Victorian government.

99design's CEO Patrick Llewellyn celebrates the progress Australia's tech ecosystem has made over the past 13 years.

**"The Australian ecosystem looks very different today than when 99designs was founded more than a decade ago. The availability and quality of local venture capital funding has improved exponentially."**

However, Llewellyn also highlights a need for increased industry consultation with government as Australia's tech sector continues to grow.

**"As Australia increasingly competes on a global stage for talent and investment, it's clear that meaningful dialogue between industry and government is necessary."**



### 1.3. Tech accelerates growth across the economy and has a significant indirect economic impact

The tech ecosystem has been a key driver of growth and innovation in the Australian economy. The ecosystem supports economic growth through an 'indirect impact' by driving enhancements of business practices and developing new assets, products, and business models. These improvements are transforming the nature of work and supporting business to access global markets, better reach customers, improve productivity and scale their business.

The benefits that firms are deriving from these technologies is shown by the indirect contribution: the value-added output of the tech sector that is embedded in other industries (see Exhibit 6). The sector's economic contribution has increased 79% since 2016 and has outpaced average growth by more than four times. The acceleration of digital adoption during COVID-19 has led to substantial growth between FY20 and FY21 (26% or \$34 billion). As a result, the tech sector would be equivalent to the third highest contributor to GDP in Australia (Exhibit 7), behind only mining and banking and ahead of health care, construction, and retail.

*"Every business in Australia is now a digital business. The tradesman or woman who seeks work through Airtasker. The landscaper who finds most of their new business through search engine placement and social media. The farmer who keeps track of their herd with electronic tags or drones. The local Thai restaurant that sells through Uber Eats, Menulog, Deliveroo or any one of half a dozen different food apps. The gym where members book their classes through an app."*

- Prime Minister Scott Morrison

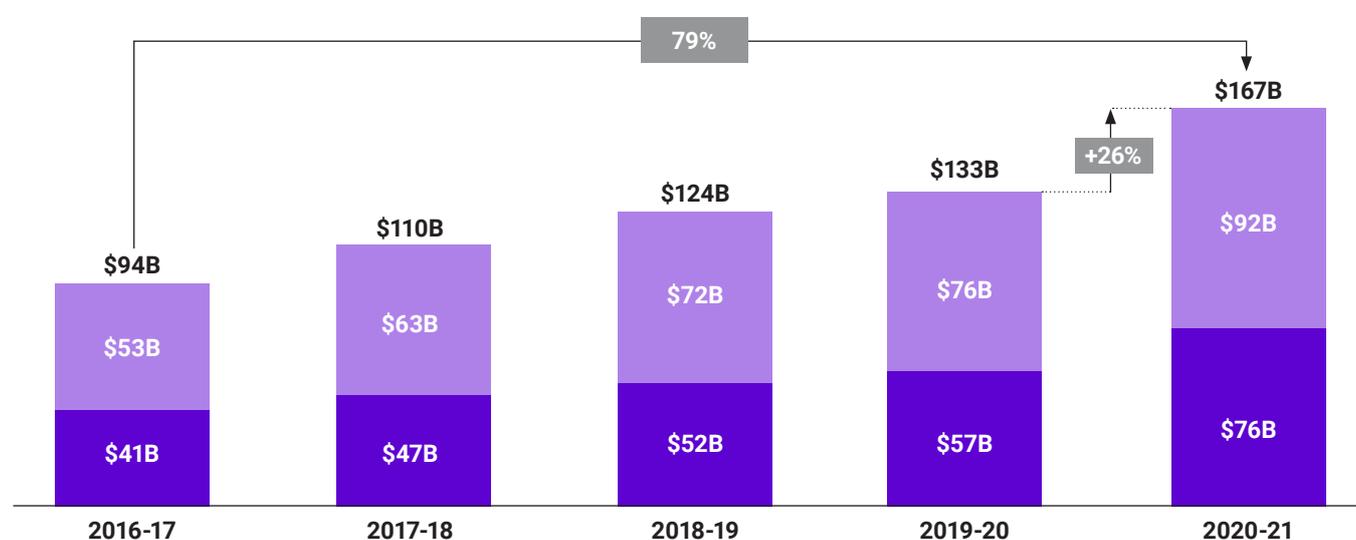
#### EXHIBIT 6

### The sector's total economic contribution has grown by 79% since 2016

#### Tech sector contribution to Australian GDP

Indirect contribution Direct contribution

\$bn GVA, total economic contribution (direct and indirect), 2016-17 to 2020-21



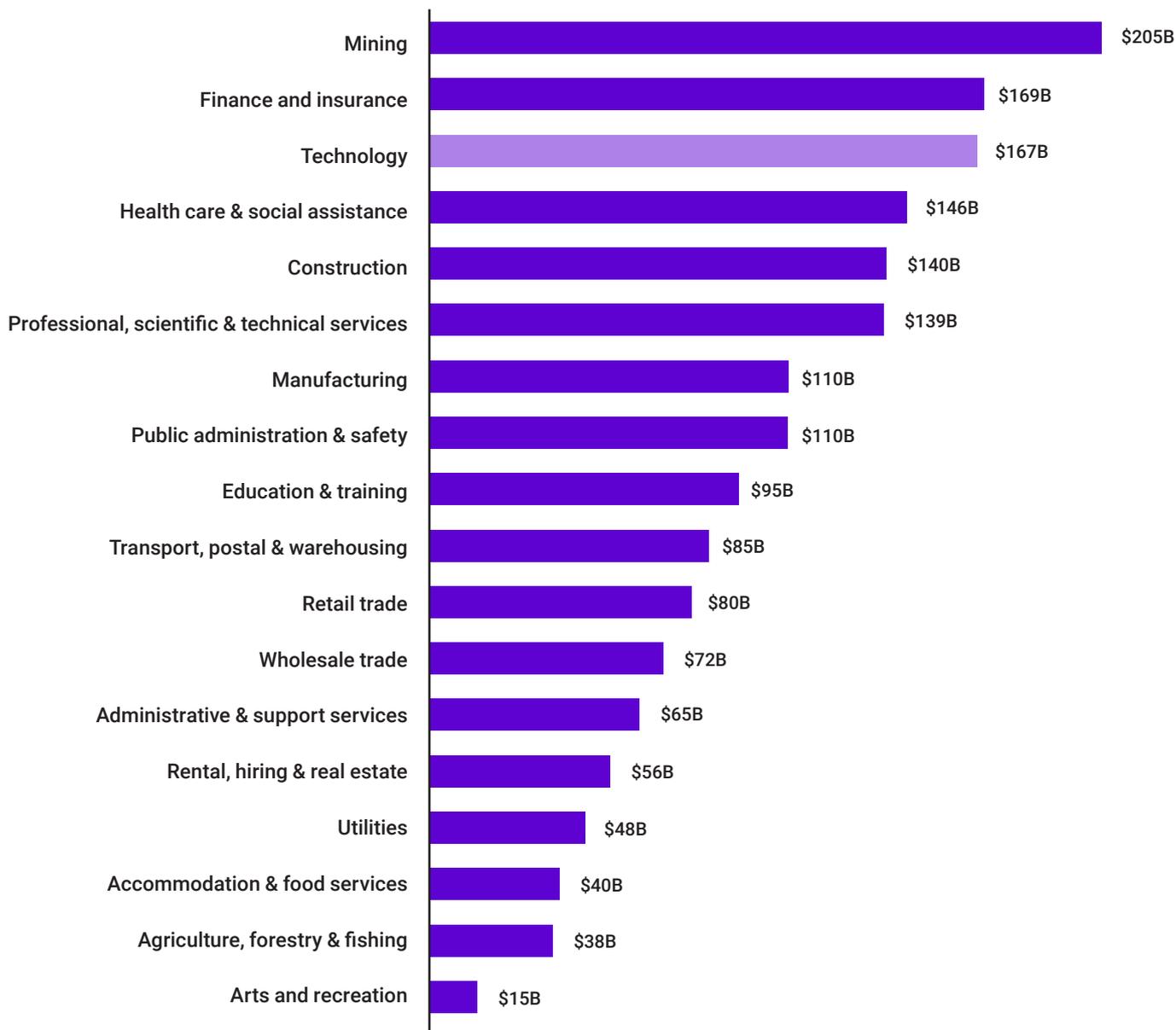
Note: The direct tech sector is defined to include internet publishing and broadcasting, telecommunications services, internet service providers, web search portals and data processing services, and computer system design and related services.  
Source: ABS (2021); Accenture analysis

## EXHIBIT 7

## The tech sector contributed \$167bn to the Australian economy in FY21 and is equivalent to the third highest contributor to GDP

### Industry ranking of contribution to GDP

\$bn, GVA contribution to Australia's GDP by industry, 2020-21



Note: The tech sector includes both direct and indirect impacts and is not an exact industry comparison as it includes components of other industries such as professional, scientific and technical services. See Appendix for details on the methodology. The information, media and telecommunications industry has been excluded from the comparison as it is substantially captured by the tech sector.

Source: ABS, Accenture analysis

New platforms and technologies create the indirect impact that is vital for all Australian businesses to reduce admin, interact with customers, accept payments, grow their business through marketing and sales, store data and build business management applications. For example, small businesses can use workforce management software, such as Seek and Deputy, to recruit and roster employees. They can accept payments in person and online through

point-of-sale software like Tyro, Vend and Afterpay, and then reconcile payments and manage business finances through accounting software such as MYOB and Xero. Businesses are also using web-based graphic design tools such as Canva and 99designs to easily create marketing material and websites. Exhibit 8 illustrates how these technologies support the value chain of a cafe.

## EXHIBIT 8

### The indirect impact of the tech sector benefits small businesses

#### Workforce management

Software to assist with recruiting and rostering



#### Work management software

Software to help manage the business, from accounting to creating documents and searching the internet



#### Property management

Property managed through digital-enabled service

**:Different**

#### Digital presence

Tools to create digital designs for an online presence

**Canva 99designs**

#### Point of sale

Payment platforms and processing

**afterpay tyro stripe**

**SECTION 1**

Cloud providers have also made advanced tech solutions available to all business, regardless of their size or industry.<sup>3</sup> This means Australian businesses can trade goods and services on the best available e-commerce platforms, use the fastest processing power and most secure infrastructure, and benefit from cutting edge software and analytics.

For example, a professional services firm can use cloud products from Google, Microsoft and Amazon to securely store and analyse data, store documents and distribute content (see Exhibit 9).

*“Implementing an online export strategy can bring millions of customers within the reach of even the smallest producer, and may provide easier market access than traditional export channels. As such, all exporters must consider how online channels fit into their business sales strategy.”*

**Austrade – ‘Introduction to online exporting’**

**EXHIBIT 9**

**The indirect impacts of the tech sector are beneficial for professional services firms**

<p><b>Workforce management</b></p> <p>Software to assist with recruiting</p> <p> </p>	<p><b>Work management software</b></p> <p>Software to help manage the business, from accounting to team collaboration</p> <p> </p>	<p><b>Digital presence</b></p> <p>Tools to create digital designs for an online presence</p> <p> </p>
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<p><b>Cloud providers enable small businesses to access IaaS, PaaS, SaaS</b></p> <p>Allows businesses to trade goods and services on the best available e-commerce platforms, use the fastest processing power and most secure infrastructure, and have cutting edge software and analytics without being a tech firm</p>	<p> Microsoft Azure</p> <p> Google Cloud</p> <p></p>
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Source: Accenture analysis

3 Note: These services can include Software as a Service (SaaS), Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) offerings.

## CASE STUDY: SERENADE

## Early startup experience inspires success at Serenade

**FUNCTION:** Personalised music performances for fans

**INDUSTRY:** Arts and Recreation

**SIZE:** 5 employees

**HEADQUARTERS:** Sydney

**FOUNDED:** 2020

When Max Shand was offered a job at an early stage fintech company in 2014, he leapt at the opportunity. Despite being fresh out of high school and having no tech experience, Shand was trusted with building the customer base of the rapidly growing buy-now-pay-later startup Afterpay.

Being at the heart of Afterpay's growth gave Shand a taste for entrepreneurship.

**“Being able to participate in an ambitious tech company offers tremendous value to a budding entrepreneur. It shows you what success is and the path to get there.”**

Shand says the skills and networks he developed at Afterpay, as well as the mentorship of founder Nick Molnar, were instrumental in helping him launch his own startup, Serenade, and venture capital firm Strangelove.

**“I learnt the language of the tech sector at Afterpay. I understood how it worked and what it wanted to achieve, and also how to approach investors and customers.”**

Serenade is an online marketplace for musicians to sell unique digital collectibles to their most devoted fans as non-fungible tokens (NFTs). Serenade now supports 200 Australian artists and is poised for expansion in the US and UK.

The tech ecosystem has continued to be integral in the success of Serenade. As a sole founder Shand has relied on his network to support him to develop the business and also find quality people with the skills and values Serenade needs.

It is an exciting time to be participating in the Australian startup ecosystem according to Shand, who highlights a growing venture capital market and the willingness of angel investors to support promising young companies.

However, he still sees challenges for Australian startups when they must compete with overseas companies who have better access to capital.

Increased support for early-stage businesses will help Australian companies on the world stage.



### 1.4. The tech sector is the engine of jobs in the new economy

The tech sector is one of the biggest generators of quality jobs for a diverse range of skillsets in Australia. Tech jobs are critical to the growth of tech firms and industries that use tech in their businesses such as banking, agriculture, mining, retail and manufacturing. Business and systems analysts, web developers, software programmers, database administrators and cybersecurity specialists are critical for developing new products and software as well as the day-to-day operations of many businesses. Tech firms also create broader employment opportunities as they hire support occupations in non-tech roles such as sales and marketing, administration, human resources and legal.

Tech occupations are some of the fastest growing occupations in Australia and can be found in several industries. The wide range of tech roles includes examples such as:

- software and applications programmers automating tasks and improving productivity in financial services,
- web developers in education creating innovative services to support online learning, or
- cyber security specialists in hospitals ensuring private data is safeguarded and secure.

Employment opportunities in the tech sector are growing at almost twice the average rate of job growth across other sectors, with tech sector jobs growing 66% between 2005 and 2021 compared to the average growth rate of 35% (see Exhibit 10). Tech sector jobs were outpacing overall growth before the COVID-19 pandemic, increasing 54% between 2005 and 2019 compared to an average growth of 25% across the economy. Growth in tech roles spiked between 2019 and 2020 (up 12.5 percentage points) while overall employment plateaued. The rise in tech jobs is equivalent to an additional 340,000 new jobs in the tech sector since 2005 and 65,000 in 2020 alone.

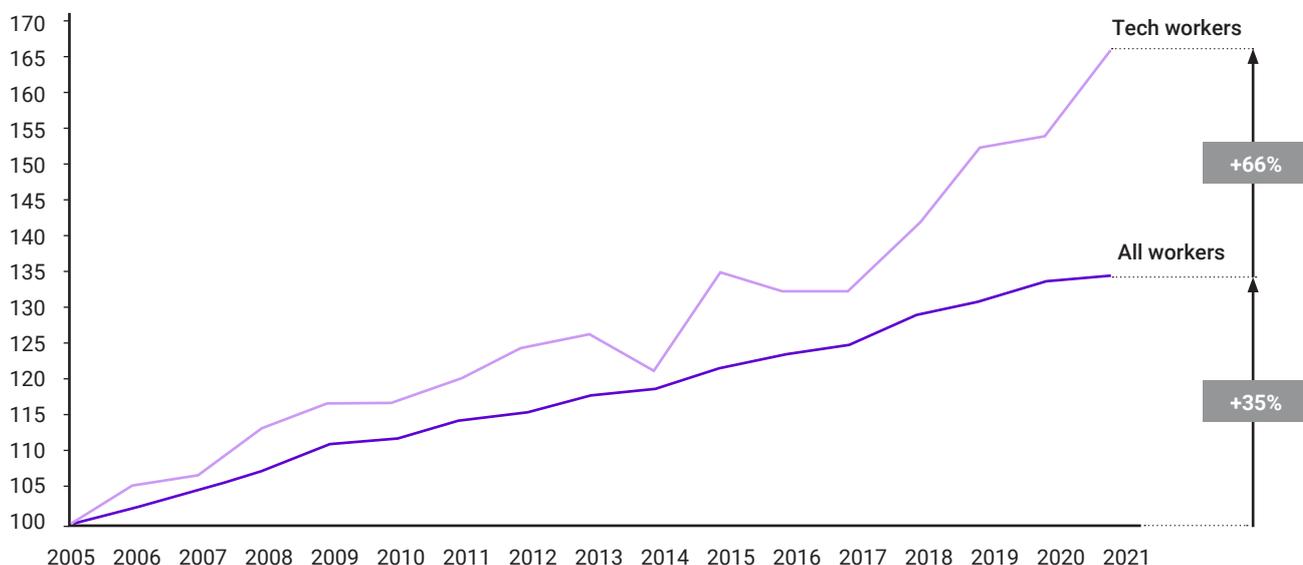
Tech-related occupations were among the fastest-growing roles in the wider economy during the pandemic, with 22,000 new software and applications programmers employed and 19,000 new jobs for multimedia specialists and web developers.<sup>4</sup>

EXHIBIT 10

### Tech sector jobs have grown 66% since 2005 compared to an average growth rate of 35% across the economy

#### Growth in number of workers in the tech sector and the overall economy

Index, where number of workers in February 2005 is equal to 100



Sources: ABS Labour Force, 2016 Census, Accenture analysis

4 National Skills Commission (2021), Employment by industry, occupation and skill level

The tech sector's rapid growth in job numbers and economic contribution made it one of the largest industries and employers in Australia in 2020-21, with 861,000 people employed in tech occupations. Overall, the sector would be equivalent to the seventh largest employer in Australia, providing jobs to 6.6% of the workforce.

Major employers of people in tech occupations include professional services firms, information media companies and businesses in the telecommunications sector, but nearly one third of tech workers are employed outside of these major tech industries. These industries often include public administration, finance, education and manufacturing. The size of this indirect workforce is equivalent in size to the total mining sector (250,000 workers).

## CASE STUDY: HEALTH CARE INDUSTRY

### Software programmers are revolutionising patient care

'Software programmer' is the most common technology role in Australia, ranking 14th among all occupations. Software programmers design, develop, maintain and improve program code. This can involve:

- analysing system needs alongside technology capabilities and limitations;
- designing and developing software;
- testing, debugging and maintaining software; and
- identifying opportunities to improve software and develop new products.

Software programmers are found in a range of industries, including health care. An exciting growth area is "health informatics" which focuses on applying artificial intelligence and digital technologies to the industry. This has led to a number of cutting-edge innovations, including in patient safety, precision health, and consumer informatics.<sup>1</sup>

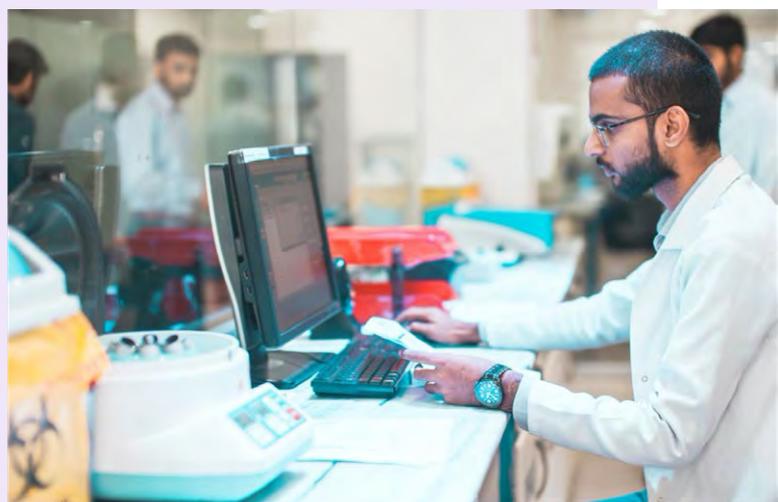
Technology continues to advance the way doctors treat and support patients, putting software programmers in high demand.

**"Health is on the cusp of a technological revolution... Every single healthcare institution is going to have to rewrite their business plan."**<sup>2</sup>

- **Dr Louise Schaper**

*Chief Executive of the Health Informatics Society of Australia*

The adoption of digital technology in the health care industry has brought important benefits. Research shows that introducing IT to intensive care units has led to a 46% to 68% decline in mortality,<sup>3</sup> while the use of digital tools has reduced the incidence of doctors providing incorrect care by up to 75%.<sup>3</sup>



1 Macquarie University - Centre for Health Informatics (mq.edu.au)

2 RACGP - Are you ready? Future-proofing your practice

3 Protti (2011), The past and future impacts of health/medical informatics on healthcare delivery

**SECTION 1**

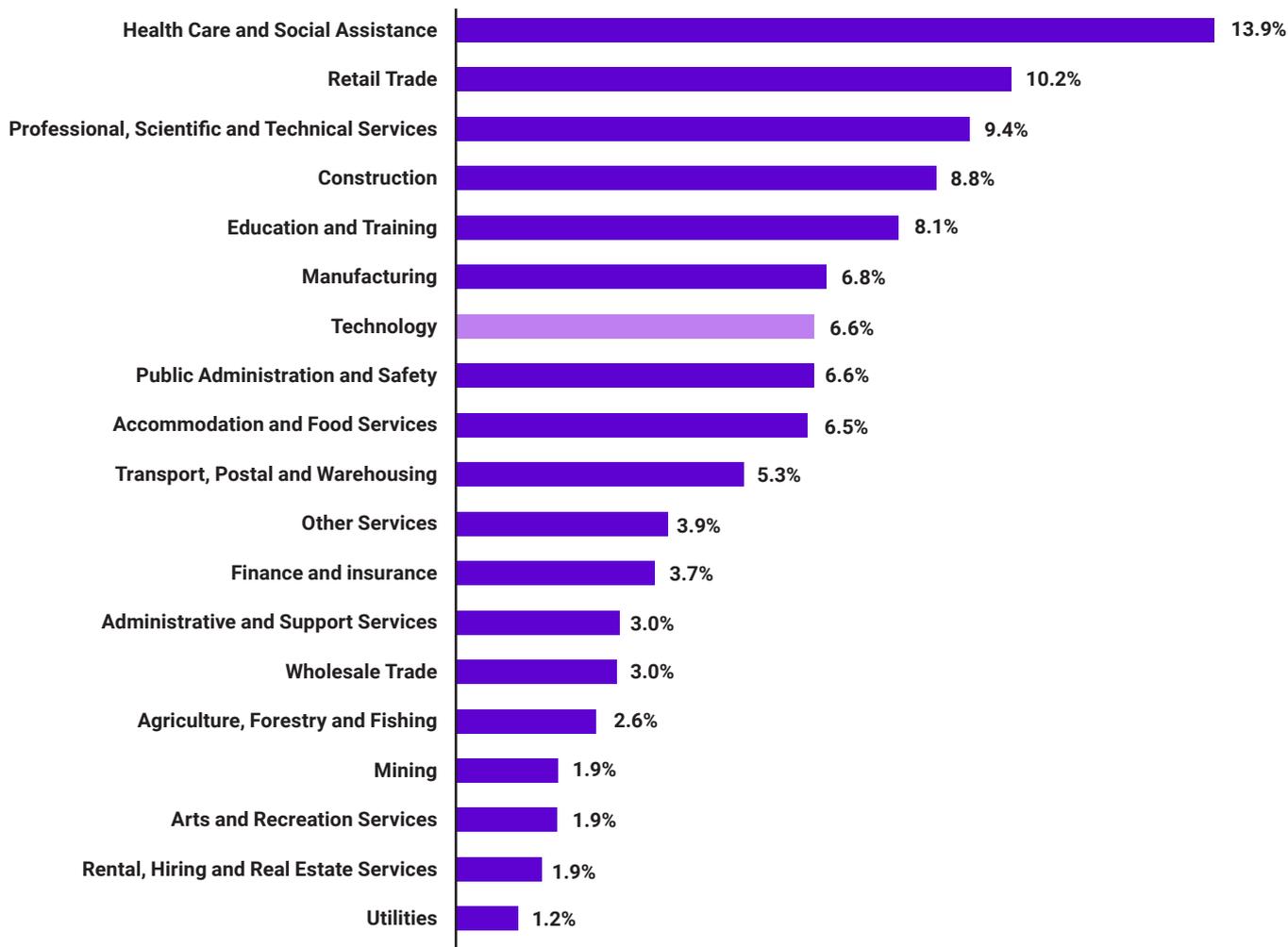
Software and application programming is the 14<sup>th</sup> largest occupation in Australia (see Exhibit 11), accounting for 151,000 workers. Software and application programmers outnumber many common occupations such as secondary school teachers (132,000; 17<sup>th</sup>), solicitors (95,000; 31<sup>st</sup>), plumbers (85,000; 36<sup>th</sup>) and hairdressers (72,000; 47<sup>th</sup>).

**EXHIBIT 11**

**The tech sector would be equivalent to the seventh largest employer in Australia**

**Share of Australian workers by industry**

%, February 2021



Note: The technology sector does not provide a mutually exclusive industry comparison as it includes employees from other sectors and, as a result, the total will not add up to 100%. See Appendix for details on the methodology. The information, media and telecommunications industry has been excluded from the comparison as it is substantially captured by the tech sector.

Source: ABS, Accenture analysis

The tech sector creates employment across Australia in cities, suburbs and regions. For example, ICT Professionals (a subset of the tech workforce) are concentrated in Sydney and Melbourne, but large groups are also found in regional areas and smaller cities such as Canberra, Brisbane, Perth and Adelaide (Exhibit 12).

## EXHIBIT 12

## The tech sector creates employment across Australia in cities, suburbs and regions

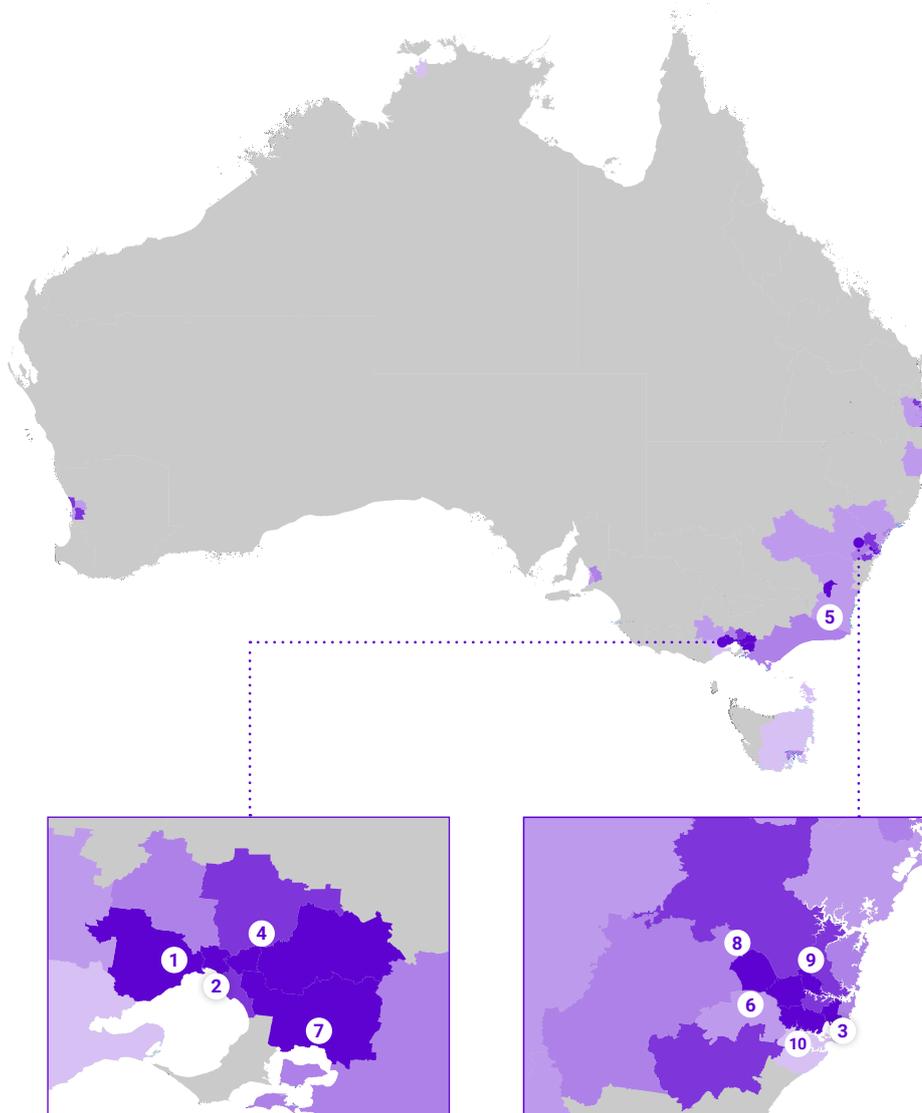
### Number of ICT Professionals by SA4 region

Relative number of ICT Professionals by SA4, August 2020

- High number of ICT Professionals
- Low number of ICT professionals
- No ICT professionals, limited data

### Top 10 regions employing ICT Professionals

1. Melbourne - West
2. Melbourne - Inner
3. Sydney - City and Inner South
4. Melbourne - Inner East
5. Australian Capital Territory
6. Sydney - Paramatta
7. Melbourne - South East
8. Sydney - Blacktown
9. Sydney - Ryde
10. Sydney - Inner South West



Source: ABS (2021), Characteristics of Employment

**SECTION 1**

Growth in tech jobs has diversified away from major capital cities and is strongest in regional and suburban areas (see Exhibit 13). The highest growth rates for ICT professionals are mostly on the outskirts of Sydney and Melbourne, including Sydney's Outer South West (including Campbelltown, Camden and Narellan) and Melbourne West (including Sunshine West, Williamstown and Altona).

Five of the top 10 fastest growing regions for ICT professionals are in South-East Queensland, with the highest average growth rates recorded in East Brisbane. Regional cities, including Adelaide and Hobart, also experienced high growth in the number of ICT professionals.

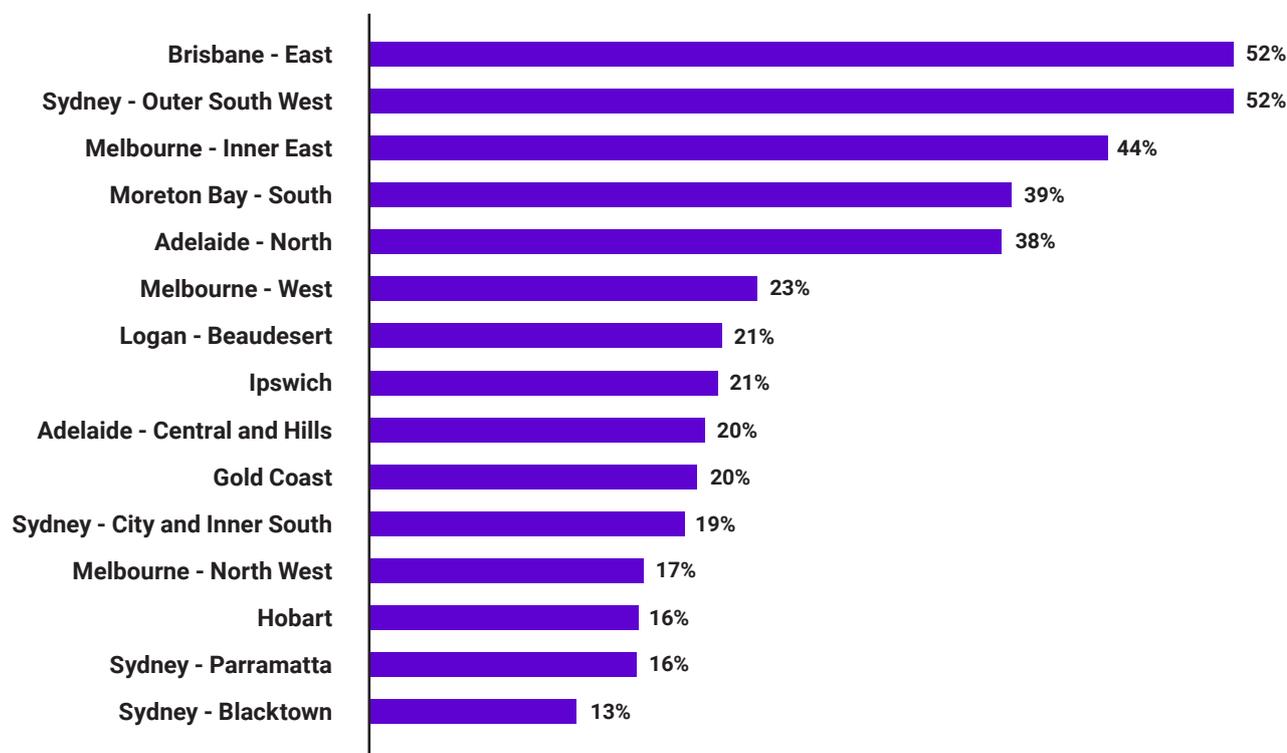
**EXHIBIT 13**

**The fastest growing areas for tech jobs are in regional and suburban areas**

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**Top 15 regions fastest growing regions for ICT Professionals**

*Average annual growth rate of ICT Professionals by SA4, 2015-2020*



Note: Geographical data is only available for a subset of tech occupations referred to as ICT Professionals, which represent approx. 40% of tech occupations.  
Source: ABS (2021), Characteristics of Employment

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## CASE STUDY: AGRIDIGITAL

## AgriDigital paves the way for agtech-meets-fintech revolution

**FUNCTION:** Supply chain management system

**INDUSTRY:** Agriculture

**SIZE:** 35 employees

**HEADQUARTERS:** Sydney

**FOUNDED:** 2016

By integrating blockchain into the grain supply chain, AgriDigital is paving the way for an agtech-meets-fintech revolution.

AgriDigital's online products facilitate every step in the grain production process – from enabling efficient farming to smart contracts and just-in-time supply chain finance.

This helps smaller agricultural companies to enter and remain in the industry.

**"The vast majority of the grain supply chain is unfinanced which depresses growth. Companies with stronger balance sheets are able to dominate, leading to market concentration and a lack of competition."**

Just four years after launching its first product, AgriDigital has 8,000 active users, accounting for 10% of all grain produced in Australia. More than 98% of customers have free access to the platform, and often see almost immeasurable efficiency gains.

**"One customer told us that they received 25,000 pieces of paper per year that needed to be sorted and filed. AgriDigital replaces that whole process."**

Emma Weston, AgriDigital's CEO, attributes the company's rapid growth to early access to funding, a broader drive by policy makers to support the tech community and a strong network in the industry. For example, AgriDigital uses 30 to 40 coding and digital infrastructure services to develop a technically

complex but user-friendly product. It also relies on Atlassian workflow tools to support its 35 employees.

AgriDigital must continue to innovate and scale as demand continues to grow. This includes investing around \$1.2 million to \$2 million in R&D each year, with two thirds of its staff in product and engineering. AgriDigital's biggest concern for the future is its ability to source local talent as it looks to double its workforce by the end of 2021. In particular, it needs experienced product managers and engineers with flexible coding capabilities.



# 2.

## Despite Australia's technology sector growth we are falling behind global peers

The Australian tech sector has matured quickly over the last decade following increased support from government and industry and the reform of the VC sector. The government's focus on innovation and science in recent years supported the rapid development of the sector. Investment in early stage information technology (IT) companies has increased by more than 1,000% since 2011,<sup>5</sup> with high growth tech firms now raising twice as much on average compared to 2015. More than 800 VC deals were completed between 2015 and 2020 and were worth five times the aggregate value of deals in the preceding five years.<sup>6</sup>

A growing list of Australian companies have developed beyond the startup phase and are competing internationally while supporting economic growth and jobs at home. This includes well-known companies such as Afterpay and Atlassian and emerging firms like AgriDigital, Willow, and CultureAmp. Many Australian tech companies have become core enablers and drivers of growth in other sectors of the economy.

<sup>5</sup> Brescia (2021), Who – and where – are Australia's VC funds? And where do they get their money from?

<sup>6</sup> Australian Investment Council, 2021-22 Pre-Budget Submission



## 2.1. Australia performs relatively well in technology adoption but there is room to improve domestic innovation and creation

Compared to other countries in the OECD, Australia ranks relatively well for technology adoption but is behind in measures of technology innovation and creation. This includes relatively high performance for measures such as the

proportion of businesses employing ICT specialists (ranking third out of 38), business adoption of cloud (sixth out of 38) and business social media use (tenth out of 38) (see Exhibit 14). This contrasts with lower rankings for measures of domestic technology innovation and creation such as R&D budget (11<sup>th</sup> out of 38), R&D incentives (20<sup>th</sup> for SME tax subsidies and 26<sup>th</sup> out of 38 for large business tax subsidies) and venture capital (VC) investment (11<sup>th</sup> out of 38). Overall, Australia ranks 36<sup>th</sup> out of 38 in the OECD for its ICT trade balance.

### EXHIBIT 14

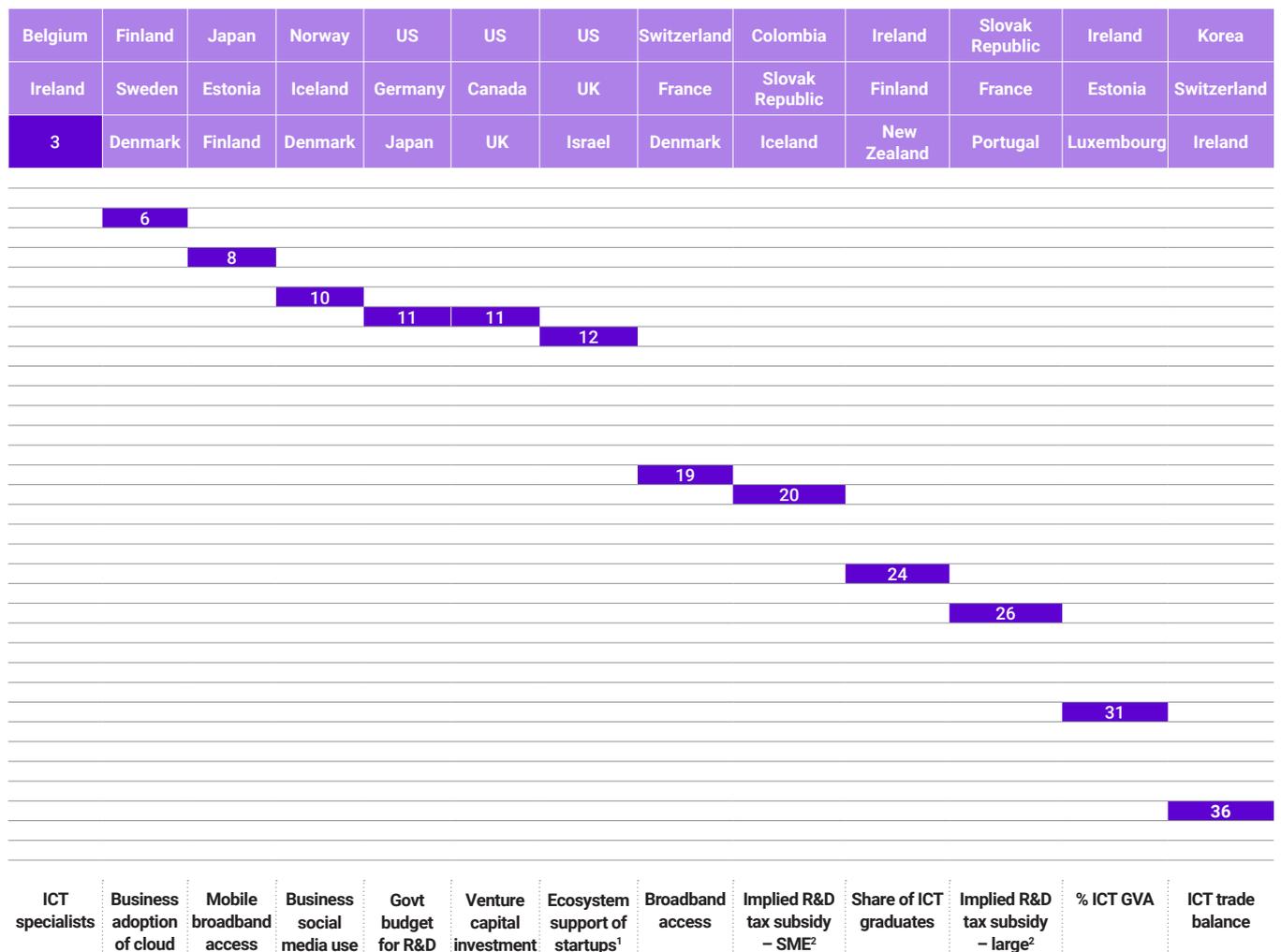
## Compared to other OECD countries, Australia performs well in technology adoption but is behind in innovation and creation

### Australia's global ranking in tech sector related metrics

✕ Australia    ■ Top 3

Ranking amongst OECD countries, 2020

Australia performs relatively well ← → Australia has opportunity to improve



1 Based on ranking of startup ecosystems where an early-stage startup has the best chance of building success, considering performance, funding, connectedness, market reach, knowledge and talent.  
 2 Based on a broad OECD assessment of headline tax credit and allowance rates, by firm size and profitability scenario. It does not take into account specific concessions that lift Australia's competitiveness in this space.

Note: Latest available data used where 2020 not available. Data is not available for specific countries for some of the criteria. Sources: OECD; Startup Genome (2020), The Global Startup Ecosystem Report GSER 2020

There has been a dramatic increase in technology adoption by small businesses in Australia in the past few years, particularly in cloud services. Half of businesses with zero to four employees now use paid cloud technologies such as SaaS, IaaS and PaaS, up 37% since 2017. Of those with five to 19 employees, the figure is even higher, at 65% (see Exhibit 15).<sup>7</sup> Small to medium-sized businesses continue to have the most

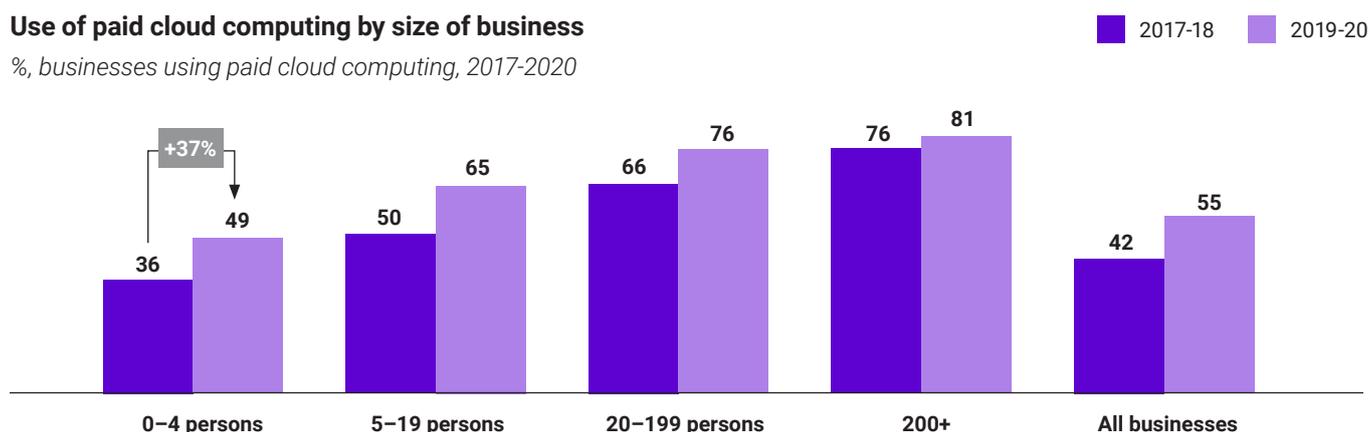
to gain from adopting cloud technologies as they provide access to tools and services that were previously only feasible for larger businesses to develop. Therefore, support for further adoption of these technologies by small to medium-sized businesses could result in significant benefits. Rates of adoption continue to be high in larger businesses.

## EXHIBIT 15

## The majority of Australian businesses now use cloud services

### Use of paid cloud computing by size of business

%, businesses using paid cloud computing, 2017-2020



Source: ABS (2021), Characteristics of Australian Business 2019-20

This growth of new technologies and innovative products has been underpinned by an emerging investment and VC sector in Australia in the last decade, increased research and development and growing digital capabilities by employees and businesses. VC deals are integral to creating successful high-growth firms in Australia as they provide up-front

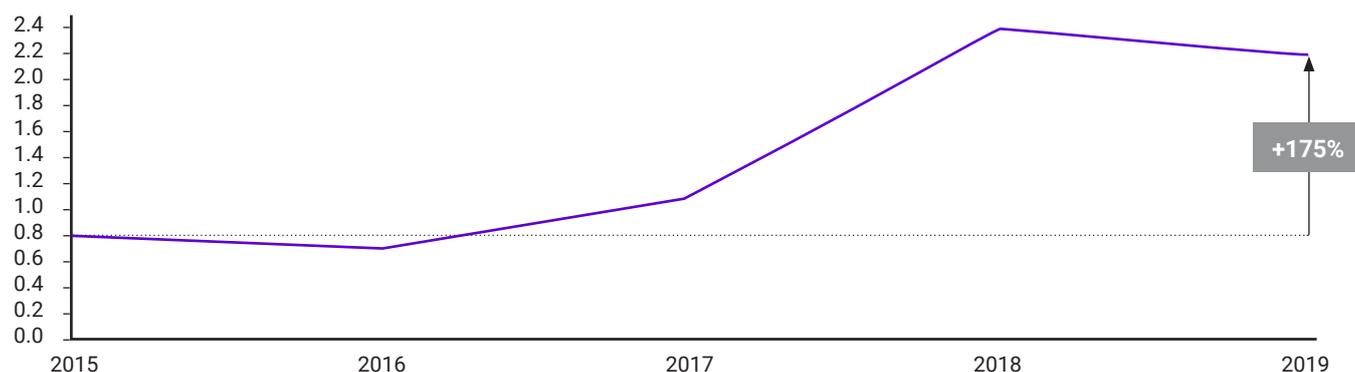
capital and advise and collaborate with startups, providing them with toolkits, networks, and promotion support.<sup>8</sup> A more substantial VC market is beginning to emerge in Australia, with total deal value more than doubling in size between 2015-2019 (Exhibit 16).<sup>9</sup>

## EXHIBIT 16

## Venture capital deals in Australia are growing

### Venture capital deals in Australia 2015-2019

Aggregate deal value \$bn



7 ABS (2021), Characteristics of Australian Business 2019-20

8 Pierakkis Y & Saraidakis G 2019, 'The role of venture capitalists in the regional innovation ecosystem: a comparison of networking patterns between private and publicly backed venture capital funds' The Journal of Technology Transfer volume

9 Australian Investment Council, 2021-22 Pre-Budget Submissions

**SECTION 2**

However, there are some barriers to capturing the benefits of digital technologies. Australian businesses predominantly report that education and policy factors are key limitations on technology use (see Exhibit 17). Two of the top three factors affecting technology use relate to education and capability, with 15% of businesses experiencing problems citing a lack of skilled personnel and insufficient knowledge of ICT.<sup>10</sup> Australia has a low global ranking for share of graduates in ICT fields

(24<sup>th</sup> out of 38 in the OECD),<sup>11</sup> reflecting this lack of technology knowledge, which will continue to limit growth of the sector.

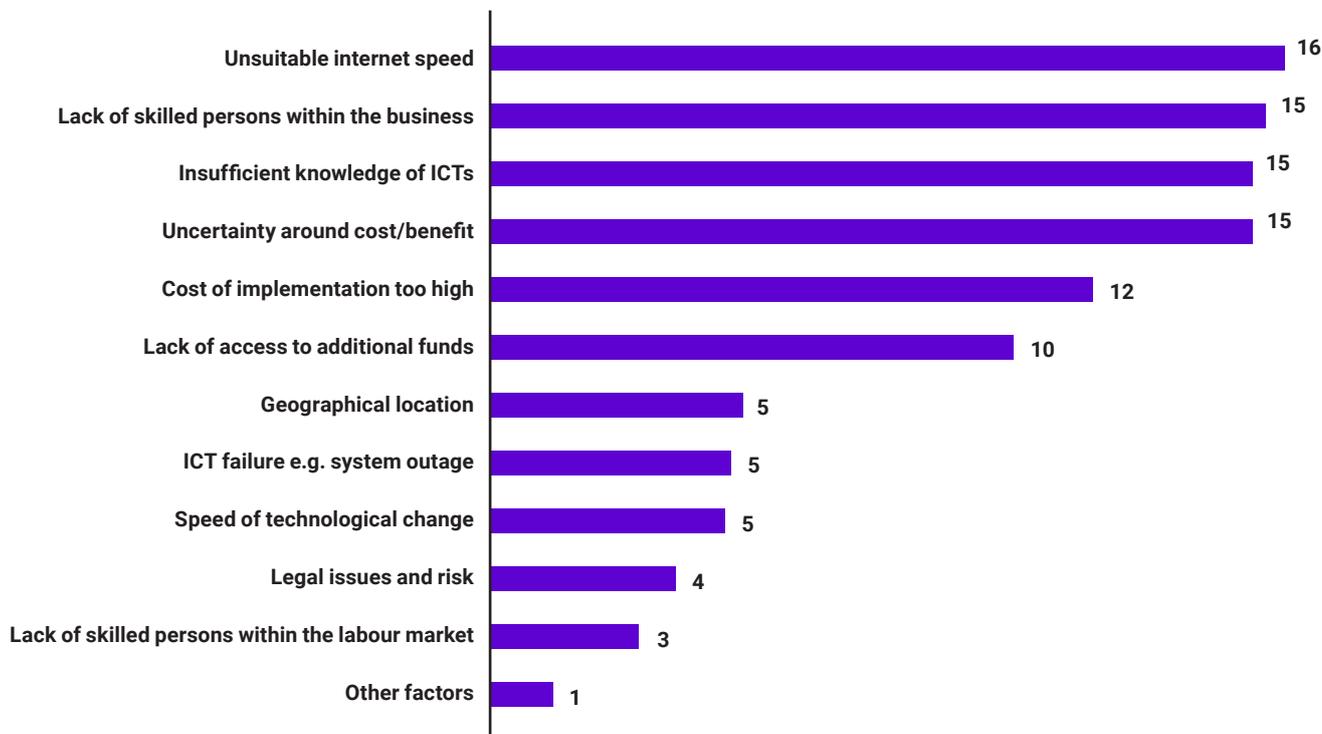
In addition, many businesses reported that policy was a factor, including uncertainty around the costs and benefits of ICT (15%), lack of access to funding (10%) and legal issues and risk (4%).<sup>12</sup>

**EXHIBIT 17**

**Key limitations on technology use by businesses include internet speed, skills and uncertainty**

**Factors which limited the use of technology by Australian businesses**

*% businesses that experienced limiting factors, 2019-20*



Note: Businesses were able to select more than one responses (% does not sum to 100)  
Source: ABS (2021), Characteristics of Australian Business, 2019-20; Accenture analysis

10 ABS (2021), Characteristics of Australian Business, 2019-20; Accenture analysis  
11 OECD  
12 OECD

While adopting technology is crucial for local productivity and efficiency gains, the greatest economic opportunities for Australia lie in creating new businesses and products that are in global demand. Research shows that startups account for a disproportionately high rate of job creation, drive higher productivity growth and innovation, and are more likely to introduce new or significantly improved goods or services than older firms.<sup>13</sup> Technology jobs also have a greater multiplier effect than any other industry.<sup>14</sup>

Australia currently ranks 36th out of 38 in the OECD for ICT trade balance and is failing to capture potential economic gains by being overly focused on adopting technologies developed overseas at the expense of driving domestic technology creation. Australia should take a pragmatic approach to the benefits of combining global and local technology creation, not one or the other. Factors that discourage local creation include limited competition in many domestic industries which reduces the incentive, or 'burning platform', to drive investment in innovation.<sup>15</sup> Another barrier is the challenge Australian businesses face in finding experienced tech talent to create new solutions. For example, data from the Management and Organisational Capabilities of Australian Businesses rates digital management capabilities as the lowest performing management capability category for Australian businesses. Inconsistent and unpredictable regulation can also act as a barrier to innovation, reducing investment in new ideas.

**" Australia currently ranks 36th out of 38 in the OECD for ICT trade balance and is failing to capture potential economic gains by adopting technologies developed overseas rather than driving domestic technology creation. "**

13 Office of the Chief Economist, Department of Industry, Innovation and Science (2015), Australian Innovation System Report

14 Moretti (2012), The New Geography of Jobs: Mariner Books

15 ABS Business Characteristics Survey

# 3.

**Australia can realise  
a tech-supported  
recovery, securing 1m  
jobs and contributing  
\$244bn annually to GDP**



### 3.1. There is an opportunity to capture additional growth by catching up to global peers

Ongoing barriers to innovation and development have constrained the size of Australia’s direct tech sector relative to its peers. It is estimated that the direct tech sector contributes 3.8% of Australian GDP which is significantly below the US (10.2%), UK (8.1%), and Canada (6.8%).<sup>16</sup> As a result, Australia has a substantial opportunity to increase the economic contribution of the tech sector to catch up with its global peers.

If the tech sector’s annual contribution to GDP remains constant over the next 10 years, it is estimated it would be \$214 billion by 2031. However, if Australia can boost tech’s contribution by 1.2 percentage points to match Canada’s tech sector contribution, it would be equivalent to an additional \$30 billion per year or a total annual contribution of \$244 billion (see Exhibit 18). Canada is a similar economy to Australia, with dominant agriculture and mining sectors. Canada’s development of its tech sector has included balanced support for global and local

companies, enabling smaller firms to build on the success and resources of major tech players.<sup>17</sup> If ambitious stretch targets were set and Australia met the UK or the US’ current sector contribution in the next decade, it could achieve an additional \$54 billion to \$124 billion in economic value by 2031 and contribute \$338 billion annually to GDP.

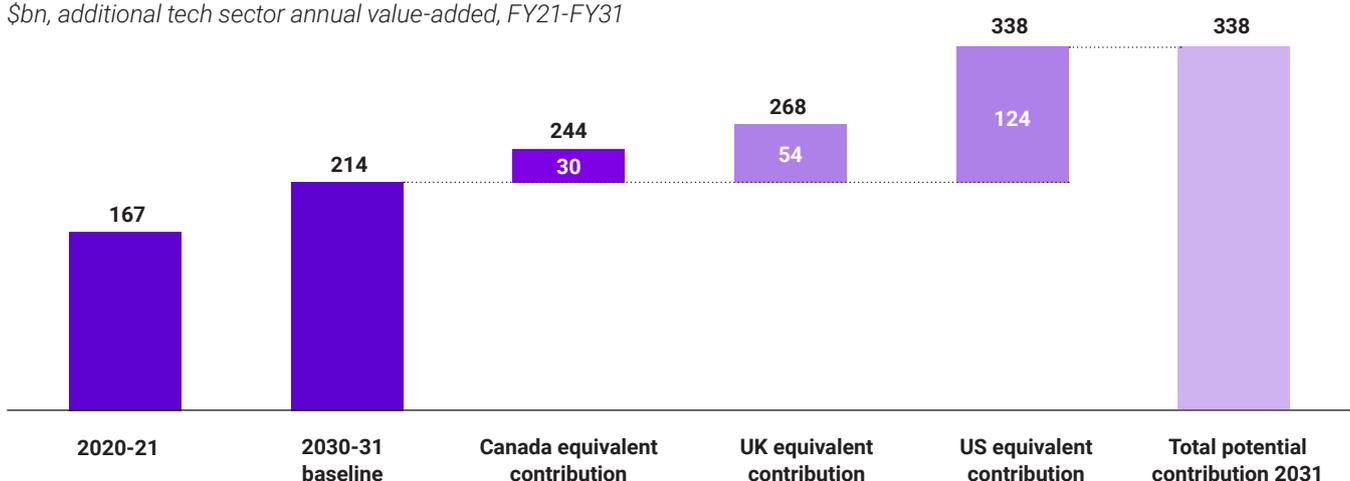
This growth will be an important source of job creation during the economic recovery from the COVID-19 pandemic. Under a growth scenario where Australia can match Canada’s tech sector contribution, the tech sector will employ 1 million people by 2025 or an additional 141,000 workers in the next 5 years. Under the stretch UK or US scenarios, between 277,000 and 638,000 additional workers could be employed annually by the tech sector in 2031 (see Exhibit 19). To capture this opportunity, Australia will need to embrace the vital role the tech sector plays in the economy through fit-for-purpose policy settings and a collaborative approach to sector development between government, industry and academia.

**EXHIBIT 18**

### If Australia’s tech sector contribution matched Canada’s, it could contribute \$244bn annually to GDP in 2031

**Projected additional tech sector value-added contribution to GDP**

*\$bn, additional tech sector annual value-added, FY21-FY31*



Sources: Bureau of Economic Analysis, Statistics Canada, UK Department for Digital, Culture, Media and Sport, ABS, IMF, Accenture Analysis

16 This ranking only includes the direct technology sector and these industries may be defined slightly differently across jurisdictions. ABS (2021); US Bureau of Economic Analysis (2018); UK Department for Digital, Culture, Media and Sport (2020); Statistics Canada (2019); International Monetary Fund (2020); Accenture analysis  
 17 See, for example, the MaRS Discovery District in Toronto, the Innovation Superclusters Initiative, and Canada’s strong relationship with the Silicon Valley tech ecosystem through its High Commissioner in Northern California. The Canadian government is also investing heavily in three key areas to develop its tech sector through the ‘Innovation Agenda for Canada’, focusing on people, technology and companies.

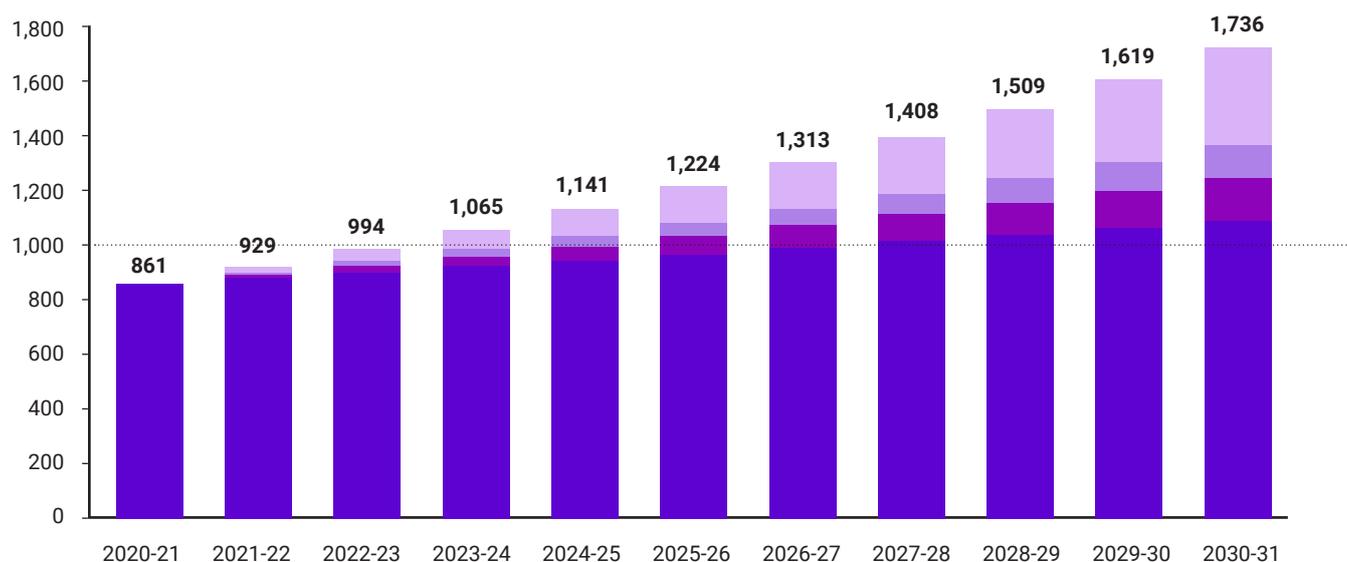
## EXHIBIT 19

## The tech sector will employ 1 million people by 2025, or an additional 141,000 workers in the next 5 years, if Australia can match Canada's contribution

### Projected number of workers in the tech sector

Number of workers, '000

US equivalent contribution    Canada equivalent contribution  
UK equivalent contribution    Baseline - business-as-usual



Source: ABS Labour Force, 2016 Census, Accenture analysis

### 3.2. Australia should focus on talent, growth and a collaborative approach to regulation to capture this opportunity

Previous policies have supported the tech ecosystem in its early stages but ongoing opportunities exist to support the sector into maturity. This includes ensuring public policy recognises, embraces and appropriately responds to technology.

Australia can capture the full economic potential of the sector by prioritising the three components of the tech ecosystem and using them as levers to accelerate growth:

1. Attract, train and retain talent to support business creation and growth.
2. Incentivise growth and investment through formation funding and targeted tax and investment incentive frameworks.
3. Collaborate with stakeholders to develop fit-for-purpose regulation and support digital-enabling infrastructure.

International success stories can inform Australia's approach and provide insight into potential benefits.

## CASE STUDY: LIVE TILES

## Big and small partnerships have taken LiveTiles from Aussie startup to global firm

**FUNCTION:** Employee experience platforms

**INDUSTRY:** B2B

**SIZE:** 130 employees

**HEADQUARTERS:** Melbourne

**FOUNDED:** 2014

LiveTiles started with about 10 employees, listing on the ASX in 2015 as a specialist intranet company. It is now a global SaaS provider with 130 employees across Australia, the US, Europe and the Asia Pacific. LiveTiles provides employee experience platforms with software products for internal communications and customisable intranets, helping employees collaborate remotely.

In addition, LiveTiles Vibe offers a rapid team-wide 'pulse-check', enabling anyone in an organisation to 'read the room' of a digital workplace on any topic.

LiveTiles attributes its success to early support from Microsoft, which provided immediate validity in front of customers, introductions to new networks and help building robust, secure and scalable products. In particular, Microsoft's cybersecurity expertise gave LiveTiles an edge while many early-stage companies struggled to develop these capabilities.

**"Reputation and customer examples were critical to getting business in the early stages – without Microsoft's backing our hypergrowth launch wouldn't have happened."**

The Microsoft partnership also boosted LiveTiles' profile with investors who provided most of LiveTiles' capital. LiveTiles now invest \$4 million to \$6 million in R&D each year to build and improve products to meet increased demand as workplaces transition into permanent hybrid models.

LiveTiles has more than 220 transacting partners, many of which are small to medium tech enterprises. These partners provide referrals and a revolving door of tech talent.

Like many Australian startups, LiveTiles has benefitted from the 'why not' culture of the US tech industry. The deep experience of the people it has hired has been a great catalyst for innovation, especially when combined with the LiveTiles value of hiring people from outside the tech industry altogether.

**"Bringing talent to Australia will be invaluable in developing the sector. Experienced hires can train and mentor our broad church of workers to grow a local innovation culture."**



## EXHIBIT 20

## Overview: Intervention priorities, examples and potential benefits

Priority area	Key existing measures	International policy examples	Potential benefits
<p><b>1</b></p> <p><b>Develop talent</b></p> <p>Attract, train and retain talent to support business entry and growth</p>	<ul style="list-style-type: none"> <li>Digital Skills Organisation</li> <li>JobTrainer Fund</li> <li>STEM support in schools</li> <li>Academy for Enterprising Girls</li> <li>Tech additions to skilled migration visa occupation list</li> <li>Global Talent Visas for skilled talent</li> <li>Changes to Employee Share Scheme cessation of employment tax event</li> </ul>	<p><b>Skilling the workforce with tech skills</b></p> <ul style="list-style-type: none"> <li> UK National College for Digital Skills (Ada)</li> <li> Sweden Stockholm School of Entrepreneurship</li> <li> Scotland's Modern Apprenticeships</li> <li> UK technology education and teacher competency curriculum</li> </ul> <p><b>Attracting new workers to the sector</b></p> <ul style="list-style-type: none"> <li> US H-1B and E3 visas</li> <li> Canada Express Entry, Provincial Nominee, Start-up and Global Skills Strategy &amp; Talent Stream visas</li> <li> Israel High Tech Work visas</li> <li> UK Tech Nation and Innovator visas</li> <li> Denmark Kobenhavns Kommune</li> <li> US Employee Stock Ownership Plans</li> </ul>	<p>Increasing talent supply to meet the forecast shortage will contribute an <b>additional \$3.6bn in GVA</b> per year</p>
<p><b>2</b></p> <p><b>Foster growth</b></p> <p>Incentivise growth and innovation through R&amp;D and business formation</p>	<ul style="list-style-type: none"> <li>R&amp;D Tax Incentives</li> <li>Biotech patent box</li> <li>Depreciation of intangible assets</li> </ul>	<p><b>R&amp;D incentives</b></p> <ul style="list-style-type: none"> <li> Belgium patent box</li> <li> EU loan for technological innovations</li> <li> Germany tax incentive for software development</li> </ul> <p><b>Cross-sector collaboration programs</b></p> <ul style="list-style-type: none"> <li> Germany EXIST startup grants and networks</li> <li> Ireland Disruptive Technologies Innovation Fund</li> <li> UK Catapult programme</li> </ul>	<p>Increasing Australia's R&amp;D contribution to meet global peers could <b>increase investment by \$5-13bn</b> per year</p>
<p><b>3</b></p> <p><b>Implement regulation &amp; supporting infrastructure</b></p> <p>Collaborate with stakeholders to develop fit-for-purpose regulation</p>	<ul style="list-style-type: none"> <li>Digital Economy Strategy</li> <li>Tech Hubs in NSW, SA, VIC</li> <li>NBN</li> </ul>	<p><b>Availability of capital</b></p> <ul style="list-style-type: none"> <li> UK Enterprise and Seed Investment Schemes</li> <li> US Small Business Administration</li> <li> Sweden angel investor tax deduction</li> </ul> <p><b>Startup assistance programs</b></p> <ul style="list-style-type: none"> <li> Israel Innovation Authority</li> <li> Enterprise Ireland</li> <li> Singapore Startup SG Founder program</li> </ul> <p><b>Appropriate regulatory settings</b></p> <ul style="list-style-type: none"> <li> UK DCMS 10 Tech Priorities, including the Digital Markets Unit and rollout of 'world class digital infrastructure'</li> <li> Singapore Infocomm Media Development Authority</li> <li> Singapore Fintech and Innovation Group</li> </ul> <p><b>Supporting infrastructure</b></p> <ul style="list-style-type: none"> <li> Canada MaRS Discovery District (Toronto)</li> <li> South Korea 'infrastructure sharing' policies enabling rollout of 5G</li> </ul>	<p>Ensuring regulation is fit-for-purpose will foster <b>broad economic growth</b></p>

Note: Australia's current measures and international examples are non-exhaustive.

## 1.

## Develop talent

### Attract, train and retain talent to support business entry and growth

There is a shortage of tech talent for businesses across the Australian economy, particularly those looking for experienced workers like product managers and software engineers. Maintaining the attractiveness of the tech sector as an employer and building pathways for Australians into tech roles will ensure Australians can make the most of tech sector opportunities. In the short term, supporting international talent to relocate to Australia to fill crucial labour shortages and transfer valuable skillsets to local talent is essential.

Increasing the tech talent supply to meet the forecast shortage could contribute \$3.6 billion to the economy per year<sup>18</sup>



## Education

Australia's future workforce will require IT skills and training to succeed in an increasingly digitised workplace. A strong pipeline of tech sector workers will also be necessary to ensure we are able to capture the sector's full economic potential and support the case for increased investment. It is forecast that Australia will need an additional 60,000 tech workers per year over the next five years. However, only 7,000 students graduated with a technology-related degree in 2019.<sup>19</sup>

Australia recently launched several education initiatives targeted at building the junior tech talent pool in the early stages of education. This includes the government's \$40 million commitment to STEM in schools in the 2020-21 Budget. While these initiatives represent an important investment in the base of tech talent, they are mostly in the early rollout stage and the target audiences will not be entering employment for at least five years. For example, it is estimated the Academy for Enterprising Girls will deliver at least \$11.6 million in economic benefits by exposing young girls to entrepreneurship, innovation and STEM and encouraging them to pursue careers in the field.<sup>20</sup> However, the program offers relatively short-term support to students aged 10-18 who are some years off entering the workforce.

Enrolment and completion rates of IT-related qualifications have seen consistently strong growth over the last five years, outpacing average growth rates for non-tech courses, but this must be accelerated to meet predicted workforce shortfalls.<sup>21</sup> Initiatives such as free or low-fee JobTrainer technology courses are important to address Australia's medium-term tech talent and skills gap. While this initiative is limited to 300,000 places across selected industries, and only for diploma-level qualifications and below, it represents an important signal and incentive for potential workers to access work opportunities in the tech sector.

18 Department of Education, Skills and Employment (2021), Occupation Projections; Deloitte Access Economics (2021), Australia's Digital Pulse 2021; Department of Education, Skills and Employment (2020), uCube completions; Department of Home Affairs (2020), Freedom of Information release for GTI visas; Department of Home Affairs (2021), 457 and 458 visa statistics; Accenture analysis

19 Deloitte Access Economics (2021), Australia's Digital Pulse 2021

20 Council of Small Business Organisations in Australia (2021), Academy for Enterprising Girls Evaluation Report.

21 Deloitte Access Economics (2021), Australia's Digital Pulse 2021; Department of Education, Skills and Employment (2020), uCube

## INTERNATIONAL SUCCESS STORIES:

### Skilling the future tech workforce

- The UK is a leader in embedding technology education in schools, including making **computer programming compulsory in school curriculums** and supporting teachers with training and competency frameworks **since 2014**.
- Scotland's Modern Apprenticeships require apprentices to demonstrate **five core skills including ICT**, regardless of their field. Vocational apprenticeships in tech-fields are in the top 5 occupations chosen by students (out of 17).
- The **UK's free coding college – Ada** (National College for Digital Skills) will train 10,000 students in coding by 2028.
- **40% of graduates from Stockholm's free School of Entrepreneurship** have become entrepreneurs and now operate 1,500 companies.
- Singapore has adopted a strong focus on **ICT integration in the education system** through four **ICT in Education Master Plans** since 1997.
- Finland introduced major reforms to its higher education system in the 1990s, creating a **system of polytechnic universities** which has resulted in a higher share of engineering graduates and entrepreneurs than other OECD countries.



## Jobs

Australia is a global leader in the rate of employment of tech workers across businesses, including in tech firms and other businesses across the economy. However, workforce demand, particularly for experienced workers, is far exceeding supply. For example, the Commonwealth Bank of Australia is building one of the largest technology teams in Australia – hiring more than 650 engineers in the next few months and bringing their total team to almost five thousand.<sup>22</sup> Stakeholder consultations also revealed many tech firms want to double their number of product managers by the end of 2021 but can only find one or two in the market. Product managers are critical to the growth of a business, where they act as a link between technical engineers and sales and marketing teams.

Ensuring that the sector remains an attractive employer for Australians with a variety of skills continues to be a priority. Many startups rely on providing equity to compete with the salary packages of larger businesses and to create an opportunity for employees to participate in the growth of nascent businesses. Employee share scheme arrangements in Australia are less accommodating of small and growing firms than similar schemes overseas, potentially disadvantaging local business in the recruitment market at home and abroad. For example, the requirement to disclose investors (that is, employees) under the scheme is particularly onerous for small businesses and can date quickly in high growth scenarios. Cessation of employment continues to be a taxing point for employee share schemes in Australia, which is a major disincentive for participation. The government's commitment to amend these provisions is a welcome change for all businesses trying to attract and retain the talent they need to compete on a global stage.

To address the immediate shortage of tech talent, Australian businesses need access to experienced overseas workers while the domestic pipeline is developed. These workers will also help mentor and grow the local junior talent pipeline.

Existing visa programs have had some success in getting tech workers into Australia. Tech occupations accounted for around one fifth of global talent visas in 2019-20 and three out of five top occupations for skilled migration visa holders are in technology.<sup>23</sup> Despite this, the strict Australian and New Zealand Standard of Classification of Occupations (ANZSCO) role definitions, and costly and long application process, has historically limited the pool of potential workers. The government has taken steps to address this with the recent addition of several tech occupations to the skills lists but the cost and time barriers remain. Other nations have successfully developed their technology industry through fast-tracked tech visas, including the US, UK, Canada and, most recently, Portugal with a 'golden visa' and startup visas for non-EU residents.<sup>24</sup>

Australia has an opportunity to emerge from the COVID-19 pandemic as a leader in cross-border employment by using remote work options to access international talent beyond traditional immigration channels. Countries in the European Union have already seized this opportunity by establishing digital nomad visas for employees who work remotely around the world. For Australia, this opportunity could include exploring double tax treaties and global worker income arrangements. It could also include facilitating the return of leading Australian entrepreneurs and businesses domiciled overseas, which is one part of the work of the Global Business and Talent Attraction Taskforce announced in 2020.

There may also be opportunities to improve the connections between Australian and overseas talent in key global technology capitals by expanding the global landing pad program and direct in-market representation. International examples of this include Denmark's Ambassador for Technology based in Silicon Valley.

#### INTERNATIONAL SUCCESS STORIES:

### Attracting new workers to the sector through incentives

- Employee share schemes are particularly prevalent in the US as they are attractive and easily accessible. More than 14 million workers in the US are covered by employee stock ownership plans (ESOPs). Reporting requirements are flexible for startups, enabling them to offer competitive remuneration as they build cash flow (148,000 workers in small privately held US businesses are covered by ESOPs).
- To encourage entrepreneurship, Sweden introduced a series of tax incentives in the 1990s and 2000's, including treating a larger share of income as capital income, which has a lower tax rate.

#### INTERNATIONAL SUCCESS STORIES:

### Attracting new workers to the sector through visas

- The US, UK, Canada and Israel have targeted tech visas for skilled workers. The effect of these visas, such as the US H-1B visa, includes faster creation of patentable technologies, job creation (up to five domestic jobs can be created per temporary foreign worker) and increased wages (1% increase in foreign STEM workers can increase domestic wages by 7-8%).
- Canada offers fast-tracked visas for skilled workers through its Express Entry scheme, offering a processing time of just two weeks.
- The US' E3 visa prioritises Australians in speciality jobs (e.g. tech). The quota of 10,500 E3 visas each year has never been exceeded.
- Portugal has recently introduced a 'golden visa' and startup visas for non-EU residents, offering a fast-tracked visa for tech workers.

23 Home Affairs (2021), Temporary Resident (skilled) Report; Home Affairs (2020), FOI Request FA 20/11/00195

24 Techcrunch (2021), [Lisbon's startup scene rises as Portugal gears up to be a European tech tiger](#), 8/1/2021

## CASE STUDY: WILLOW

## Willow is ready to launch Australia into the built world's digital revolution

**FUNCTION:** Digital twins of physical assets (SaaS)

**INDUSTRY:** Real estate, infrastructure

**SIZE:** 250 employees

**HEADQUARTERS:** Sydney

**FOUNDED:** 2017

Data collection is rare and operating systems are siloed in most traditional built assets. However, the built world is undergoing a digital transformation with the rise of IoT and increasing processing capabilities. Willow's founders recognised this opportunity and quickly developed WillowTwin™, software that creates a digital twin of physical assets so that users can understand, manage and analyse assets at scale.

**“The built world is not just bricks and mortar – it’s an ecosystem. Just as an ecosystem exchanges energy, light and water, built assets exchange data. This is a precious resource that we’re currently not capturing.”**

Willow was a first mover in digital twins and continues to be a market leader in infrastructure technology development. An ongoing partnership with Microsoft helped Willow's speed to market; and the ability to leverage existing Microsoft technology took years off Willow's development time.

Necessity forced Willow to become a global company almost overnight. The US offered a substantial client base and a tech talent pool that far exceeded what was available in Australia. US companies were incredibly enthusiastic and ready to invest with Willow.

**“Our experience was US companies were forward looking and willing to innovate, and we could rapidly prototype and develop the product.”**

Willow sees itself as a global company and is building a global workforce with staff across North America, Europe and Asia Pacific. To start advancing Australia's digital skill pipeline, Willow are working with the University of Sydney to build curriculum and courses on data science in the built world. The courses use Willow's building data to enable students to apply their skills to real challenges and to demonstrate the broad range of opportunities in the tech sector. Willow facilitates a direct pipeline from university to industry through internships in their cyber and data science capabilities.



## 2.

## Foster growth

### Incentivise growth and innovation through R&D and business formation

Gross expenditure on R&D in Australia has steadily declined over the last decade, slowing innovation and creation.

Providing clear and attractive incentives for businesses to invest in R&D, while also supporting industry and academia to work together to commercialise research ideas, will promote growth across the economy. Increasing Australia's R&D contribution to match global peer economies could contribute \$5 billion to \$13 billion to annual GDP.<sup>25</sup>

The availability of capital and business assistance for early stage companies is crucial to success. Increasing investor incentives and supporting new Australian businesses can improve survival rates. If Australia increases seed VC investments to match the rates of global leaders it could lead to an additional \$460 million per year in extra investment.<sup>26</sup>



### Productivity and innovation

Innovation drives productivity across the economy by enabling new technologies and business models. However, Australia spends proportionally less on ICT-related R&D than its global peers and its ICT trade balance is one of the lowest in the OECD (36th out of 38). In particular, lack of clarity about R&D tax incentives for software development has stalled local investment in one of the fastest growing areas internationally.<sup>27</sup> Whilst great progress has been made around the treatment of software in accessing the incentive, the joint administration of the incentive and processes for eligibility and claiming continue to create challenges for software claims. The assessment model was designed for research being conducted in a laboratory and has not been updated to better reflect the nature of software development.<sup>28</sup> Countries such as Germany have developed tailored software R&D tax incentives to account for this discrepancy, where a firm is able to claim up to €500,000 per year (or 25% of R&D expenses).

Relatively weak links between industry, academia and government continue to inhibit Australia from converting its high-quality, peer-reviewed research into commercial opportunities. Main Sequence, a deep tech venture fund founded by CSIRO, has been a valuable link between research and commercialisation in Australia. Main Sequence uses a venture science model to bring together scientists, industry and investors to launch startups in response to critical challenges across the economy. Previous successes of the fund include telehealth software platform Coviu, subterranean drone technology developer Emesent, IoT satellite connectivity startup Myriota and quantum computing firmware designer Q-CTRL. Its portfolio companies have created more than 600 jobs since 2017. Australia could investigate the option to leverage and expand this model to lift commercialisation rates.

25 OECD (2020), GERD as a percentage of GDP; ABS (2020), National Accounts; Accenture analysis

26 StartupAus (2019), Crossroads; ABS (2021); Accenture analysis

27 Office of Innovation and Science (2020), Australian Business Investment in Innovation: Levels, Trends, And Drivers

28 Australian Financial Review (2021), Top tech companies tell ATO: software is legitimate R&D

Sweden's Triple Helix model is another example that successfully achieves this objective. Through this model, government explicitly and transparently collaborates with academia and industry to identify, research and develop innovative new technologies and services. This has resulted in Sweden being ranked among the world's most innovative countries.<sup>29</sup>

The recently announced biotech patent box is an important step towards bringing Australia's innovation incentives in line with international initiatives. Broadening the patent box beyond biotech and medtech innovations would support Australia to capture the full benefit of technological developments in other vital domestic industries such as construction, manufacturing and trade where digitisation lags compared to global peers.<sup>30</sup>

## INTERNATIONAL SUCCESS STORIES:

### Incentivising research, development and commercialisation

- The EU's loan for technological innovations de-risks business investment in R&D through upfront capital loans and a non-repayable bonus towards the costs of R&D.
- Software development projects in Germany are eligible for a tax incentive of up to €500,000 per year (or 25% of R&D expenses). Germany also encourages research commercialisation through EXIST startup grants and networks. The program funds salaries for researchers while they work at a startup firm and connects tech entrepreneurs in Israel with academic entrepreneurs in Germany, and research institutions with entrepreneurial networks.
- The Disruptive Technologies Innovation Fund in Ireland provides grants to projects that leverage local research in priority areas for a commercial impact. To be eligible for the grant, the project must partner with at least one research organisation and a subject matter expert.
- The UK's Catapult programme is a government-led initiative to foster collaboration between businesses and academia and promote the development and early adoption of advanced digital technology such as AI, virtual reality and future networks.
- The UK, France and Belgium use 'patent boxes', or tax concessions on patent profits, to encourage R&D investment. Belgium's tax deduction of 80% of patent income has contributed to a fivefold increase in R&D's contribution to GDP and business R&D<sup>1</sup> intensity has risen by 50% in the last 10 years.

1 OECD (2019), "[R&D Tax Incentives: Belgium, 2019](#)"

29 SAAB (2020), The Triple Helix: Sweden and Saab's recipe for success

30 AlphaBeta (2021), Benchmarking Australia's Digital Performance



## Growth

Global investment in digital innovation is growing rapidly, with global technology leaders focussed on improving access to investment capital and business support for new firms and startups. Australia has made good progress in building a local VC industry in the last decade, and now ranks 11th in the OECD for VC investment. However, there is room to improve seed and angel funding rates to achieve desired sector growth. These early investment sources are crucial for new businesses and many local startups are beginning to explore growth opportunities overseas.

Australian tax benefits under provisions for early stage innovation companies (ESIC), Venture Capital Limited Partnerships and Early Stage Venture Capital Limited Partnerships have supported investment while our domestic sector has matured. However, these provisions no longer reflect the nature of the sector, with many genuine startups rapidly outgrowing available concessions.

Startups have also said the fragmented approach to small business and startup support across government is a barrier to existing funding and business support. This could be addressed by a centralised, targeted assistance program, potentially through expanding and tailoring existing programs such as NSW's Business Connect or the government's Small Business Advisory Services.

### INTERNATIONAL SUCCESS STORIES:

#### Early stage support to encourage growth and new ventures

- The UK Enterprise Investment Scheme provides tax relief to investors in high risk and growing companies. The Seed Enterprise Investment Scheme is also available for investors in small and early stage startups.
- The US Small Business Administration issues guaranteed loans and its Small Business Development Centre provides business assistance (such as free consulting for small businesses on management, cash flow, market research).
- Sweden gives angel investors a 50% tax deduction on their investment.
- The Israel Innovation Authority supports more than 1,000 projects annually by providing tools and funding to support both early-stage startups and mature companies.
- Enterprise Ireland provides tailored advice and funding to Irish businesses to innovate, expand and succeed globally including additional supports during the COVID-19 pandemic.
- The Startup SG Founder program in Singapore provides grants, mentoring, legal support, publicity and incubation space to innovative startups.

## CASE STUDY: SONDER

## Sonder supports Australia's workforce by combining tech with a human safety net

**FUNCTION:** Safety and wellbeing helpline and support

**INDUSTRY:** Health care and social assistance

**SIZE:** 250 employees

**HEADQUARTERS:** Sydney

**FOUNDED:** 2016

Sonder provides an on-demand safety and wellbeing service through an app, chat function and operations centre. This blended model uses technology to provide peace of mind and create an accessible service without replacing human support.

Sonder employs 250 people across Australia and has 400,000 users who are registered, eligible through an employer or education provider.

Sonder signed a large contract with a global insurance company, which provided an early revenue stream that enabled rapid growth. A government R&D grant also provided an alternative to source of capital to VC funding.

**"Many startups don't know where to start and aren't aware of the opportunities outside of venture capital. This is where government can really add value with easy-to-locate, centralised grants and business support."**

The number of mental health cases Sonder has recorded accelerated during the COVID-19 pandemic, particularly for frontline workers. Today, around half of all cases are related to mental health and 90% of interactions occur through the chat function.

**"The threshold of picking up the phone to call a clinician can prevent a person seeking help. We lower this barrier so that people reach out sooner."**

Sonder is also creating a valuable and unique data asset as it continues to scale: real time information on the health and wellbeing of Australia's workforce.

Despite leading a successful tech company, Sonder's founders do not come from tech backgrounds. Instead, they rely on the tech ecosystem to source the talent and technology to bring their product to market. However, tech talent shortages in Australia may mean that Sonder has to shift its engineering capabilities offshore.

**"It's nothing to do with cost savings – we want to hire Australian software engineers. We just can't find any."**



## 3.

## Implement regulation and supporting infrastructure

### Collaborate with stakeholders to develop fit-for-purpose regulation

Promoting collaborative policy development across government, industry and the community will ensure regulations are fit-for-purpose. This will also foster broad economic growth and ensure that high rates of job creation and value creation continue in the wake of the COVID-19 pandemic.

Ongoing investment in digital infrastructure and data sharing should remain a priority area for government to support the growth of the tech sector and the widespread digitisation of other industries.



### Policy

Fit-for-purpose regulation will play a vital role in the evolution of the tech sector and in incentivising the development of digital technologies. Recent government policies to support the tech sector, such as the \$1.2 billion commitment in the Australian Government's Digital Economy Strategy, are valuable steps towards sector development.

Given the pace of change in the digital economy, it is important that regulatory frameworks are adaptable, collaborative and agile and are cognisant of the sector's direct and indirect economic contribution. To address a similar challenge, Singapore created the Infocomm Media Development Authority to oversee regulation and development of the converging IT and media sectors.

#### CASE STUDY: REGULATION AND DEVELOPMENT

## Singapore Infocomm Media Development Authority

The Singapore Infocomm Media Development Authority (IMDA) is jointly responsible for the development and regulation of the IT and media sectors. This requires the agency to ensure holistic development of these converging sectors; by promoting growth and innovation through policy actions and regulatory settings.

The IMDA regularly engages with industry to ensure its work aligns with current needs. It seeks proposals from industry to participate in programs and solutions, to understand what is important to the sector and incorporate fast-evolving capabilities and skillsets.

So far, the IMDA has successfully enabled local innovation through programs such as the Open Innovation Program (OIP). The OIP has supported businesses to share more than 120 challenges with 6,000 innovators. The IMDA is also using its role

as a statutory board to safeguard the interests of consumers while fostering pro-enterprise regulations.

#### This is part of the IMDA's ambitious agenda to:

1. **Develop the ecosystem:** Create an environment for local firms to create and innovate, while also enabling local firms and startups to work with the world's top multinationals to develop "the next big thing for industry."
2. **Enable businesses:** Promote the adoption of technology across the economy through public/private collaborations and grants for startups and new tech talent.
3. **Empower society:** Ensure broad expertise and perspectives are considered through wide consultation, while also assisting the entire community to access, understand and use technology.

Government must continue to continue to promote growth while collaborating with business and the community to safeguard against risks. The OECD has identified that appropriate regulatory settings in tech are crucial to “foster broad public and consumer interests and limit any potential unintended negative consequences of these developments by providing general rules that reflect societal values and preferences”.<sup>31</sup>

A collaborative approach will ensure Australia can lead in the new economy with regulation that enables safe and early introduction of new products and services, increased investment and improved government service delivery. The integration of technology and tech firms into traditional industries means that a broad range of regulation and policy will have flow-on effects for the sector. For example, new tech innovations in payments (Buy Now Pay Later), transport (rideshare) and delivery (drone delivery) have created the need for traditional regulation and policy to adapt to new consumer behaviours and preferences. To address this challenge in financial services, Singapore has developed the Fintech and Innovation Group (FTIG) within the Monetary Authority of Singapore. FTIG manages technology-related policies and technology adoption in the financial services industry. This includes the development of innovative regulation of payment technologies and technology enabled infrastructure.

Continuing to support competition and innovation in digital supply chains and data infrastructure, while constructing a rules-based approach that advances Australian values in our interconnected world, will promote competitive choices for Australian governments, businesses and consumers. It is important that our domestic rules align with global norms and standards so that Australian businesses are operating within a framework that transfers easily to global markets. This includes ensuring Australia’s data and privacy regulation is proportionate and consistent with the rest of the world. For example, adopting internationally compatible data protection standards to regulate global data streams will protect Australian consumers while helping Australian companies to do business globally.

### **Regulation in Australia should be developed in line with the following key principles.**

#### **1. Appropriate**

- Policies should have a clear purpose that is established and articulated.
- Proposed measures are the best solution for the problem and are reviewed regularly.
- Compliance is feasible and not excessively burdensome.
- Policies are relevant, transparent, forward-looking, and do not discriminate.
- The diverse needs and functions of businesses are considered and reflected.

#### **2. Balanced**

- Decisions are based on costs and benefits to consumers, industry, and government.
- The inter-related impacts of regulation are considered across:
  - jurisdictions, including state, federal and international obligations,
  - sectors, including the flow on effects on adjacent or related industries,
  - government, including the implications for whole-of-government objectives and across the whole of the economy. The recently released Department of the Prime Minister and Cabinet’s Regulator Performance Guide advocates for a whole-of-system approach to regulation and provides good advice on achieving this objective.

#### **3. Collaborative**

- Policy is not made in isolation and is the result of collaboration and communication across government, agencies and industry.
- Reform is consistent with clearly established objectives and strategies.

## OECD (2019), Regulatory effectiveness in the era of digitalisation

*“More than ever, a **“whole-of-government”** approach to rulemaking is needed to address the institutional challenges raised by digitalisation. In view of their cross-jurisdictional nature, regulating digital technologies calls for increased dialogue and coherence among government bodies...”*

*“Given the level of technical expertise involved, the uncertainty surrounding digital developments and the overwhelming pace of digital transformation, governments need more than ever to **actively engage a broad and diverse range of stakeholders**, invest in **foresight and horizon scanning**, initiate **regulatory impact assessments** early in the policy making process, and carry out **regular post implementation reviews...**”*

*“Given the strong cross border effects of the digital economy, **solutions limited to the domestic domain will no longer suffice...**”*

### CASE STUDY: A GOLDEN AGE FOR TECH

## UK 10 Tech Priorities

The UK recently launched **10 Tech Priorities** to assist with the COVID recovery and lead the UK into "a new **golden age for tech**". These priorities include:

1. *Rolling out world-class digital infrastructure nationwide including widespread 5G and gigabit broadband access*
2. *Unlocking the power of data by creating an open, secure environment for worldwide data access and contribution*
3. *Building a tech-savvy nation including **apprenticeships, boot camps** and **business support** for tech adoption*
4. *Keeping the UK safe and secure online through **balanced security legislation** for online harm and cyber threats*
5. *Fuelling a new era of startups and scaleups by **improving access to growth capital** across the startup cycle*
6. *Unleashing the transformational power of tech and AI with a National Artificial Intelligence Strategy and research and innovation agenda*
7. *Championing free and fair digital trade with **digital provisions in trade deals**, partnerships and investments*
8. *Leading the global conversation on tech regarding governance, democracy, diversification, coordination and ethics*

9. *Levelling up digital prosperity across the UK through **regional innovation centres**, strengths and specialities*
10. *Using digital innovation to reach Net Zero and leverage locally developed climate and conservation tech and business tools to reduce emissions*

This initiative also establishes a **new Digital Markets Unit (DMU)** to oversee the digital regulatory regime. **A key focus of the DMU is to work with industry** to prepare for a smooth transition before, during and after regulation. The DMU will be responsible for:

- Carrying out preparatory work before implementing statute, including preparing draft guidance
- Advising government on statutes, including insights from digital platforms, small businesses and customers
- Gathering data on digital markets
- Engaging and building relationships across industry, academia, regulators and government to ensure diverse insights inform regulatory development.



## Data and infrastructure

Supporting the tech sector with digital and physical infrastructure as well as appropriate regulatory settings is vital for the functioning of the ecosystem. Businesses and consumers rely heavily on access to physical and digital infrastructure to operate in an increasingly digital world. Government-funded infrastructure initiatives such as the nbn have been critical, with the importance of digital infrastructure heightened during the COVID-19 pandemic and the shift towards remote working, telehealth and online shopping. High speed internet is expected to be a key enabler of future technological growth. For example, high speed internet is required for:

- Improving business efficiency and innovation through increased download speeds of broadband services and the use of more effective cloud solutions.
- Enabling greater use of IoT services and applications (including mission critical services like healthcare) that rely on low latency and ultra-reliable broadband.

Precinct-based development, or the creation of “technology hubs”, is emerging as another international trend to drive industry growth. These hubs provide the infrastructure for startups to come together in a central location to collaborate, attract investment and grow talent. The MaRS Discovery District in Toronto, Canada, serves as an example of government being able to offer a platform for researchers to connect with startups and scaleups. Governments in New South Wales, South Australia and Victoria have already introduced technology hubs that will bring together more than 30,000 tech workers across the three states.

Investment in data and other intangible intellectual property is necessary to support whole-of-economy digitisation. Data exports are worth more than \$6 billion annually<sup>32</sup>, and investment in intangibles is an increasingly important driver of GDP growth.<sup>33</sup> The recent introduction of intangible asset depreciation measures in Australia is predicted to generate \$170 million in tax savings over the first two years. This is the first step in bringing Australia in line with more extensive intangible asset concessions in the US, UK and Europe.

### INTERNATIONAL SUCCESS STORIES:

#### Data and infrastructure

- The MaRS Discovery District is the largest urban innovation hub in North America. It was founded by a partnership of government, industry and the University of Toronto and supports more than 1,200 science and tech companies.
- The Italian Government has set a ‘Hyper Depreciation’ allowance of 150% on ‘industry 4.0 enabling technologies’.
- The UK government has made rolling out world-class digital infrastructure nationwide, including widespread 5G and gigabit broadband access, the first priority in its 10 Tech Priorities.
- South Korea used infrastructure sharing policies to manage a significant roll-out of 5G and connect more than 7 million 5G customers by the end of April 2020.

32 Department of Foreign Affairs and Trade (2021), Digital trade and the digital economy: value of data exports in 2017

33 Corrado et al. (2018), Intangible investment in the EU and US before and since the Great Recession and its contribution to productivity growth

## CASE STUDY: CULTURE AMP

## Melbourne-based Culture Amp creates world-leading digital experiences for employees

**FUNCTION:** Digital employee experience platform

**INDUSTRY:** HR/People operations

**SIZE:** 535 employees

**HEADQUARTERS:** Melbourne

**FOUNDED:** 2011

Culture Amp is the world's leading employee experience platform. It supports more than 4,000 active businesses in 47 countries to uncover what matters to more than 100 million employees. In the Asia Pacific, Culture Amp supports almost 1,000 businesses with 30 to 130,000 employees.

Psychologists and data scientists designed the Culture Amp platform to unlock employee insights and inform evidence-based people and culture strategies. It also promotes a culture of high performance through resources and coaching.

Co-founder and Chief Technology Officer Doug English attributes Culture Amp's success partly to being a global company from day one, highlighting the unique ability of tech companies to scale-up rapidly.

**Being international from day one has given us an edge over competitors who have typically focused on their region."**

Culture Amp announced new product partnerships in collaboration with popular communications platforms like Microsoft Teams and Slack during the COVID-19 pandemic.

**"With everyone more distributed and remote, tools for employees to better understand and improve the experience of their employees have never been more in demand."**

The importance of digital tools like Culture Amp is only increasing, with large numbers of workers changing jobs in the current economic climate. This churn is raising the stakes for companies to attract and retain top talent and heightening the need for companies to understand the experience of exiting and onboarding employees.



# 4.

## Conclusion

The tech sector has matured and accelerated through the COVID-19 pandemic and is now one of the most important drivers of growth in the economy, contributing 8.5% to GDP and employing one in 16 Australians.

Limited access to talent, limitations on business and managerial capability around technology, challenges in accessing the internet in remote and regional areas and lower than average R&D incentives may be leading to an inability to fully capture the opportunities of the digital age.

By addressing these challenges and catching up to global peers Australia can realise a tech-supported recovery, securing 1 million jobs by 2025 and contributing \$244bn annually to GDP. Government, in partnership with industry, can play a key role in capturing this opportunity by supporting:

- **Growth:** Accelerating growth and investment by addressing early stage funding gaps, incentivising R&D and encouraging digital adoption.
- **Talent:** Supporting businesses and educational institutions to attract, train and retain talent, alongside a pragmatic approach to skilled migration.
- **Regulation:** Bringing a whole of government approach, and collaborating with industry, to develop fit-for-purpose regulation that considers the far-reaching impact of the tech sector.

# Appendix

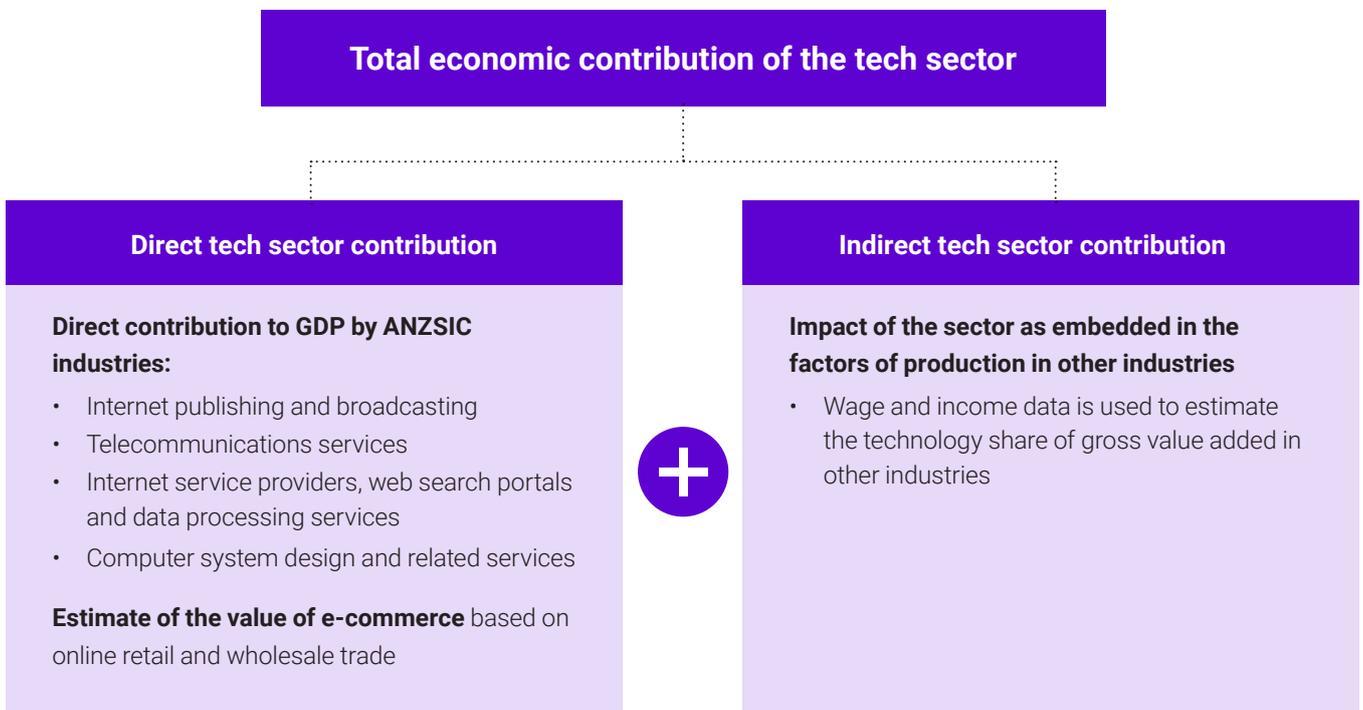
## Detailed methodology

### Economic contribution of the tech sector

We use the income method to calculate the economic contribution of the tech sector. This involves estimating both the 'direct' and 'indirect' contributions, using the methodology shown in Exhibit 21.

EXHIBIT 21

### Economic contribution of the tech sector FY2021



The result was validated using the expenditure method of calculating economic output, by quantifying the technology share of consumption, investment, government spending, and net exports.

The sources we used in this calculation are summarised in the following table.

Parameter	Source
<b>GVA of direct tech industries</b>	ABS (2020) Australian Industry, 2018-19
<b>Online retail turnover</b>	ABS (2021) Retail Trade, Australia
<b>Wholesale trade internet income</b>	ABS (2018) Summary of IT Use and Innovation in Australian Business
<b>Number of workers by industry and occupation</b>	ABS (2021) Labour force detailed
<b>Wages by occupation</b>	ABS (2021) Average weekly earnings, ABS (2017) 2016 Census
<b>Total GOS and taxes</b>	ABS (2021) National accounts

### Size of the tech workforce

The size of the tech workforce is estimated by adding the number of workers in the direct tech industries and the number of workers in tech occupations in other industries. These are defined in the following list of ANZSCO occupations:

- ICT Managers
- ICT Trainers
- Graphic and Web Designers, and Illustrators
- Electronics Engineers
- ICT Professionals nfd
- Business and Systems Analysts, and Programmers nfd
- ICT Business and Systems Analysts

- Multimedia Specialists and Web Developers
- Software and Applications Programmers
- Database and Systems Administrators, and ICT Security Specialists
- Computer Network Professionals
- ICT Support and Test Engineers
- Engineering, ICT and Science Technicians nfd
- Electronic Engineering Draftspersons and Technicians
- ICT Support Technicians

Note: nfd refers to 'not further defined'

We used the sources shown in the following table.

Parameter	Source
<b>Number of workers in direct tech industries</b>	ABS (2020) Australian Industry, 2018-19
<b>Number of workers in defined ANZSCO occupations</b>	ABS (2021) Labour force detailed
<b>Proportion of workers in ANZSCO tech occupations who also worked in direct tech industries</b>	ABS (2017) 2016 Census

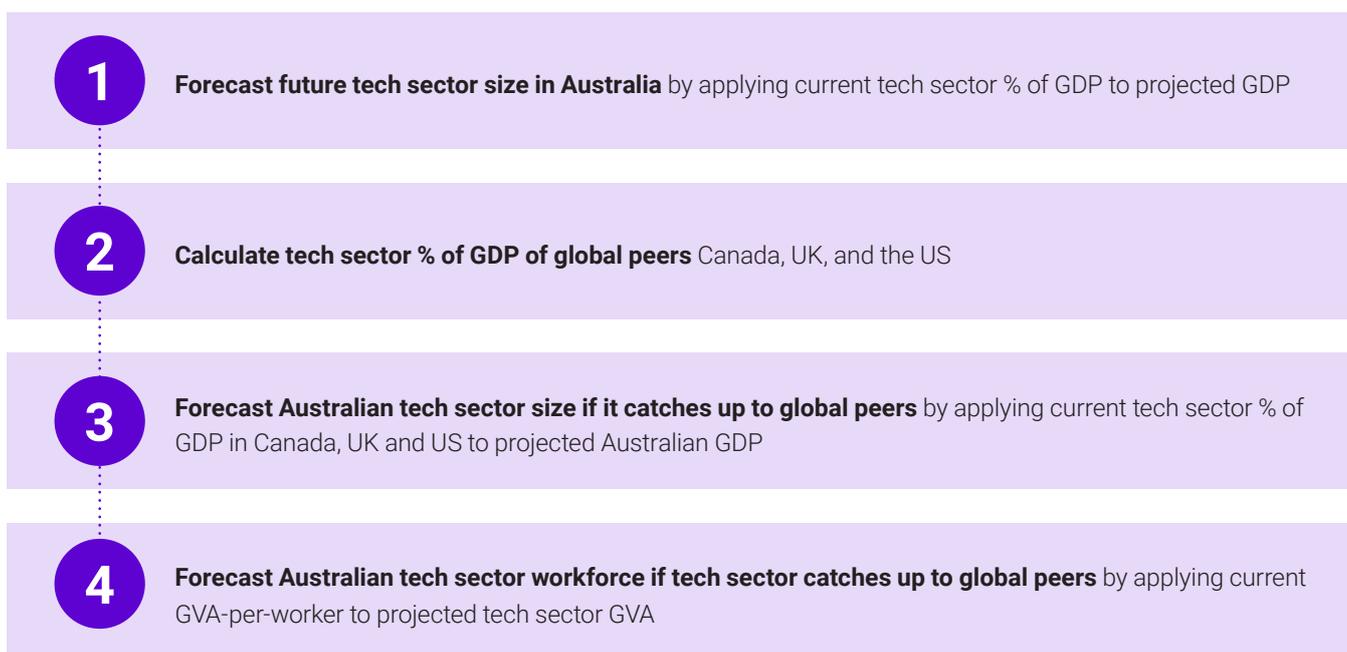
## Potential size of the Australian tech sector if it catches up to global peers

We modelled three possible scenarios for the future size of the Australian tech sector, based on it catching up to the current tech sector percentage contribution to GDP of global

peers by 2031. These scenarios comprised a conservative scenario based on Canada, and moderate scenario based on the UK, and an ambitious scenario based on the US. The methodology is outlined in the figure below.

### EXHIBIT 22

## Future size of the Australian tech sector if it catches up to global peers



The sources we used in these calculations are shown in the table below.

Parameter	Source
Projected GDP in Australia, the US, Canada and the UK	IMF (2021) World Economic Outlook
US tech sector economic contribution	BEA (2020), Digital Economy
Canada tech sector economic contribution	Statistics Canada (2019) Measuring digital economic activities in Canada: Initial estimates
UK tech sector economic contribution	DCMS (2021) Sectors Economic Estimates

## Potential policy benefits

The exhibit below outlines the methodology used to estimate the potential benefits for Australia if it made changes to its policies towards the tech sector.

### EXHIBIT 23

## Sizing potential policy benefits

Action	Potential benefits for Australia	Methodology	Data sources
Attract, train and retain talent to support business entry and growth	Increasing talent supply to meet the forecast shortage will contribute <b>\$3.6bn in GVA</b> per year	Calculate projected shortfall in workers based on current employment rate, university course completions and international migrants. This is then multiplied by the average gross value added (GVA) generated per worker in the tech sector.	<ul style="list-style-type: none"> <li>• ABS (2021), National Accounts; Labour Force Detailed</li> <li>• Deloitte Access Economics (2021), Australia's Digital Pulse</li> <li>• Department of Education, Skills and Employment (2020), Employment projections 2020-2025</li> <li>• Department of Home Affairs 457 and 482 Visa Statistics (2021); FOI for GTI visas</li> </ul>
	Increasing Australia's R&D contribution to meet global peers could <b>increase investment by \$5-13bn</b> per year	Calculate the average R&D contribution as a % of GDP for high-performing countries that exceed Australia's rate (UK, France, US, Belgium, Canada) and estimate the incremental difference to the current rate in Australia.	<ul style="list-style-type: none"> <li>• ABS (2020), Research and Experimental Development, Businesses, Australia; (2021), National Accounts</li> <li>• OECD (2020), Main Science and Technology Indicators</li> </ul>
Incentivise growth and innovation through R&D and business formation	Increasing seed venture capital investments to global rates could <b>add \$460m in investment per year</b>	Calculate the average seed and angel investment per capita for high-performing countries that exceed Australia's rate (UK) and estimate the incremental difference to the current rate. This is then multiplied by the total Australian population.	<ul style="list-style-type: none"> <li>• ABS (2021), National Accounts</li> <li>• StartupAUS (2019), Crossroads</li> </ul>



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