



AUSTRALIA'S DIGITAL OPPORTUNITY

GROWING A \$122 BILLION A YEAR TECH INDUSTRY

αlphaβeta
strategy x economics

SEPTEMBER 2019



Australia's Digital Opportunity



\$122B

Contribution to the Australian economy by the technology sector

This represents 6.6% of GDP



580,000

Australian workers employed in the broader tech sector

\$44B

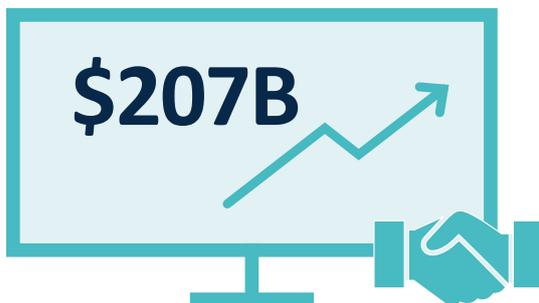


Value created for consumers by the tech sector through free and cheaper digital goods and services



90%+

of tech companies are SMEs



Potential GDP value per year by 2030 of the tech sector if Australia catches up to global leaders



Prepared for DIGI | www.digi.org.au

SEPTEMBER 2019

This paper was commissioned by the Digital Industry Group Inc. (DIGI) and prepared by AlphaBeta. All information in this report is derived from AlphaBeta analysis using both proprietary research and publicly available data. Where information has been obtained from third-party sources, this is clearly referenced in the footnotes.



TABLE OF CONTENTS

EXECUTIVE SUMMARY	6
1. THE TECH SECTOR'S BENEFITS ARE FAR-REACHING, CONTRIBUTING \$122 BILLION TO THE ECONOMY EACH YEAR AND 580,000 JOBS	10
1.1. The tech sector contributes \$122 billion, or 6.6% of GDP	11
1.2. The sector employs nearly 580,000 workers who tend to be highly skilled and productive	16
1.3. Technology contributes \$5,000 per year in value to the average household and improves government and community outcomes	20
1.4. SMEs in tech and non-tech sectors benefit from new growth and export opportunities	25
1.5. Regional Australia gets \$12 billion of economic value per year from improved services and work opportunities	30
1.6. Technology precincts drive innovation and improve Australia's talent pool	34
2. THE TECH SECTOR COULD CREATE AN ADDITIONAL \$50 BILLION PER YEAR IF AUSTRALIA CATCHES UP TO GLOBAL TECHNOLOGY LEADERS	36
2.1. While Australia's tech sector makes a significant contribution, it lags in OECD rankings	37
2.2. The tech sector will be a major driver of global economic growth in the coming decades	41
2.3. Australia's tech sector could grow to \$207B in GDP per year by 2030	46
3. A PRAGMATIC, PARTNERSHIP-BASED APPROACH TO POLICY REFORM WILL HELP AUSTRALIA REALISE TECH SECTOR OPPORTUNITIES	48
3.1. Foster collaboration between government, academia and business	50
3.2. Incentivise research, development and innovation	51
3.3. Encourage greater investment in technology and innovation	52
3.4. Ensure policies and regulations are pragmatic and globally consistent	54
3.5. Skill the workforce of the future	55
3.6. Improve access to global talent	56
APPENDIX: DETAILED METHODOLOGY	58



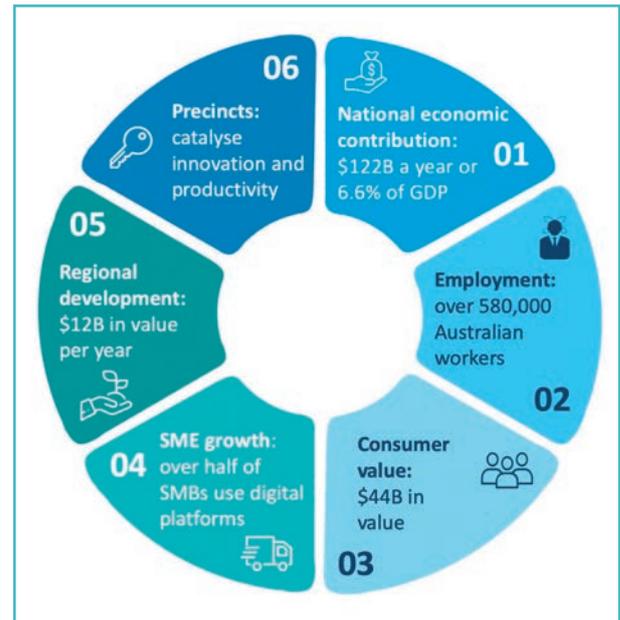
EXECUTIVE SUMMARY

The tech sector is a critical component of modern economies like Australia. It is a major industry that contributes 6.6% of Australian GDP, employs over half a million workers (or 5% of Australia's working population) and supports many small and medium-sized businesses. It also underpins innovation and productivity growth in almost every other industry.

Technology is Australia's sixth largest industry, contributing **\$122 billion each year** and employing **580,000 workers**, including **66,000 in regional Australia**. Benefits of the sector are far-reaching: Australian consumers receive an estimated \$44 billion a year in economic value from free goods and platforms such as web searching, maps, social media, online shopping and banking, and content streaming. **Over 90% of technology businesses in Australia are small and medium enterprises (SMEs)**, and digital technologies enable SMEs in many other industries to launch, grow and succeed.¹

FIGURE 1

The tech sector is a critical component of Australia's economy



SOURCE: Alphabeta 2019

¹ SMEs refer to small and medium sized enterprises (SMEs). Small enterprises are defined in this report as a business with fewer than 20 employees, including non-employing businesses such as sole proprietorships and partnerships without employees. Medium sized enterprises are defined as businesses with 20-199 employees. Our sizing of businesses in this context refers to the information, media and telecommunications (IMT) sector.

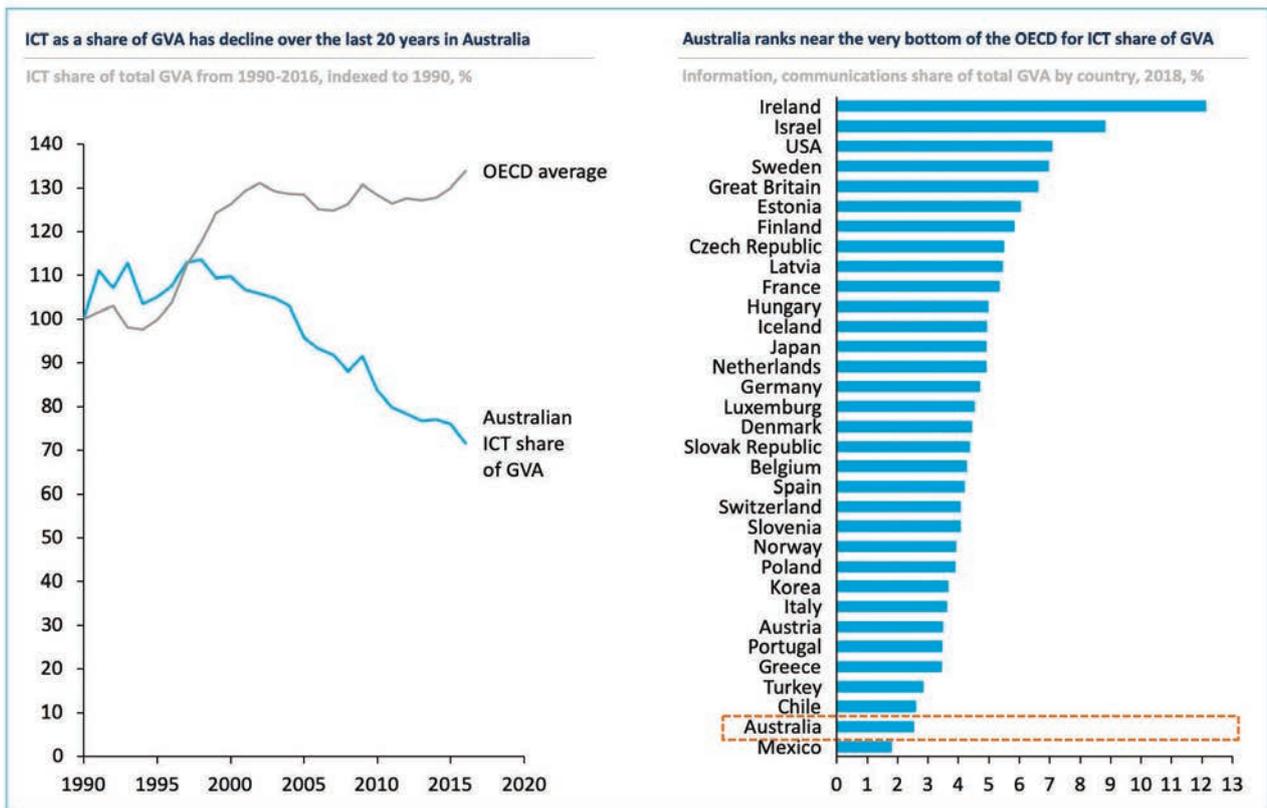
Australia's tech sector is not reaching its full potential, and could generate **\$207 billion per year in GDP** by closing the gap on peer countries by 2030 (Figure 3). This opportunity was calculated by quantifying the impact of increasing the direct GDP contribution of Australia's tech sector to match that of global leaders. For example, the direct contribution of the tech sector in the United Kingdom and United States is approximately 40% higher than in Australia.

Australia has traditionally been a strong adopter of digital and technological change; however, **innovation and investment has stalled over the past decade:**

- Australia's ICT sector is around **half the size of global peers** as a proportion of GDP, ranking below all OECD countries except Mexico²
- Australia's listed tech sector is **four times smaller than that of the US**, as a share of the total stock market
- Australia ranks in the **bottom half of OECD countries for innovation** and R&D

FIGURE 2

OECD data shows Australia's ICT share of GVA has fallen over the last 25 years; Australia is near the bottom of OECD countries on ICT share of GVA



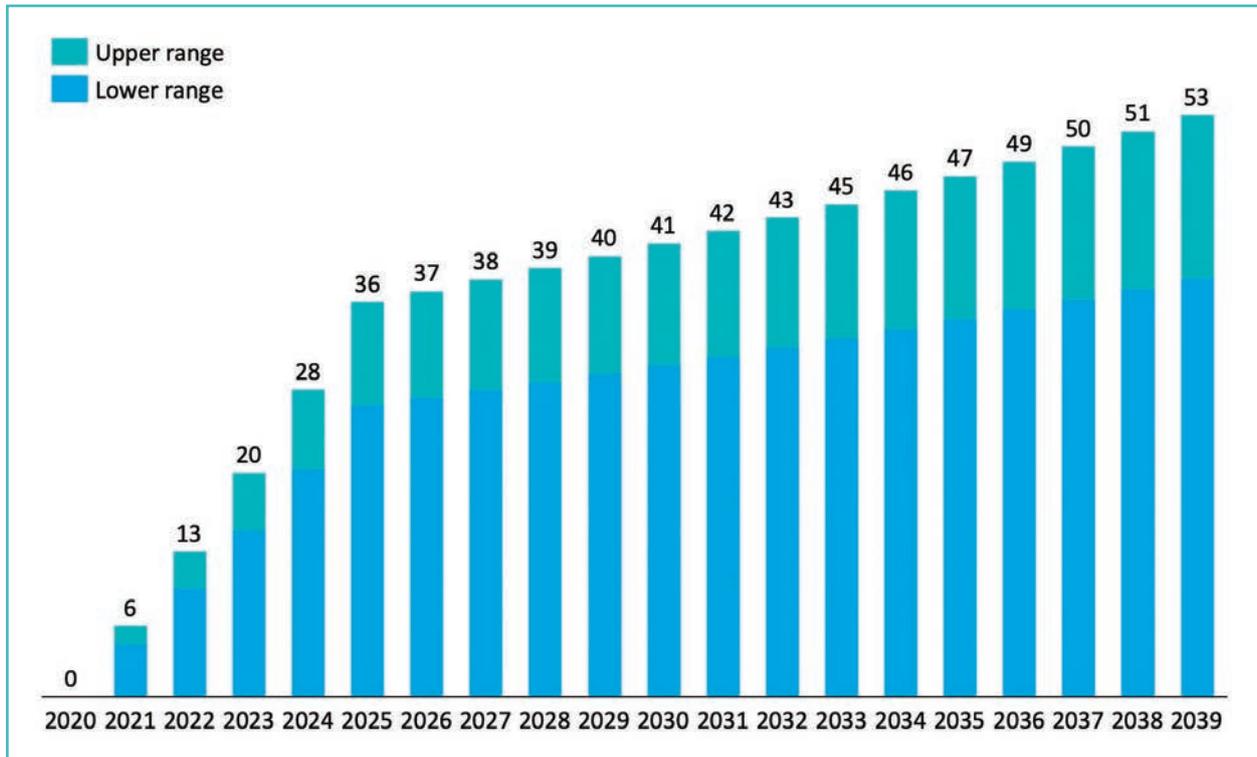
SOURCE: OECD 2019, ICT share of total Gross Value Add, by country by year
 Note: Gross Value Add (GVA) is the term is used to describe gross product, or contribution to GDP, by industry. In summary, it is measured as the value of output minus the value of inputs.

² The ICT (information and communications technology) sector is defined by the OECD as a “combination of manufacturing and services industries that capture, transmit and display data and information electronically”. It is likely that declines in the ICT sector in Australia is driven by declines in ICT-related manufacturing. It should also be noted that the ICT sector differs from broader definitions like ‘digital activities’ in the economy which was analysed by the ABS (see Zhao P 2019, ‘Measuring Digital Activities in the Australian Economy’). The broader “tech sector” in this report includes the ICT sector as well as other digital activities such as digitally-enabled activities, goods and services.

FIGURE 3

The tech sector could add an additional \$50 billion per year to GDP by 2037, if Australia caught up to global leaders

\$ billion gross value add per year (additional to current contribution)



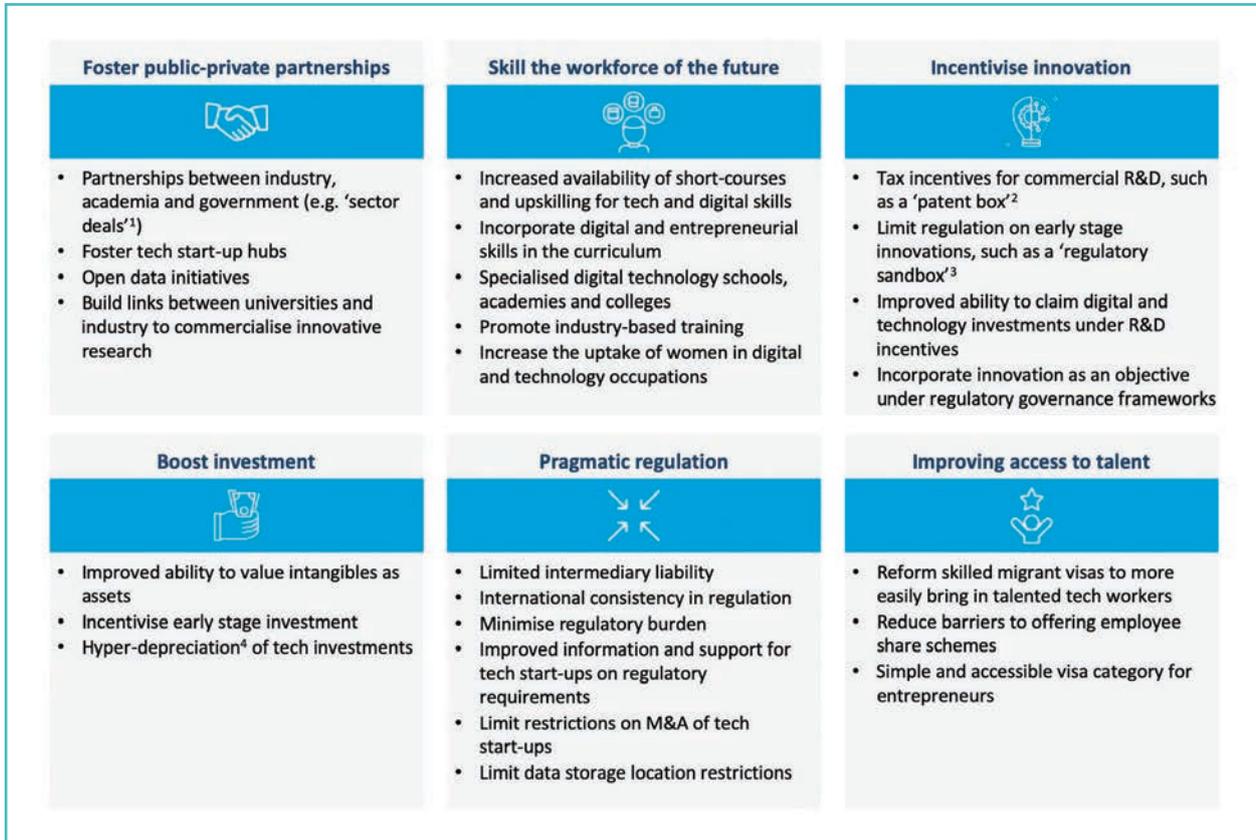
SOURCE: AlphaBeta analysis 2019; OECD, ABS National Accounts 2019

There is an active policy debate in Australia about digital platforms. Governments and community are considering policy solutions to ensure this evolving industry maximises the benefits to Australians whilst mitigates the potential risks. If new regulation is not well-designed, it can diminish the significant benefits the technology sector presents to consumers and the wider community.

Experience from countries with high-performing tech sectors reveal **a number of opportunities for Australia to improve its tech sector policy framework** and seize this future potential. The key lesson is that governments need to take a coordinated approach to the digital economy. Our current policy environment is a legacy of a previous era with fragmented and overlapping responsibilities across multiple government departments and agencies. As the digital economy becomes a larger part of all Australian industries, we need a more coordinated approach to developing the foundational policy and regulatory frameworks to ensure our success. Successful performance in leading countries has been characterised by encouraging collaboration between business, government and academia; establishing strong skills and visa frameworks to support the sector's need for talent; and incentives for innovation and R&D, as summarised under six key themes in Figure 4.

FIGURE 4

A pragmatic, partnership-based approach to policy reform can enable Australia to realise the opportunities that the tech sector presents



Notes: (1) Sector deals refer to partnerships between the government and industry on sector-specific issues which can create significant opportunities to boost productivity, employment, innovation and skills. Sector deals are prevalent in the UK's Industrial Strategy³ (2) A patent box is a special low corporate tax on revenues attributable to a patent (3) The regulatory sandbox allows eligible companies to test certain products or services without regulations such as a licence (4) Hyper-depreciation allows a much higher depreciation rate on eligible assets to incentivise investment

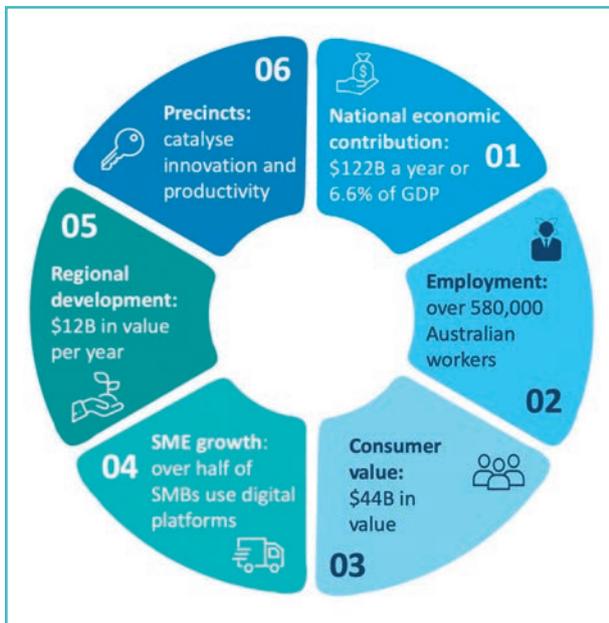
³ See the UK's Industrial Strategy, available at <<https://www.gov.uk/government/topical-events/the-uks-industrial-strategy>>

THE TECH SECTOR'S BENEFITS ARE FAR-REACHING, CONTRIBUTING \$122 BILLION TO THE ECONOMY PER YEAR AND 580,000 JOBS

Rapid progression in digital technologies in the 21st century has fundamentally changed how households, firms and governments interact. Australia's broader tech sector now employs nearly 580,000 people and contributes \$122 billion to the economy per year, representing roughly 6.6% of GDP, as outlined in Figure 5 below.

FIGURE 5

The tech sector is a critical component of Australia's economy



SOURCE: AlphaBeta 2019

Besides its contribution to GDP, the tech sector also greatly improves other industry sectors, regional communities, and government and community outcomes. Small to medium-sized businesses benefit from technologies such as social media for marketing and targeted advertising, and enterprise software to increase productivity, while consumers derive an estimated \$44 billion a year in additional value from online information, entertainment and other platforms that contribute to their lives.

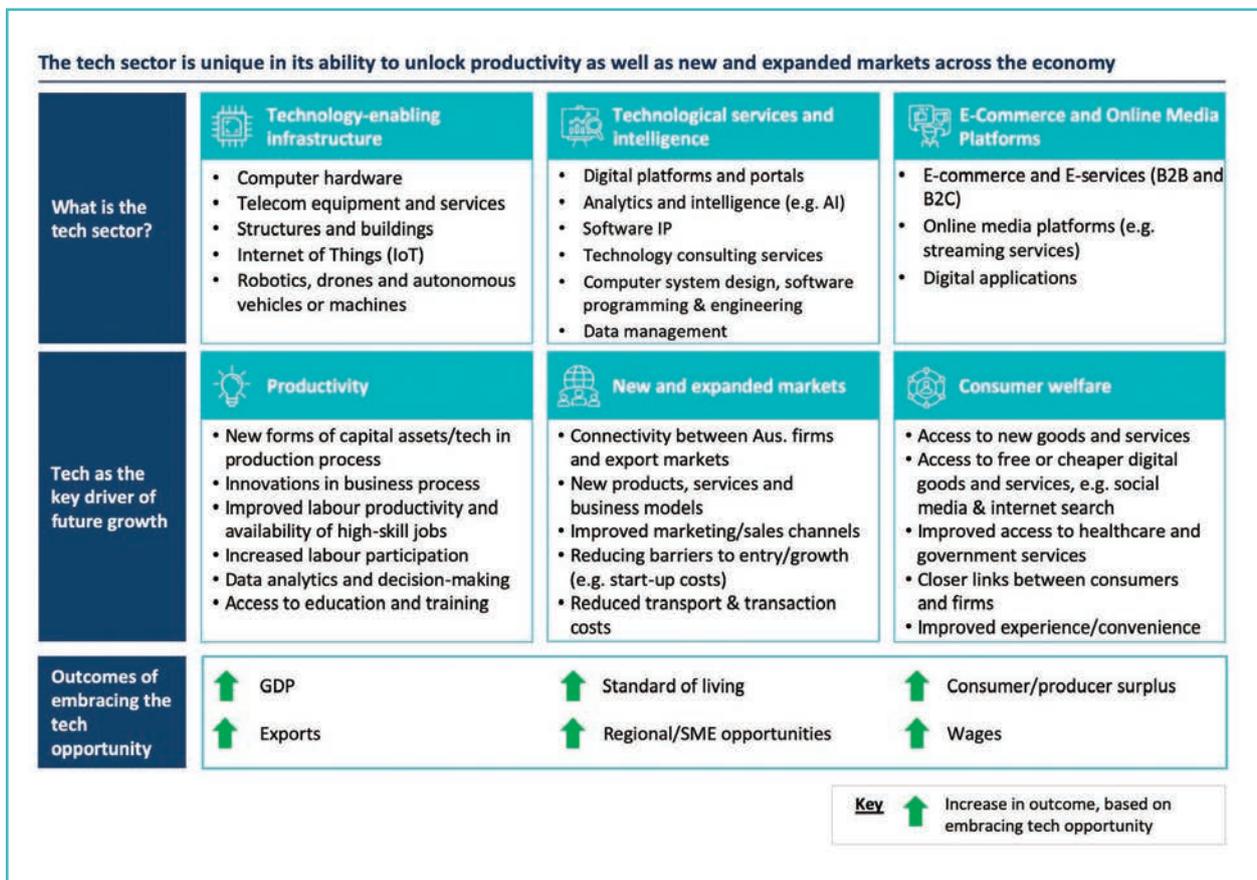
The tech sector also provides unprecedented opportunities for regional areas through reducing the 'tyranny of distance'. We estimate that the sector delivers \$12 billion in economic contribution in regional areas, as well as approximately 66,000 jobs. Finally, technology precincts catalyse innovation and productivity by clustering all elements of the technology ecosystem in one location, including startups and entrepreneurs, businesses, funders, and researchers. These critical contributions are described in the following sections.

1.1. THE TECH SECTOR CONTRIBUTES \$122 BILLION, OR 6.6% OF GDP

The technology sector encompasses a broad range of innovative uses of digital products and services that are transforming the economy, which can be defined as technology enabling infrastructure, technological services and intelligence and e-commerce. This sector covers a global network of activities, goods and services that are enabled by information and communications technologies, such as social media, artificial intelligence and e-commerce⁴ (Figure 6). In total, the tech sector contributes \$122 billion to GDP, representing 6.6% of the economy.⁵

FIGURE 6

Definition of the tech sector and drivers of growth



SOURCE: AlphaBeta analysis of ABS (2019), 'Measuring Digital Activities in the Australian Economy'; Bureau of Economy Analysis (2018), 'Defining and Measuring the Digital Economy'

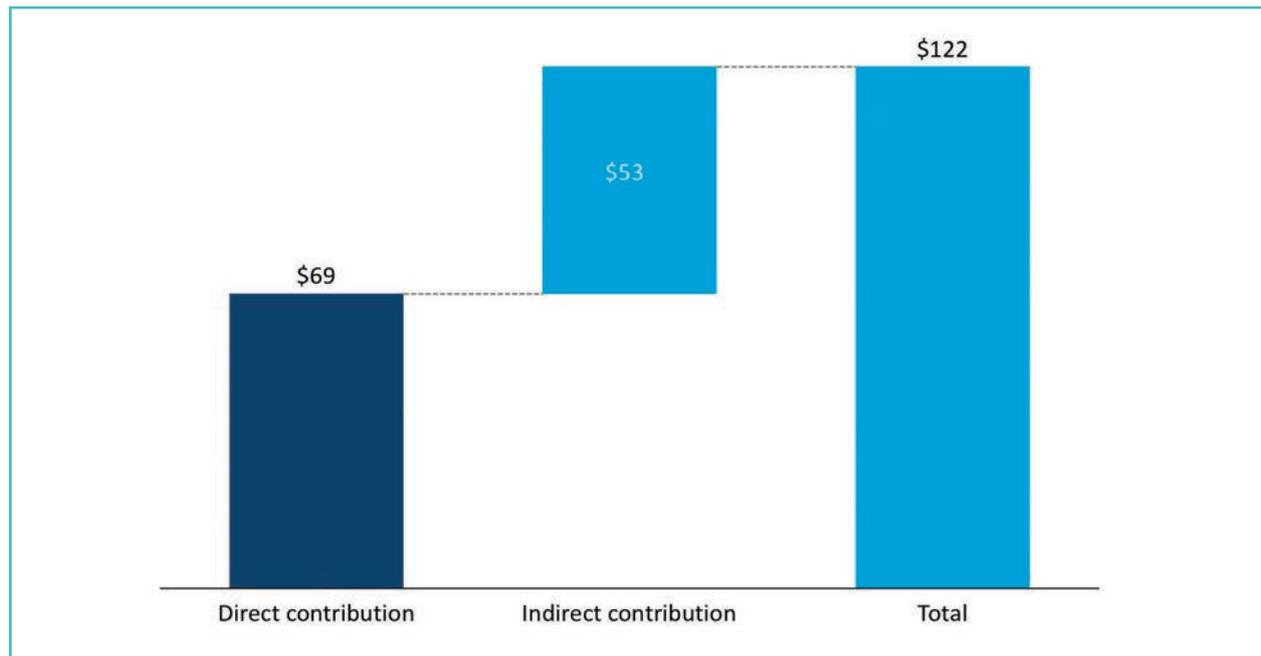
⁴ This definition considered previous definitions in Department of Broadband, Communications and the Digital Economy (2009), *Australia's Digital Economy: Future Directors*.

⁵ See Appendix for details on the methodology

FIGURE 7

The tech sector contributes \$122 billion, equivalent to 6.6% of GDP

\$ billion in Gross Value Add



SOURCE: ABS 5204, 'Table 5: Gross Value Added (GVA) by Industry' 2017-18; ABS 8155, 'Table 3: Industry value added by industry subdivision' 2017-18; ABS 8167, 'Table 4: Internet income as a proportion of income from goods or services'; ABS 6530, 'Table 1.1: Household Expenditure'; ABS 5206 Australian National Accounts.

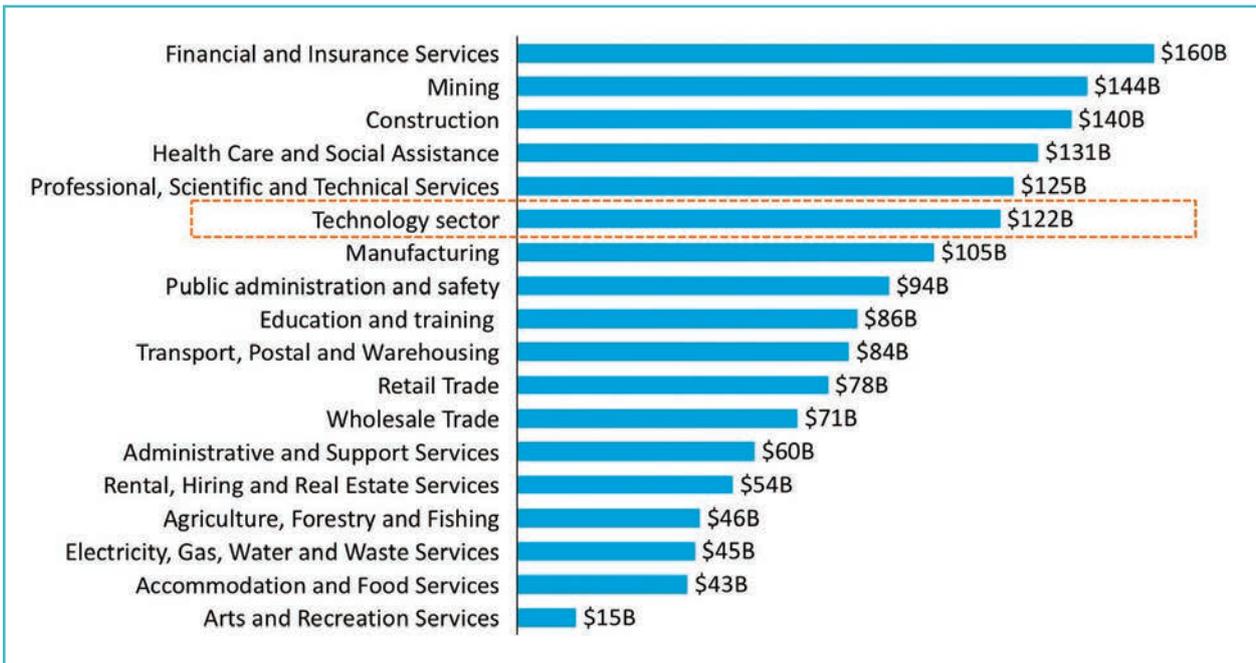
This \$122 billion comprises two components: the direct impact of firms within ICT industries such as internet publishing and broadcasting, search portals, data processing, computer system design, and telecommunications; and the indirect impact of technology on other sectors. The direct contribution from the tech sector is \$69 billion, or 3.8% of GDP. The indirect contribution includes wages for technology professionals working in non-tech sectors, and profits enabled by digital activities, and is valued at an estimated \$53 billion. This quantification does not directly estimate the productivity gains from the technology sector, for example through efficiencies gained through enterprise software.

If the broader economic impact of the tech sector were contained within one industry, this \$122 billion would make the tech sector the sixth largest Australian industry in terms of economic impact (Figure 8). This ranks the tech sector below industries such as finance, mining, and construction, but above industries including manufacturing and agriculture.

FIGURE 8

If the tech sector were an industry it would make the sixth largest contribution to Australia's GDP

Industry contribution to Australia's GDP, Gross Value Add \$B 2018



*Note: the tech sector includes both direct and indirect impacts and is not an exact industry comparison as it includes components of other industries like professional, scientific and technical services. See Appendix for details on the methodology.
 SOURCE: AlphaBeta 2019 analysis of ABS National Accounts

The impact of the tech sector on traditionally non-tech industries is demonstrated in the following case studies. Fleet Space Technologies uses satellite, connectivity and 'internet of things' (IoT) technology to improve the productivity of the agriculture, mining and construction sectors. Meanwhile,

Atlassian's suite of software development and project management tools are used to improve collaboration, save time and boost productivity at a wide range of firms, across a range of sectors.



FLEET SPACE TECHNOLOGIES REVOLUTIONISES RURAL INDUSTRIES WITH A MISSION TO 'CONNECT EVERYTHING'

Founded in 2015, Fleet Space Technologies is an Australian startup revolutionising space and the Internet of Things (IoT), inspired by the connectivity challenges faced by many global businesses. Based in Adelaide, Fleet is leveraging advancements in nanosatellite and edge computing technologies with new IoT connectivity standards to create remote connectivity systems and a global backbone for deployments in remote and rural areas.

Fleet is facilitating the digitisation of traditional industries including agriculture, mining, construction, and logistics, by offering a cost-effective solution to connect sensor devices at scale. Fleet's connectivity offers the possibility to improve efficiency in any industry, from monitoring soil moisture content to inform irrigation decisions, tagging sea animals to understand their migration behaviour, providing predictive maintenance solutions to wind farms, or providing supply chain assurance for fresh produce in transit.

Fleet is a particularly powerful solution for remote businesses, where mobile networks are often poor and digitisation options were previously limited. Fleet's technologies allow businesses to reduce costs, analyse trends and patterns, and create new lines of revenue by monitoring where their assets are at any time, such as tracking individual cattle and identifying leakages in water assets. Fleet's ground station Mission Control South Australia opened in July 2018 with the support of the South Australian Government, and it launched the first four of a planned constellation of 100 nanosatellites late last year. This widespread transformation of remote industries in Australia and around the world is only just getting started.



ATLASSIAN PRODUCTS ENHANCE TEAMWORK BY STREAMLINING COMMUNICATION AND COLLABORATION

Now famous as one of Australia’s great technology success stories, hitting US\$1 billion in revenue in 2018-19, Atlassian was founded by university mates Mike Cannon-Brookes and Scott Farquhar in 2001. Focused on driving better teamwork, Atlassian’s goal is to ‘advance humanity through the power of software’. Atlassian released its first product (Jira 1.0) in 2002, financed by \$10,000 in credit card debt, and has now grown to 3,000 employees, seven offices around the world and is used by over 150,000 customers, and has donated over \$132 million in Community licenses. The company now offers a wide suite of tools, including software development tool Jira, incident management tool Opsgenie, collaboration platforms Confluence and Trello, and Git code management tool Bitbucket.

Australian technology leader Cochlear uses Atlassian products to drive R&D collaboration

Cochlear is another pioneering Australian technology company, a global leader in implantable hearing solutions that has helped over 300,000 people worldwide. Cochlear

implants are a software-based product – clinicians use software to configure and customise each device for each recipient. Cochlear implants help those with hearing impairment to connect with the people in their lives, participate more fully in the community, and enjoy a more normal day to day life.

Cochlear has seen significant productivity increases from adopting a range of Atlassian tools including Jira, Confluence and Bitbucket, improving team communication and collaboration and reducing time spent on the code review process alone by 50-80%. Jira has been especially beneficial for Cochlear’s R&D team, the backbone of continued innovation, which is now spread across Sydney and Belgium. The team uses Jira while testing products to create trackable issues, so that issues move seamlessly from developers to code reviewers and back to testers. This ensures issues are resolved quickly and with wide visibility, and has even increased enthusiasm around the testing and reviewing process, improving Cochlear’s products and workplace.

1.2. THE SECTOR EMPLOYS NEARLY 580,000 WORKERS WHO TEND TO BE HIGHLY SKILLED AND PRODUCTIVE

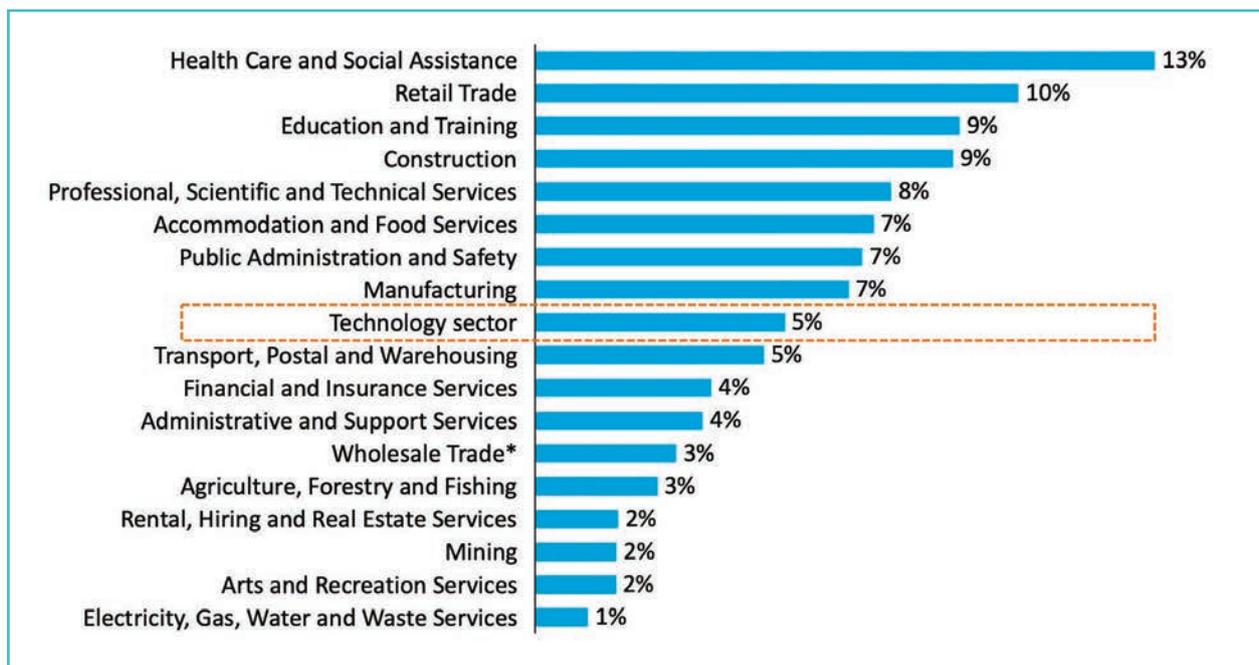
The tech sector is an important source of high-quality employment for Australian workers in both metropolitan and regional areas. Over 5% of the workforce, or 578,000 employees, are employed in the tech sector. Beyond these direct employment impacts, the tech sector also helps to support employment in other industries by connecting businesses with customers and driving productivity improvements.

If the tech sector were defined broadly to include all workers in the technology companies as well as technology-based workers in other sectors, the tech sector would be the ninth largest employer in Australia (Figure 9).

FIGURE 9

The tech sector, including workers in tech-based occupations in other sectors, is the 9th largest employer in Australia

Share of Australian workers by industry, %, 2018



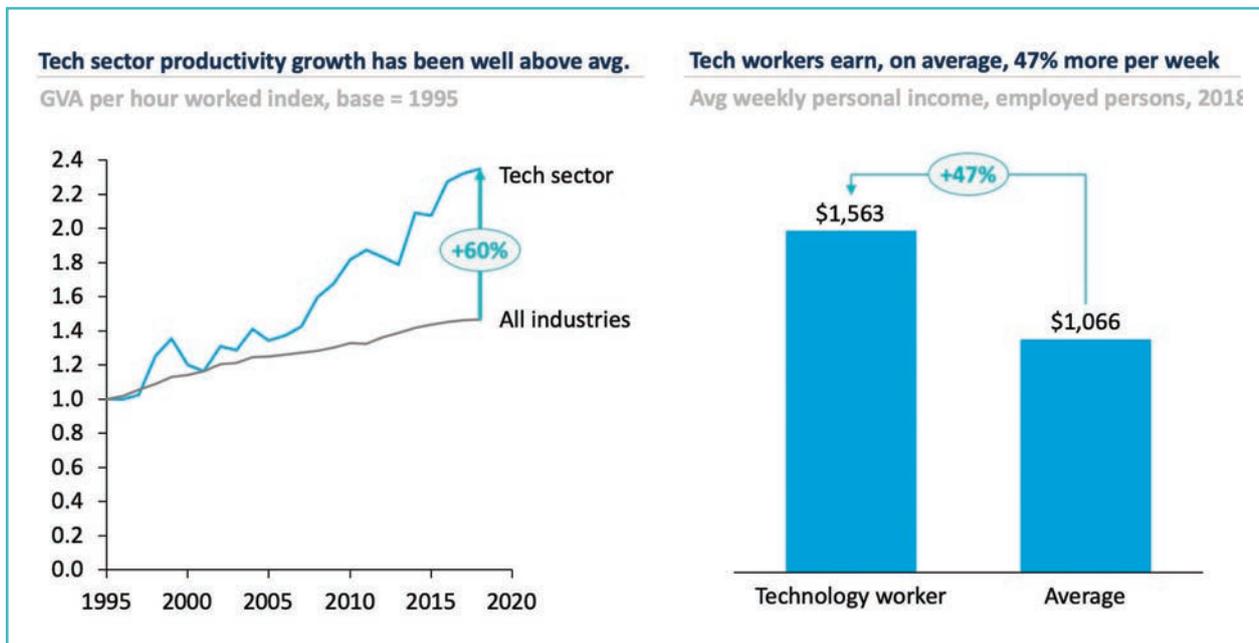
SOURCE: AlphaBeta analysis of ABS 2016, Census of Population and Housing

Note: The technology sector does not provide a perfect industry comparison as it includes employees from other sectors

The tech sector creates high-quality jobs with technology workers earning 47% more than the average Australian worker, or \$1,563 per week on average compared to \$1,066 for workers in non-tech occupations. In addition, technology workers are 60% more productive than the average for all industries⁶. In the last two decades, labour productivity of Australia's ICT sector has significantly outpaced the rest of the economy, growing 3.8% per year compared to an average of 1.5% for all industries. Tech sector labour productivity has been particularly strong since 2007 and the introduction of 'Web 2.0'⁷, which saw the rise of digital platforms including cloud computing and social media.

FIGURE 10

Technology sector workers are more productive and earn higher wages



SOURCE: AlphaBeta analysis of ABS 2018 National Accounts and ABS 2016 Census of Population and Housing

⁶ Productivity is measured as Gross Value Added (GVA) per hour worked.

⁷ Web 2.0 describes the second generation of the internet, where it transitioned from static webpages to more interactive and dynamic platforms. Web 2.0 enables people to collaborate, socialise and share information online via social media, online video, blogging and Web-based communities.

PLATFORMS LIKE HIREUP ENABLE IMPROVED EMPLOYMENT OPPORTUNITIES

Hireup is an innovative business revolutionising the Australian disability sector. Through a secure online platform, Hireup provides people with disability the tools to find, hire and manage their own support workers who share their interests. Hireup harnesses technology to give people greater choice and control in their lives. The platform allows people seeking support to choose the type of support they need and the workers who can best fulfil this.

Adam joined the Hireup platform in 2017 as he lives with non-verbal autism, while running his own business delivering fruit and vegetables around Sydney twice a week. Through Hireup, Adam was connected to support worker Trent who provides him with care and also drives the van for his delivery runs, and together they've built up a network of regular clients and work. Adam also has a screen-printing business, printing designs by local artists onto cards, t-shirts and bags.

"On paper the role I spend in Adam's life is a support worker," says Trent. "I do see myself supporting him, but I see myself as a friend, as a mentor, as a workmate, a colleague, a peer. And I see our relationship being very diverse in that regard as well."

Adam's mother Karen is happy Adam is socialising with people his own age, getting out and about in the community, and has built a strong friendship after seeing Trent's familiar face week-in, week-out.

"Trent's so lively, enthusiastic and warm. I'm very happy Adam's engaging, doing age-appropriate things; they do pretty much anything that's fun that young guys can do. Adam's becoming better at socialising and being more adaptable, and I'm really proud he can do it and that we've been able to facilitate that."

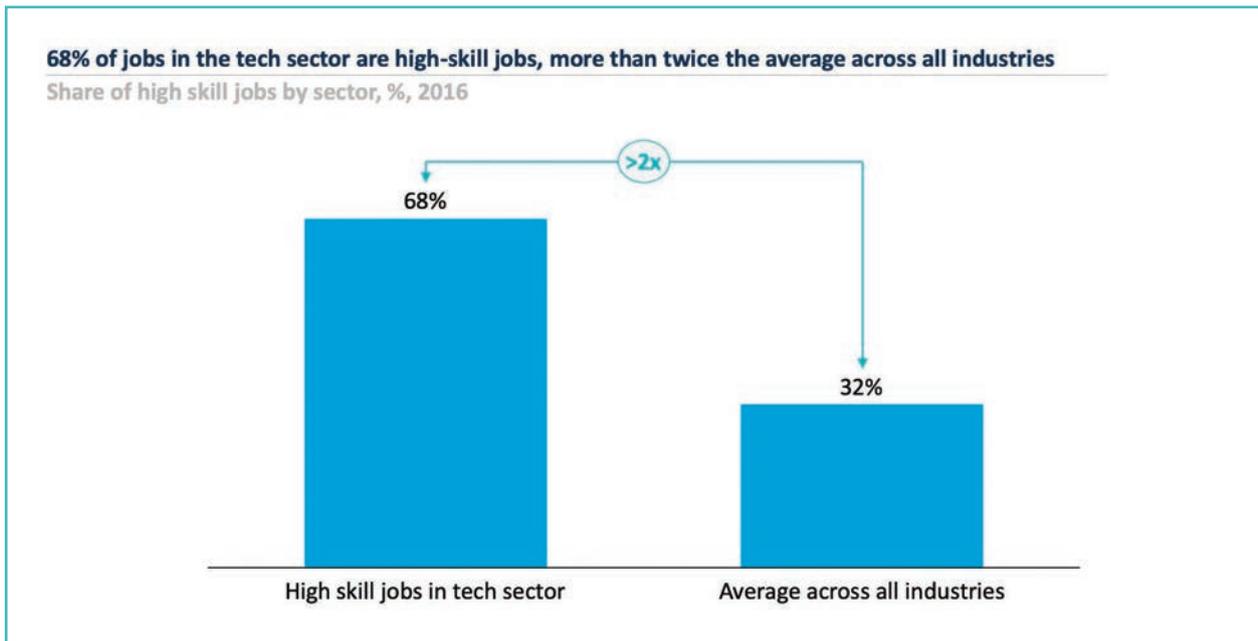


Through a secure online platform, Hireup provides people with disability the tools to find, hire and manage their own support workers who share their interests.

The tech sector is also helping to stem 'brain drain' in Australia through the creation of high-quality, high-skilled and well-paying jobs, especially for workers with STEM skills. **The tech sector significantly outperforms other industries in the creation of high-quality jobs.** Over two-thirds of jobs in the tech sector are high-skilled (such as workers in professional and management roles), compared to an average of 32% for all industries (Figure 11).⁸

FIGURE 11

Over two-thirds of jobs in the tech sector are high-skill jobs, more than the Australian average for all industries



SOURCE: AlphaBeta 2019, analysis of ABS Census of Population and Housing 2016

⁸ High-skilled jobs are defined using ABS ASCO Skill Level 1, which is equivalent to a level of skill commensurate with a bachelor's degree or higher qualification or at least 5 years of relevant experience.

1.3. TECHNOLOGY CONTRIBUTES \$5,000 PER YEAR IN VALUE TO THE AVERAGE HOUSEHOLD AND IMPROVES GOVERNMENT AND COMMUNITY OUTCOMES

Digital technologies like maps, web search, online banking and shopping generate considerable value for consumers that is not captured in traditional measures of GDP. These gains may be measured as a ‘consumer surplus’. The consumer surplus created by the tech sector in Australia is estimated to be nearly \$44 billion, or approximately \$5,000 per Australian household per year on average (Figure 12).⁹

‘Consumer surplus’ generally refers to the positive difference between the price a consumer is willing to pay for a good or service, and the price the consumer actually pays. While many digital goods and services are free, they provide immense value to consumers by allowing them to access resources, entertainment and information that improve their work, study and personal lives. For example, a study that asked US consumers to put a dollar value on the benefits they derived from Facebook estimated the platform to have added nearly 0.5 percentage points to the nation’s GDP growth per year.¹⁰ AlphaBeta research from 2015 found that Google Search saved the average Australian user roughly 31 hours per year in time spent answering questions, and Google Maps saved users 29 hours through more efficient driving, public transport and walking routes.¹¹

Platforms like Redbubble are allowing customers to access a wider variety of goods and services by linking independent local artists with a global marketplace. Point of sale technologies like Square enable customers to use more convenient, cashless payment methods in previously cash-only situations like markets and festivals. Video streaming and online education platforms are improving consumers’ access to new knowledge, skills and qualifications. In addition, tools like mobile banking, digital government services and telehealth have made it more convenient for consumers to access these services, saving them time and improving productivity.

This report uses figures from previous research on the consumer surplus of the internet to understand the consumer surplus created by free digital goods and services in relation to average internet spending (see Appendix for a more detailed explanation of this methodology). Using this approach, we estimate the tech sector to create \$44 billion of consumer surplus, including \$13.3 billion from information and learning, \$7.3 billion from social media and other communication, \$6.9 billion from entertainment, and \$5.8 billion from maps.



⁹ Includes only households with access to the internet at home. According to the 2016 Census, the average Australian household has 2.6 people.

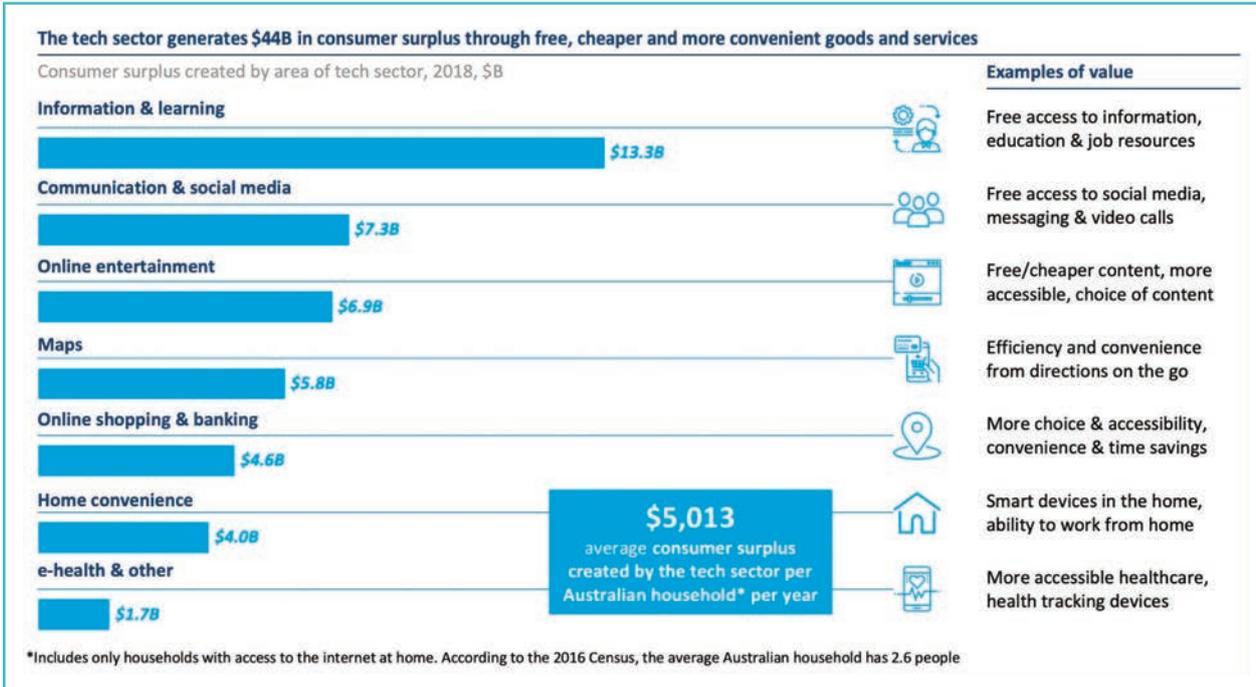
¹⁰ Brynjolfsson et al. (2018), “Using Massive Online Choice Experiments to Measure Changes in Wellbeing”. 2018 statistics from Roy Morgan and Nielsen suggest that social media use in the US and Australia is comparable, with the average adult spending 5.25 hours a week on social media in the US, and 6 hours a week in Australia.

¹¹ AlphaBeta (2016), “Google Economic Impact Australia 2015”

FIGURE 12

The tech sector creates \$44 billion in additional value to consumers

\$ billion in consumer surplus



SOURCE: AlphaBeta 2018, *Connecting Australia*; ACCAN & SACOSS 2017, *Telecommunications Expenditure in Australia*

Digital technologies give governments and community groups more reach

In addition to consumer surplus, the tech sector creates economic value by reducing the cost of many goods and services, enabling resources to be directed towards a more productive use. In particular, the tech sector enables significant cost savings for the government, including an estimated \$3.9 billion a year from online services delivery, and \$5.4 billion from e-health.¹²

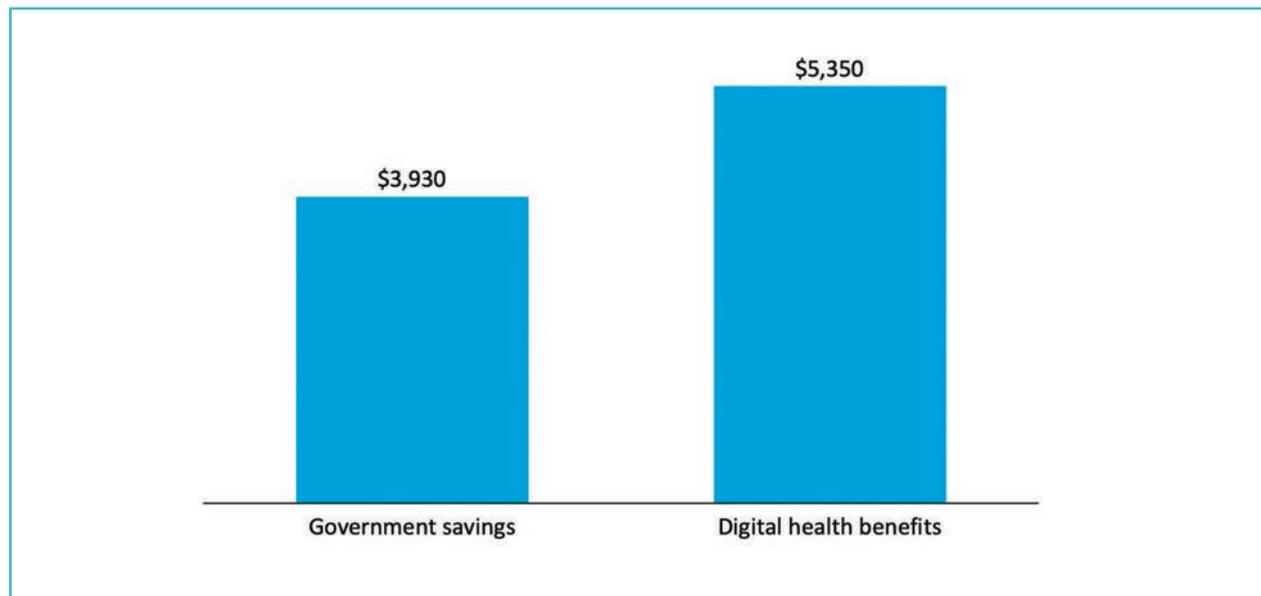
Digital innovation is also creating new opportunities and driving growth in the not-for-profit sector. By increasing connectivity, access and communication, digital technologies enable Australians to develop new forms of community, new ways to advocate for a wide range of causes, and new avenues to support those in need.

¹² Digital transactions cost less to perform than non-digital transactions. See Appendix for methodology.

FIGURE 13

The tech sector is improving the efficiency and outcomes of government service delivery

Government savings per year, 2019, \$m



SOURCE: AlphaBeta 2019, see Appendix for details on the methodology

There are a number of significant benefits associated with the use of SNS [social networking services] including: delivering educational outcomes; facilitating supportive relationships; identity formation; and, promoting a sense of belonging and self-esteem. Furthermore, the strong sense of community and belonging fostered by SNS has the potential to promote resilience, which helps young people to successfully adapt to change and stressful events.

- Cooperative Research Centre for Young People Technology and Wellbeing, Melbourne¹³

¹³ Collin, P., Rahilly, K., Richardson, I. & Third, A. (2011) *The Benefits of Social Networking Services: A literature review*. Cooperative Research Centre for Young People, Technology and Wellbeing. Melbourne.

The case study below on GoFundMe, and the campaigns launched through that platform to raise money for farmers facing challenges across Australia and women facing poverty and imprisonment in Western Australia, highlights the important social contribution enabled by the tech sector in Australia.

GOFUNDME FACILITATES NEW APPROACHES TO FUNDRAISING AND SOCIAL IMPACT

GoFundMe launched in the US in 2010 as a social fundraising platform, or a platform that allows users to start their own fundraising campaign, using the internet to find a wide base of donor support. In 2016, GoFundMe launched in Australia, which has since become one of its top markets outside of the US.

Helping Australians support causes that matter to them

Digital technologies and platforms such as GoFundMe are introducing new ways of fundraising for a wide range of causes that Australians care about. In particular, social fundraising creates new ways for individuals and their families and communities who fall through the gaps of established and traditional government or charity support systems in Australia, to find a wide network of support. Since launching in 2016, over \$200 million has been raised through GoFundMe in Australia and over 2 million Australians have donated to a cause. Top fundraising categories on the platform include fundraising for medical expenses, emergency and crisis relief.

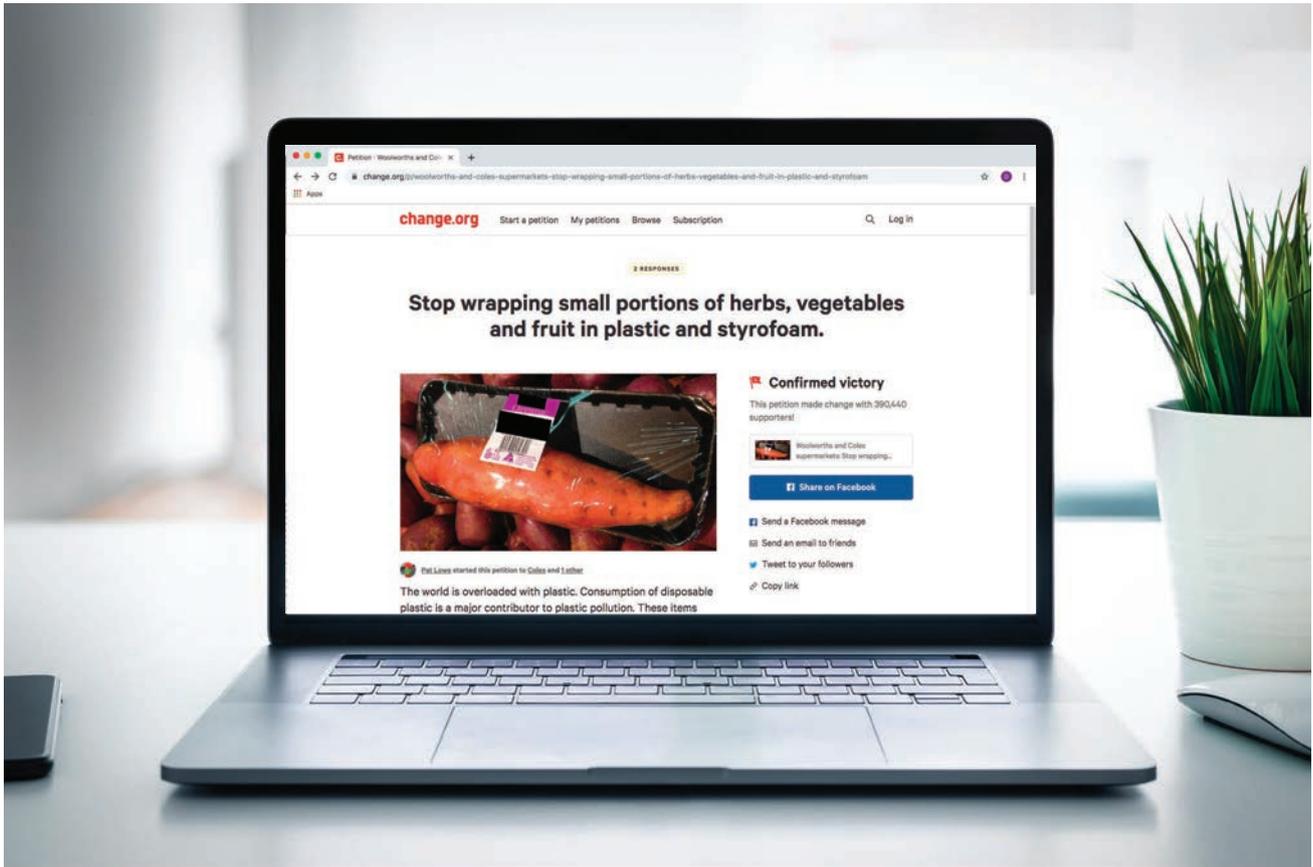


GoFundMe has helped raise over \$1 million for Australian farmers

Farmers are facing challenges in Australia, and communities across the country are taking to GoFundMe to find new ways to provide direct support to farming communities. In 2018, 10-year-old Jack Berne learned about farmers struggling with drought, and the impact that this was having on kids like him, in class in a Sydney primary school. With the support of his school, he launched ‘A Fiver for a Farmer’ on GoFundMe. The campaign received widespread attention and support and has so far raised over \$700,000 for affected farming communities, distributed by Rural Aid and Drought Angels. Following devastating floods in North West Queensland in early 2019 that wiped out thousands of cattle and horses and destroyed family farms, charity Sisters of the North launched a campaign on GoFundMe. The campaign has so far raised an additional \$300,000 to support farming families in North West Queensland.

Over \$400,000 for women facing poverty and imprisonment in Western Australia

In Western Australia, people who have no criminal convictions could face imprisonment if they do not have the capacity to pay a fine. This largely affects single Aboriginal mothers, already struggling with poverty and homelessness. Community organisation Sisters Inside Inc has used GoFundMe to raise over \$400,000 to release women in this situation from prison or to pay warrants so they are not imprisoned. The campaign has helped over 100 women so far and is also encouraging donors to contact government officials with their concerns.



CHANGE.ORG ENABLES PARTICIPATORY DEMOCRACY

Change.org is a social enterprise that offers a free open platform, which allows people everywhere to start petitions, mobilise supporters, and work with decision makers to drive solutions. Nearly every hour, a petition around the world on Change.org achieves victory, changing a wide range of laws, and decisions by governments and companies. Globally, it is used by over 250 million people in 196 countries. In Australia, the platform currently has almost 6 million users. In addition to people starting and signing petitions. Change.org is used by:

- Leading organisations that advance their causes and mobilise new supporters.
- Decision makers at the highest levels of government and business that engage with their constituents and consumers.
- Journalists who sourcing stories and cover campaigns hundreds of times a day globally.

Online petitions are increasingly an important feature of contemporary political engagement in advanced democracies. An analysis of Change.org data in Australia shows that the majority of petitions are typically politically motivated and that 'super users' of the online petition system engage broadly as well as often. The analysis concludes that online petition creation and signing petitions on platforms like Change.org is a distinct and important part of citizen engagement in politics.

Some of the changes initiated by Change.org users in Australia 2018 include:

- Residents of a small town in Western Australia convinced the country's largest supermarket chains to reduce plastic wrapping for fruits and vegetables.
- A young animal protection named Brelle Revello convinced a pet food manufacturer in Australia to stop putting shark flesh in its products.
- 300,000 Sydneysiders expressed their objections to the sails of the Opera House being used for advertising.

1.4. SMES IN TECH AND NON-TECH SECTORS BENEFIT FROM NEW GROWTH AND EXPORT OPPORTUNITIES

The tech sector is a major source of opportunities for SMEs, which represent nine in 10 Australian businesses and about 40 percent of all jobs. **Within the tech sector, SMEs with fewer than 20 employees account for over 90% of Australian technology businesses.**¹⁴

Digital technologies also provide significant opportunities to SMEs outside of the tech sector by improving productivity and connecting them to a wider pool of partners, customers and suppliers. It has been estimated that small businesses in Australia can unlock an additional \$49.2 billion of private sector output over the next ten years by making better use of digital technologies.¹⁵

The tech sector helps Australian SMEs grow in five key ways:

- **Reduced startup costs:** Startups in the digital economy can now be established at a relatively low cost without the need for a 'bricks and mortar' store front. Online payment and web development platforms have rapidly reduced the barriers for online sale of goods and services. This unlocks opportunities in a range of industries where it was historically difficult to access the capital required to start or expand a business.
- **Outsourced and streamlined business models:** Digital platforms and services like cloud computing provide small firms with off-the-shelf products for a range of services including website design, payments, legal, accounting, project management, logistics and marketing. This allows small businesses to run a 'lean' operating model and access expert business services without a large workforce. The next wave of innovation will leverage machine learning to further enhance operations. Over the last five years it has been estimated that the adoption of cloud services has resulted in cumulative productivity benefits of \$9.5 billion over the last five years¹⁶
- **Improved sales and marketing channels:** Startups can form global connections and reach international customers from their inception. SMEs worldwide are joining e-commerce marketplaces to access business resources and reach new markets. Amazon now hosts two million third-party sellers, while some ten million small businesses have become merchants on Alibaba platforms.¹⁷ Social media platforms provide access to new marketing and sales opportunities to improve market penetration and customer access.

- **Increased product and business model variety:** Digital technologies have created new opportunities for entrepreneurs in products and services such as app development, blockchain technologies, digital media, fintech and a host of other industries that were non-existent even a decade ago. In addition, innovative business models allow new types of products and services to be profitable.

- **Improved ability to innovate and collaborate:** Online and digital communication brings together businesses, customers, suppliers, labour and information at a low cost. This allows the innovation process to occur much quicker through faster feedback loops, improved access to expert knowledge as well as instantaneous access to suppliers and labour internationally to develop products that are market-ready.

This is exemplified in the employment impacts that are being driven by the technology sector in Australia, by enabling growth and improving productivity. For example, 58% of SMBs have hired more staff aided by the growth they have experienced from using Facebook, while over a hundred thousand employees hired each year are aided by the growth from SMBs using Facebook¹⁸.

Canva is one example of an Australian technology company that is reducing barriers to entry for SMEs. As outlined in the case study, Canva's online design platform allows SMEs to build their brand by developing professional-looking marketing materials cheaply or for free. Deputy is another example of an Australian technology company that is enabling companies to grow and scale through outsourced and streamlined business models. As outlined in the case study, Deputy created a technology-based solution to common staffing and compliance challenges faced by many Australian businesses. This particularly benefits SMEs in retail and hospitality, which have been able to more efficiently manage and grow their businesses.

¹⁴ SMEs refer to small and medium sized enterprises (SMEs). Small enterprises are defined in this report as a business with fewer than 20 employees, including non-employing businesses such as sole proprietorships and partnerships without employees. Medium sized enterprises are defined as businesses with 20-199 employees. Our sizing of businesses in this context refers to the information, media and telecommunications (IMT) sector.

¹⁵ PwC (2015), *Small Business: Digital Growth*

¹⁶ Deloitte Access Economics (2019), "The economic value of cloud services in Australia"

¹⁷ McKinsey Global Institute (2016), "Digital Globalization: The New Era of Global Flows"

¹⁸ Facebook (2018), "Connecting benefits, How social networking supports Australian small business and communities"



CANVA EMPOWERS SMES TO BUILD THEIR BRAND THROUGH DESIGN AND MARKETING

Canva is an online design platform that empowers anyone to design professional-looking logos, graphics, marketing materials and more using templates and drag-and-drop elements.

The company is particularly focused on helping SMEs market themselves professionally and develop their brand, creating opportunities for small business owners across Australia.

The company was founded in 2012, following a chance meeting between co-founder and CEO Melanie Perkins and US venture capitalist Bill Tai. Utilising seed funding from venture capital, as well as an 'Accelerating Commercialisation' grant from the Australian Government, Canva has expanded to become one of Australia's great startup success stories. 50,000 customers signed up to use Canva in the first month it launched, and there are now over 15 million monthly active users across 190 countries.

Canva supported the development of Liandra Swim, an Indigenous-inspired swimwear business

Liandra Gaykamangu, a Yolngu woman from North-East Arnhem Land, is one example of an entrepreneur and small business owner who developed and launched their business with the help of designs she created on Canva. Liandra Swim is a swimwear company with designs inspired by Aboriginal Australian culture. The business was created from Gaykamangu's vision for a more inclusive marketplace and desire to celebrate her culture and childhood growing up at the beach.

Building a small business gave Gaykamangu economic freedom, creative control and more time to spend with her family. However, having previously worked as a teacher, Gaykamangu found the unfamiliarity of the business world and launching an effective marketing campaign as a small business overwhelming at times. Canva became the springboard for Liandra Swim, providing a one-stop-shop where Gaykamangu could create everything from her logo, social media content and care labels, ensuring the brand had a unified, compelling image. Now a successful swimwear business, Liandra Swim has created a strong brand of premium swimwear that gives the wearer a unique Australian fashion experience.



DEPUTY SIMPLIFIES STAFFING AND COMPLIANCE FOR AUSTRALIAN BUSINESSES

Deputy is an Australian startup with a mission to ‘free people from the mundane’. The concept for Deputy was born when entrepreneur Steve Shelley was struggling to manage the staffing demands of his small business – he found himself spending all his time on administrative tasks with no time to focus on growing his business. Shelley teamed up with Ashik Ahmed, who built a platform to automate staffing and create insights to increase efficiency. That platform became Deputy, which launched in 2008 and is now used by 165,000 businesses in 70+ countries.

Australian restaurants use Deputy to scale and improve efficiency

Thievery restaurant opened in Sydney in 2015, and based on its success, the team opened their second restaurant, Butter, less than a year later. As the restaurant expanded, there was a need to scale quickly and contend with a high turnover workforce. In order to help resolve this issue, Thievery utilised Deputy, to support a tripling of employees while minimising additional time spent on administrative tasks. The software allowed the teams to avoid using paper timesheets and improved their ability to manage employees and shift scheduling.

Australian chocolateria chain San Churro calculated that they saved approximately \$130,000 per year in administrative costs utilising Deputy’s software. Trying to manage a growing business across multiple stores using paper rosters, spreadsheets, and emails was slow and chaotic for owner Giro Maurici. He found the software made it easy to communicate with employees, allowed managers to track roster costs across each store, and ensured all employees are paid the correct award wages through the built-in award interpretation compliance tool.

More than just a business tool, Deputy gives new freedom to Australians with complex needs

Although designed as a business tool, Deputy also enables social outcomes. Matthew Simpson was born with cerebral palsy, which affects his speech and fine motor control. For the last five years, Matthew has used Deputy to schedule care workers who provide for him throughout the day, using the platform for communication and payment.

Online sales and social marketing help small businesses export

Digital technologies have also made it easier for Australian SMEs to export. While businesses historically had to establish significant economies of scale before looking overseas, startups may now be ‘born global’ with immediate access to the online marketplace. In the United States, large multinational corporations accounted for only half of exports in 2013, down from 84 percent in 1977, reflecting the export gains of smaller businesses. Among SMEs that export, the smallest are gaining export market share the fastest.¹⁹

One in three of all Australian SMEs receive orders via online platforms, driving approximately \$90 billion of income to these businesses.²⁰ Social media drives a significant share of online sales: 8.2 million Australians have purchased from, or visited, an SME after seeing content relevant to the business on Facebook alone.²¹ The proportion of businesses with a social media presence has reached the highest level recorded.

More than half of all Australian small (51%) and medium-sized businesses (58%) have a social media presence.²² Of these, approximately half use social media for advertising and promotional purposes.²³

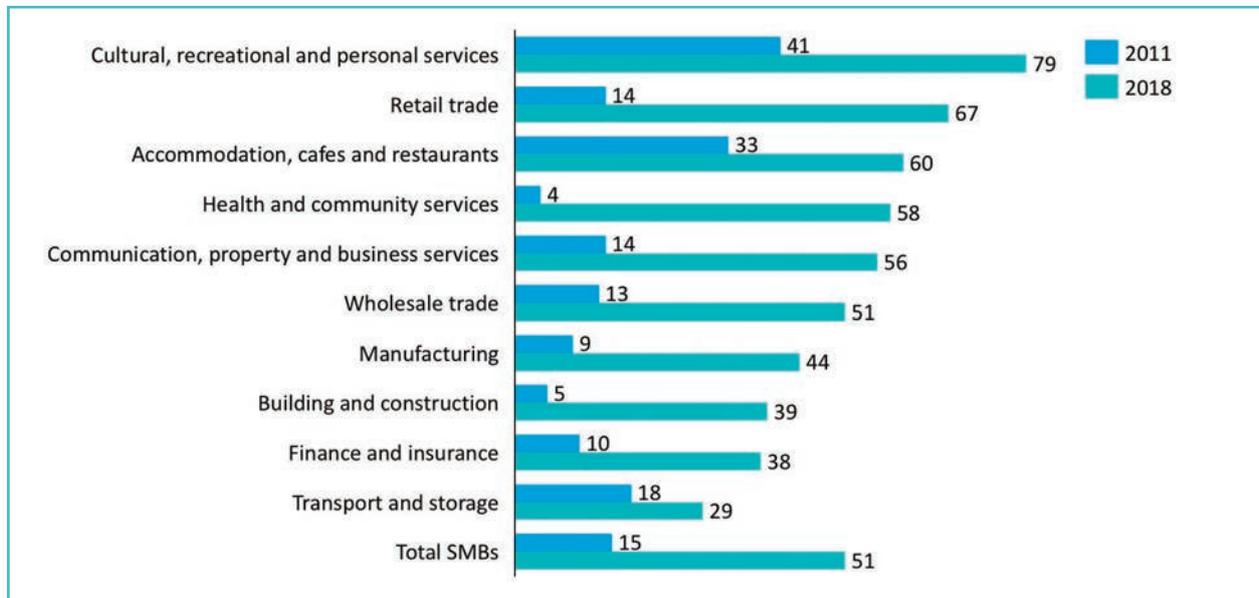
Figure 14 shows that social media platforms are critical for a significant proportion of SMEs, particular in consumer-facing industries like health and community services, where the share of businesses with a social media presence has grown by a factor of more than 5-10 times since 2011. The breadth of social media use across industries highlights the importance of digital platforms to the whole economy, with at least a third of SMBs using social media in industries such as manufacturing, construction and wholesale trade.

The case study to the right on Redbubble, based in Melbourne, demonstrates the power of online platforms to accelerate sales for SMEs and sole traders, empowering independent artists to sell to a global customer base.

FIGURE 14

Social media presence of small and medium businesses

% of SMBs with a social media presence



SOURCE: Yellow 2018, Yellow Social Media Report 2018 – Businesses

¹⁹ McKinsey Global Institute (2016), “Digital Globalization: The New Era of Global Flows”

²⁰ AlphaBeta (2016), “Google Economic Impact Australia 2015”

²¹ Facebook (2018), “Connecting Benefits”

²² This refers to social media platforms like Facebook, Instagram, LinkedIn, Twitter, Google +, YouTube, Pinterest and Snapchat.

²³ Yellow (2018), “Yellow Social Media Report 2018”



REDBUBBLE CREATES A PLATFORM FOR INDEPENDENT ARTISTS TO SELL THEIR CREATIONS TO A MASS AUDIENCE

Redbubble was founded in Melbourne in 2006 by Martin Hosking, Peter Styles and Paul Vanzella as a new way for creatives to sell their art and designs directly to a mass audience. Redbubble is an online platform that allows any individual to open their own 'shop' for free, creating an income stream and customer base for independent artists selling creations including apparel, stationery, homewares, bags and wall art. The company is now a global success story, with offices, contributing artists, and customers around the world, and listed on the ASX in 2016.

Redbubble empowers artists to sell to a global audience, facilitating access to third party printing and shipping services and taking care of customer service. Redbubble

also creates new opportunities for consumers to discover unique products in a global marketplace and support independent artists. Over 800,000 artists now publish their creations through Redbubble, including over 75,000 located in Australia who sell to a global audience.

The site allows artists to set their own prices and margins and earn income for every product they sell through the site, and artists retain ownership and control over their creations. For artists, selling on the Redbubble platform typically represents an important income stream and opens up new global markets that may otherwise be difficult to access. To date, artists have earned over \$160 million through the site globally.

1.5. REGIONAL AUSTRALIA GETS \$12 BILLION OF ECONOMIC VALUE PER YEAR FROM IMPROVED SERVICES AND WORK OPPORTUNITIES

The tech sector is helping to drive inclusive growth across all Australian regions and industries. Better systems, processes and connectivity have allowed workers and businesses to base themselves in remote locations while remaining connected to customers and supply chains located around Australia and the world. While Australia's tech sector is largely concentrated in the metropolitan areas of capital cities, we estimate that it generates nearly \$12 billion in economic value for regional Australia by enabling regional businesses, creating local jobs, and improving residents' access to goods and services as shown in Figure 15.²⁴

The tech sector drives regional economic and social development in six key ways:

- **Access to customers and labour:** Digital platforms allow regional businesses to access customers, suppliers and labour that were previously limited by distance and transport costs.
- **Access to employment:** Telework, flexible working arrangements and online business models allow regional residents a variety of new opportunities for employment, entrepreneurship and the ability to start and grow a small business. Large technology companies like Atlassian are promoting telework policies which aim to increase the pool of talent, improve workplace flexibility and productivity.²⁵

FIGURE 15

The tech sector enables regional economic development



SOURCE: AlphaBeta 2019

²⁴ The tech sector generates over \$111 billion in GVA in Australia capital cities, based on AlphaBeta analysis of ABS 2018 National Accounts and ABS 2016 Census of Population and Housing.

²⁵ CIO (2019), "Atlassian launches Australia-wide remote working initiative"; Forbes (2017), "Are Remote Workers More Productive than In-Office Workers?"

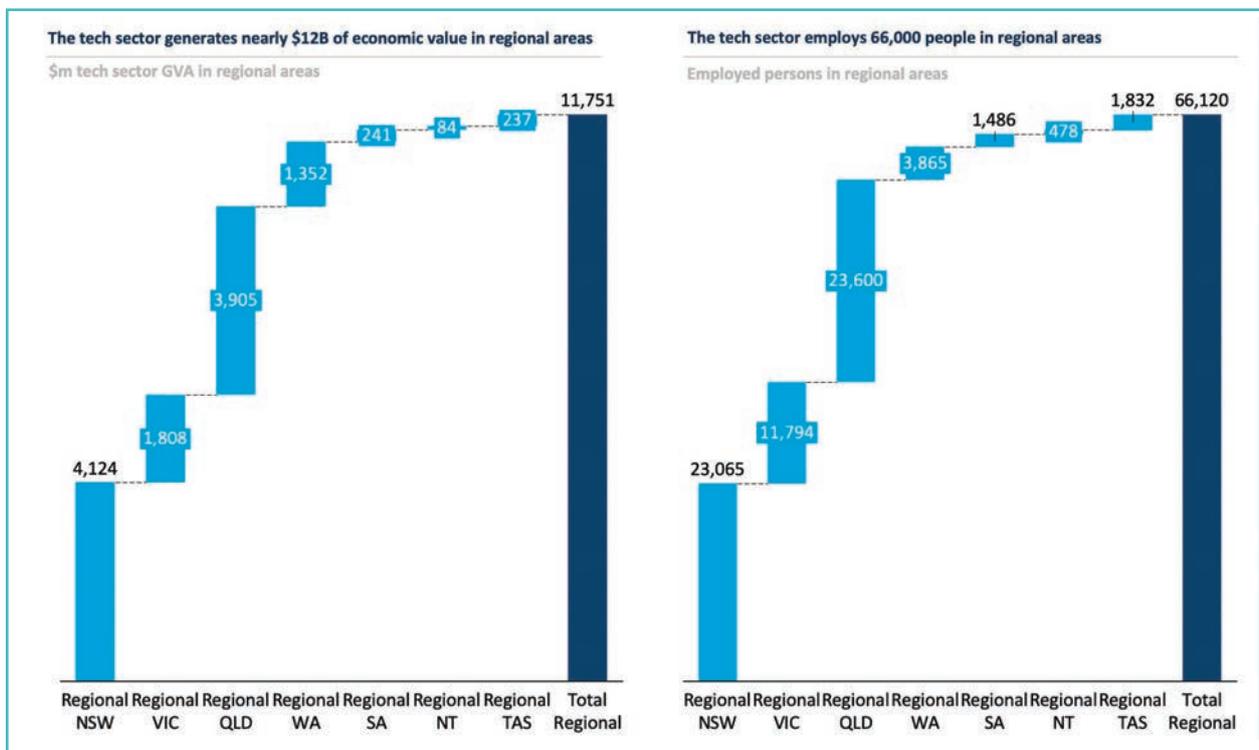
- **Health and education:** Online education platforms and learning modes allow regional residents to access world-class education without having to travel to major cities. Health services are now accessible via digital and online channels, reducing the need for travel for certain types of care.
- **Consumer goods and services:** Consumers in remote locations can now access a wider variety of products and services including international entertainment, shopping, culture, art and sporting media instantaneously via digital media platforms, without the need to travel large distances.
- **Business improvement:** Digital innovations improve the productivity of business processes.
- **Government services:** Government and emergency services are now accessible online, improving emergency response and making government transactions more convenient.

Although the tech sector makes a significant economic contribution in the regional areas of all states and territories, these benefits are most strongly felt in regional NSW and Queensland, which account for roughly two-thirds of the \$12 billion in value generated and seven in 10 regional tech sector jobs (Figure 16). In total, over 66,000 regional Australians work in the tech sector or in technology-related occupations. Over 3,500 technology businesses are located outside of Australian capital cities, with over a third of these located in regional Queensland.

The case study on the following page on Square demonstrates the way that digital innovations are empowering regional businesses, especially SMEs, to increase sales, reach new customers and improve standard business processes such as payments. SafetyCulture, an Australian technology company that launched in Townsville and is now used by businesses across Australia, is one example of the way that technology companies are driving economic gains for regional Australia both within and outside the sector.

FIGURE 16

The tech sector generates nearly \$12B in economic value in regional areas, and is responsible for 66,120 regional jobs and 3,500 regional businesses



SOURCE: AlphaBeta 2019

NOTE: Regional locations refer to areas outside greater capital city areas. Gross Value Add (GVA) is the term is used to describe contribution to GDP, by industry. In summary, it is measured as the value of output minus the value of inputs.



SAFETYCULTURE SAVES TIME, MONEY AND LIVES BY TRANSFORMING SAFETY AND QUALITY PROCESSES

SafetyCulture was launched in Townsville in 2004 by CEO Luke Anear, who leveraged his experience as a private investigator in the workers compensation sector to develop a mobile solution for managing safety and quality. SafetyCulture's flagship iAuditor app is an inspection app which provides visibility and insights to help raise safety and quality standards across an organisation. The app is used to collect consistent data, standardise operations, send workplace safety and inspection reports, identify failed areas and get problems resolved.

iAuditor is the most widely used inspection and auditing application in the world and is now used by 25,000 companies in over 80 countries, including a large export market. Currently, SafetyCulture employs of 320 people globally in five offices including 156 people in its Sydney and Townsville offices.

Sunshine Crane Repairs increases safety, saves time, and improves audits using SafetyCulture

Sunshine Crane Repairs, a family-owned business on the Sunshine Coast in regional Queensland, improved efficiency and safety of its auditing processes thanks to iAuditor. Crane repair requires working at heights, and owner Donald Kempf previously had to carry clipboards, notepads, pens and cameras up with him. This increased safety risks and was time consuming, as he had to type up reports and compile photos after collecting data onsite. Through iAuditor, Kempf was able to not only digitise his checklists and data collection, but also expand his checklist from one page to fourteen because he was no longer carrying physical documents. A report that used to take two hours is now done in minutes, and contains much more comprehensive

information, improving the quality of service Kempf can offer his clients. iAuditor facilitates real-time data collection and reporting in order to help businesses like Sunshine Crane Repairs quickly recognise and improve workplace safety and efficiency.

Use of iAuditor has significant benefits with customers reporting a 23% reduction in safety incidents in the construction industry. It has also seen a 7% increase in customer satisfaction in retail and a reduction in the time per report by eight times, allowing companies to more efficiently run their business with a corresponding savings in the amount of paper previously used to conduct a similar report. The application is a tool that empowers frontline workers, distributed teams and other users to raise standards and maintain best practice. It is now transforming a wide range of industries including retail, aviation and hospitality, with over 60% of customers using the tool for functions outside of safety, such as quality control and assessing customer experience.

SafetyCulture epitomises the gains from collaboration for technology startups, government and universities. In 2013, SafetyCulture received an Accelerating Commercialisation grant of \$1.79 million from the Australian Government. Combined with funding from Blackbird Ventures, this helped to accelerate growth, allowing SafetyCulture to hire 21 people in three months and start building a team. SafetyCulture also developed a close relationship with the computer science program at James Cook University, which assisted them to find talent. In return, SafetyCulture created great opportunities for students, providing internships, work experience placements and sponsored science and innovation events on campus.



SQUARE ALLOWS SMALL, REGIONAL AND TRAVELLING BUSINESSES TO DO BUSINESS IN ANY LOCATION

Square was founded 10 years ago in the US by artisan Jim McKelvey and Twitter CEO Jack Dorsey, after McKelvey's firsthand experience of the lack of affordable credit and debit card facilities for SMEs – a major challenge in the transition to a largely cashless economy. Square was launched as a portable card payment technology that plugs into the seller's phone, allowing small businesses to take card payments from any location, including markets, festivals, or on the roadside.

Empowering Australian businesses to participate in the increasingly cashless economy

Square launched in Australia three years ago. 60,000 businesses signed up within the first year, 80% of which had never taken a credit card payment before, including sole traders, family farms wanting to sell from the roadside, and small businesses that sold primarily at markets. Square card readers are lightweight and inexpensive, allowing small, regional and travelling businesses to experiment with accepting credit cards without investing in larger and more expensive traditional payment technologies.

Square helped Glencoe Farms expand from traditional family farm to premium fine foods business

Glencoe Farms in Victoria operated as a traditional family farm for over 30 years, mostly selling tomatoes. The farm began to feel the pinch as costs rose while the price of tomatoes did not. On a trip home to the family farm while studying engineering, 30-year-old Andre decided to help his parents explore new avenues. They developed a range of pasta sauces, pastas, and vegan jerky from their farm produce and began selling at farmers markets. However, as a premium product they found that prospective buyers were often not carrying enough cash to make large purchases. The business turned to Square, allowing them to take card payments wherever they sold their products. This allowed Glencoe Farms to establish their fine foods business and expand production, now selling at markets around the state and to independent grocery stores in Victoria and NSW. The business also tracks sales data using the Square Dashboard, identifying the products that sell well at each location, allowing them to optimise sales for each market.

1.6. TECHNOLOGY PRECINCTS DRIVE INNOVATION AND IMPROVE AUSTRALIA'S TALENT POOL

Technology precincts bring together workers, businesses, funders, entrepreneurs, researchers and suppliers to increase their ability to collaborate, develop intellectual property, commercialise products, attract skilled labour and match suppliers and customers. Precinct-based development is emerging as an international trend to drive industry growth. These precincts are typically high-density areas with access to public transport, community amenities, green space and a mix of housing, collaboration and work areas to incentivise the attraction of global expertise and talent. This 'clustering' effect is critical for attracting investment and productivity growth. The US Economic Development Administration, in conjunction with Harvard Business School, has developed a cluster mapping of economic development zones across the US recognising that:

Companies in clusters gain access to specialised regional suppliers, service providers, and institutions, and can also benefit from deep pools of skilled employees and shared infrastructure dedicated to their needs.

– US Economic Development Administration²⁶



²⁶ Cluster Mapping US, available at <http://www.clustermapping.us/>



Governments across Australia have realised the importance of precinct-led development to driving technological innovation. For example, Sydney is currently developing an Innovation and Technology Precinct, with the aim of catalysing innovation and entrepreneurship to become a “powerhouse of the Australian economy”. According to NSW Premier Gladys Berjiklian:²⁷

|| This [the Sydney technology and innovation hub] will be the home of 10,000 new jobs in the future, it will be Australia’s version of Silicon Valley. ||

– Gladys Berjiklian, NSW Premier Administration

Cluster-led development is underpinned by global technology firms such as Google, Atlassian, Facebook and Twitter, who locate their offices in Australia’s major cities. This enables cluster development in four key ways:

- A source of demand for many goods and services from related firms within the cluster. This improves the viability of potential firms within the area. For example, many of Atlassian’s innovative applications have been purchased by major technology firms in such as Microsoft, Facebook and Spotify.
- Scale to invest in R&D to develop new products and services. In addition, anchor firm employees often develop spin-out companies which further support and build the capacity of the sector.
- Create a critical mass of high-quality employment and helps improve the local talent pool by attracting world-class, highly skilled workers who are able to train and develop local talent.
- Attract other companies by reducing the costs and barriers to entering into a particular location.²⁸

²⁷ NSW Government (2019), *Sydney Innovation and Technology Precinct: The Future Made Here*

²⁸ Agrawal, A and Cockburn, I (2003), “The anchor tenant hypothesis: exploring the role of large R&D intensive firms in regional innovative systems”; Alcazer, J and Chung, W (2007), “Location strategies and knowledge spillovers”

THE TECH SECTOR COULD CREATE AN ADDITIONAL \$50 BILLION PER YEAR IF AUSTRALIA CATCHES UP TO GLOBAL TECHNOLOGY LEADERS

The technology sector is the cornerstone to Australia's future economic success. Currently the sector makes a significant contribution to the economy, employs a large section of the workforce, drives value for consumers and underpins growth in traditionally 'non-technology' sectors.

But while the tech sector will be critical to Australia's future growth and prosperity, it is not capturing its full potential. Australia's reliance on traditional industries such as mining, banking and property has seen it fall behind global benchmarks in the tech sector. **In the past 25 years, Australia's ICT sector has contributed a declining proportion of net economic value, resulting in the nation being ranked near the bottom of OECD countries for ICT share of GVA (Figure 17).**²⁹

Improving Australia's tech sector is increasingly important as global economies prepare for the 'Fourth Industrial Revolution', in which autonomous systems, remote sensors, machine learning, cloud computing and other advanced technologies are expected to transform industries. Australia's competitive advantages in highly skilled labour, openness to trade, and willingness to adopt technological innovation mean that this next wave of innovation could provide an even more significant economic catalyst than previous industrial transformations to date.

Australia performs well in some areas and has been a strong adopter of embedding technology within existing industries, but it has a significant opportunity to improve by catching up to global tech sector leaders. The following sections outline areas of strength, weakness and opportunity for the Australian tech sector. **If Australia is successful in matching the tech sector growth rates of leaders like the United States and United Kingdom, it could add \$50 billion per year to GDP over the next 20 years, boosting GDP by 1.2-1.5%.**

|| In order to continue our run of over 27 years of uninterrupted economic growth, Australia must seize the significant economic and social opportunities that digital technologies bring. ||

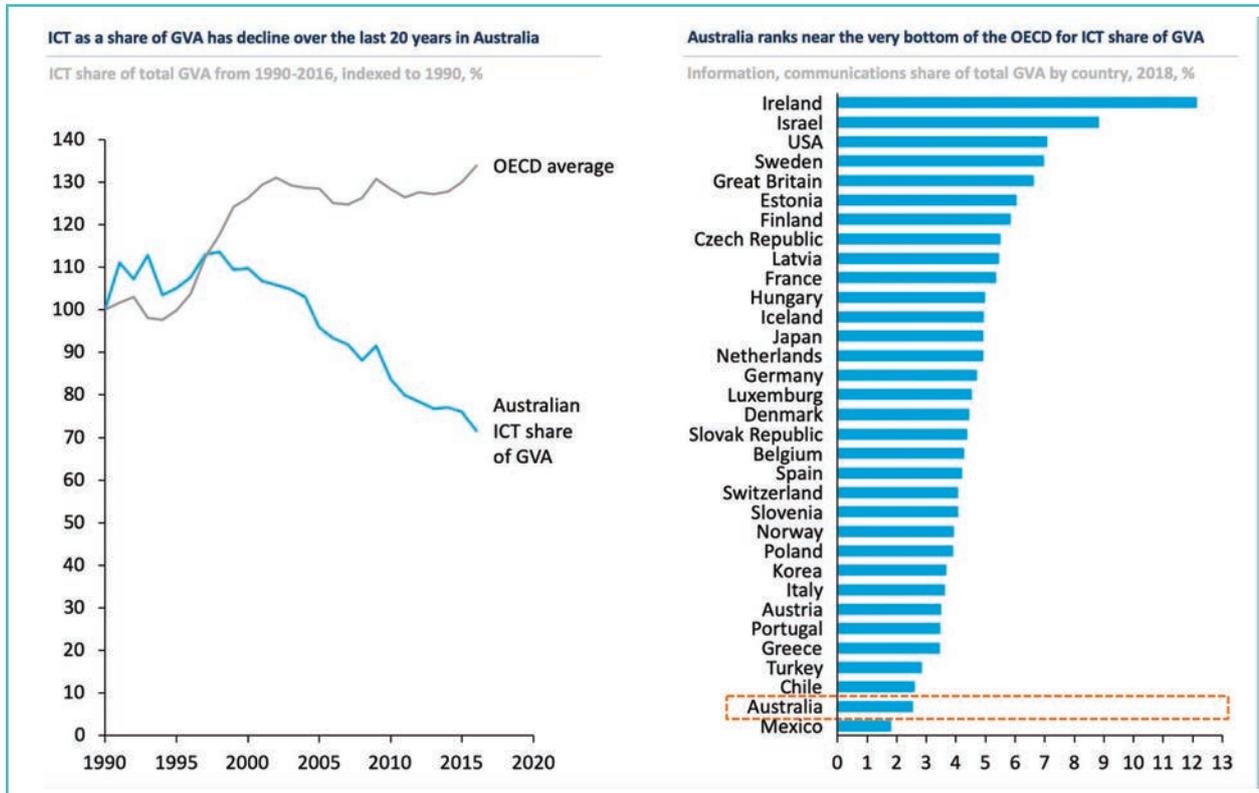
– The Hon Karen Andrews MP, Minister for Industry, Science and Technology³⁰

²⁹ The rapid fall in the Australian figures is due in part to the mix of industries included in the ICT sector by the OECD and is likely to be driven by declines in ICT manufacturing in Australia.

³⁰ Department of Industry, Innovation and Science (2019), "Minister's Foreword, Australia's Tech Future"

FIGURE 17

OECD data shows Australia's ICT share of GVA has fallen over the last 25 years; Australia is near the bottom of OECD countries on ICT share of GVA



SOURCE: OECD 2019, ICT share of total Gross Value Add, by country by year

Note: Gross Value Add (GVA) is the term is used to describe gross product, or contribution to GDP, by industry. In summary, it is measured as the value of output minus the value of inputs. The ICT (information and communications technology) sector is defined by the OECD as a “combination of manufacturing and services industries that capture, transmit and display data and information electronically”.

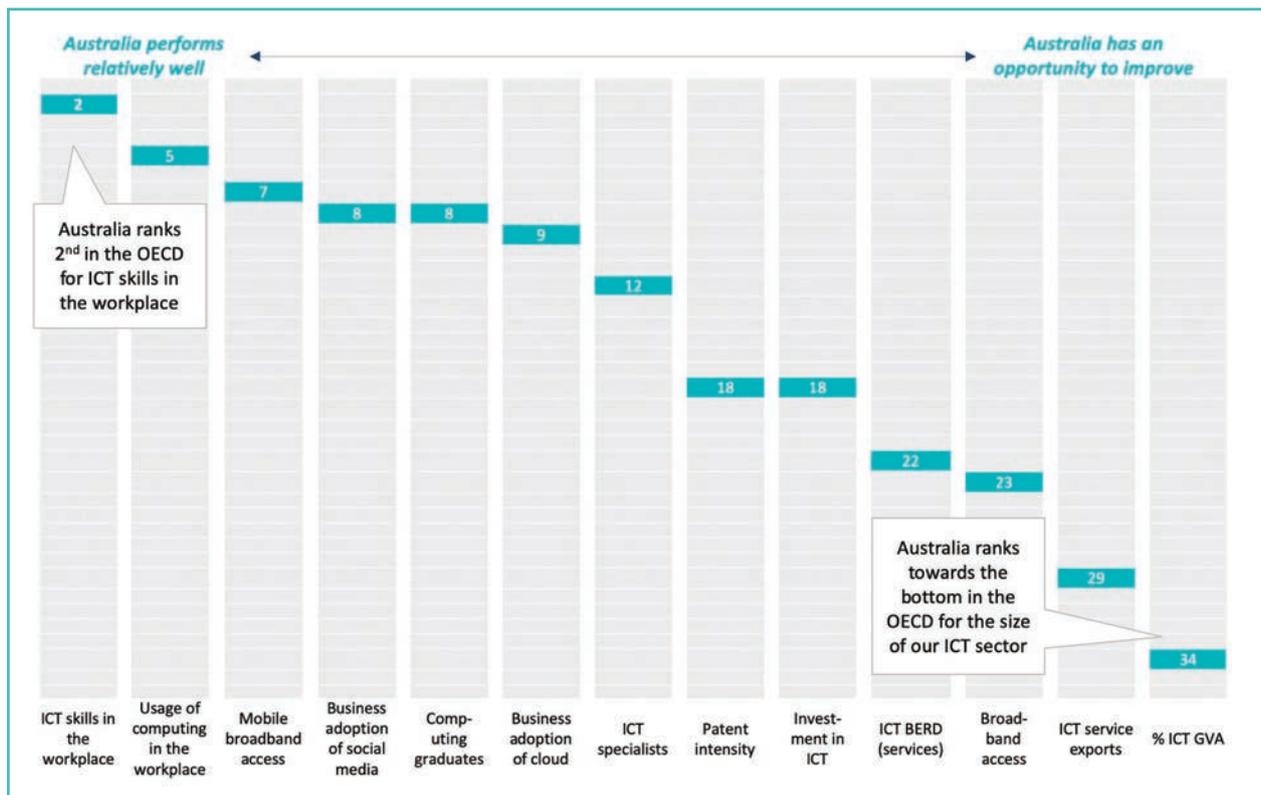
2.1. WHILE AUSTRALIA’S TECH SECTOR MAKES A SIGNIFICANT CONTRIBUTION, IT LAGS IN OECD RANKINGS

While the tech sector makes an important contribution in Australia, the Australian economy has had an inconsistent experience in capitalising on and capturing economic value from the digital revolution. As shown in Figure 18, compared to other advanced economies, Australia is a strong adopter of new technologies but lags behind global peers on many dimensions important to innovation and tech sector growth, such as investment in ICT research and development and ICT service exports.

FIGURE 18

Australia performs well in technology adoption and has an opportunity to improve in investment and innovation

Ranking amongst OECD countries



NOTE: BERD refers to 'business expenditure on research and development'.
 SOURCE: OECD, note some data is not available for specific countries for some of the criteria

Australia performs well in technology adoption and skills

Australia is among the leading countries in the OECD for adoption of technology in the workplace and prevalence of ICT skills. These factors have played an important role in lifting Australia’s economic productivity to date, with the adoption of technological innovations in existing industries contributing 7.4% to Australia’s GDP growth between 2000-2018.³¹ Australia’s openness to global competition and foreign direct investment (FDI) has made an important contribution to technology adoption, with FDI expected to be a key component of driving business investment and development of new markets.³² However, continued success in these areas

cannot be taken for granted. In particular, although Australia ranks relatively highly on measures of computing graduates and ranks second in the OECD for ICT skills in the workplace, technology businesses in Australia are still struggling to find employees with STEM skills, and there are signs that skills shortages may worsen over time. While federal and state governments are currently implementing a number of initiatives to equip students with the skills necessary for the digital economy and technology-based careers, the share of Year 12 students studying ICT and design and technology subjects actually decreased from 2010 to 2017.³³

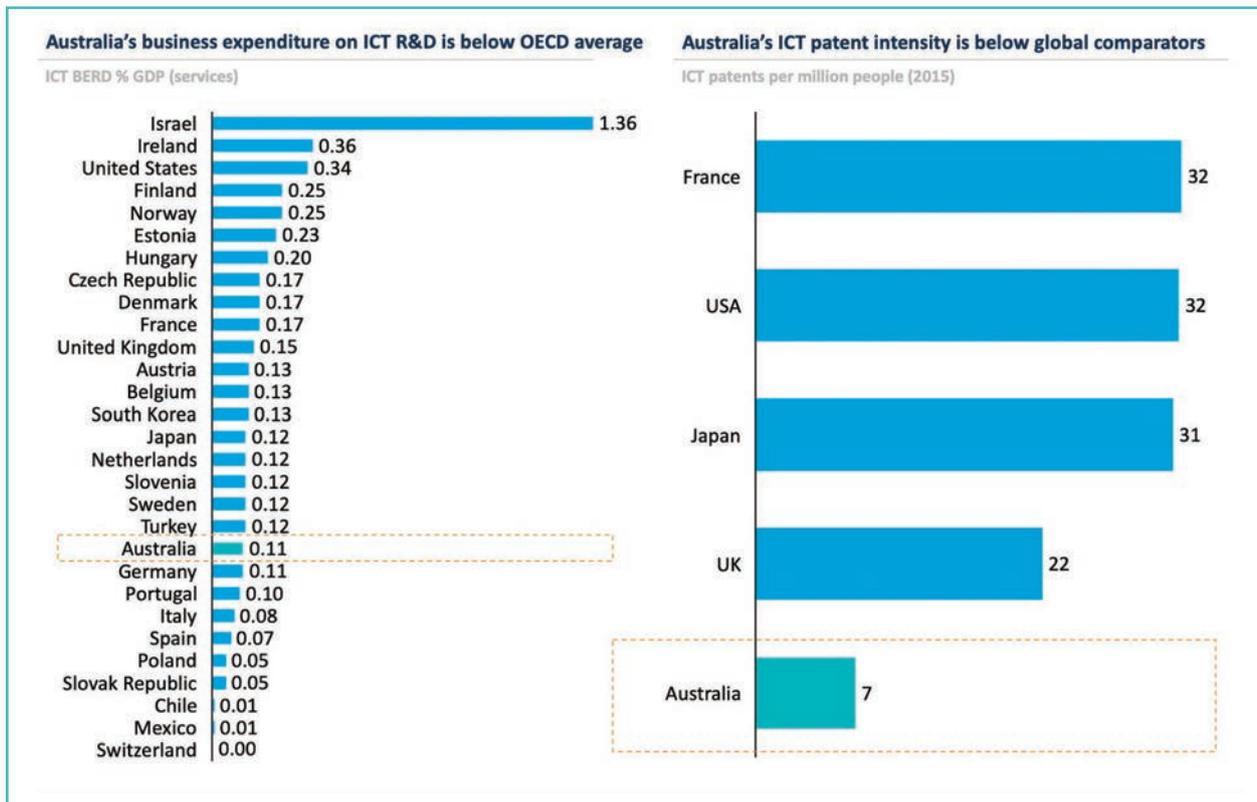
31 AlphaBeta (2018), “Digital innovation: Australia’s \$315B Opportunity”
 32 Department of Industry, Innovation and Science (2019), Corporate Plan 2018-19
 33 Australian Government (2019), “Advancing Women in STEM”

Australia lags in innovation and investment in the tech sector

Australia’s tech sector is falling behind global peers in most indicators relating to innovation, especially in areas relating to business expenditure on research and development (BERD) in ICT and the prevalence of technology in the Australian share market. While Australia ranks very highly on research published in peer-reviewed journals, industry and researchers are not translating these into commercial opportunities.³⁴ For example, Australia ranks 29th out of 30 for industry-university collaboration in the OECD.³⁵ As shown in Figure 19 below, Australia falls far below the OECD average for ICT Business Expenditure on Research and Development (BERD). This may also explain why it produces relatively few ICT patent per capita, despite its strong performance in publishing high-quality research.

FIGURE 19

Australia’s innovation in tech is falling behind global peers



SOURCE: OECD

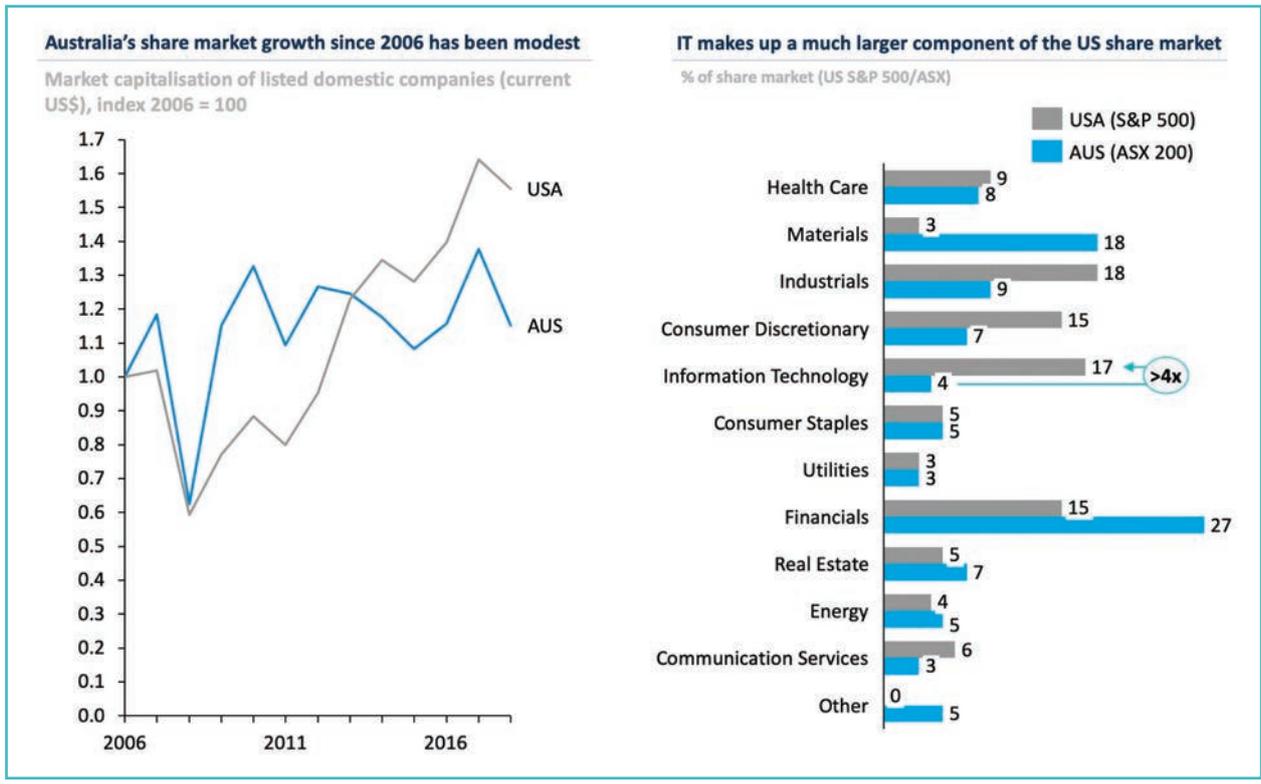
³⁴ Note this refers to overall research which includes, but is not limited to, technology-related work.
³⁵ Australian Academy of Science (2016), “Starting the conversation between academia and industry”

While Australia has leaned heavily on its mining and finance sectors to deliver almost three decades of economic growth, countries like the United States have invested elsewhere. The tech sector has been one of the most important sectors to US economic growth since the emergence of Silicon Valley in the 1980s and 1990s. Although stock market valuations do not encompass the entire economy and can be subject to volatility, they provide an indication of relative industry performance. Technology companies now represent four times as many listed companies in the US than in Australia, as a proportion of the overall stock markets in those countries (Figure 20).

Even more starkly, **22% of the NASDAQ top 50 companies are technology companies, compared to 0% of the ASX top 50.**³⁶ In addition to the stock market impact, this very small share of technology companies amongst Australia's top companies means that Australia is not fully capturing the productivity and economic potential of the tech sector outlined above. A portion of this under-representation may be explained by local technology companies choosing to list on foreign exchanges as a more effective means of raising capital, rather than the ASX.³⁷

FIGURE 20

Tech makes up a 4x larger share of the stock market in the US



SOURCE: Sentieo, ASX, OECD, World Bank Development Indicators

³⁶ StartupAUS (2018), Crossroads V

³⁷ As explained by McDuling J 2017, 'Missed opportunity: Atlassian and the Australian markets' tech headache', The Sydney Morning Herald



2.2. THE TECH SECTOR WILL BE A MAJOR DRIVER OF GLOBAL ECONOMIC GROWTH IN THE COMING DECADES

Australia's lagging tech sector is failing to fully capture the economic opportunities of the rapidly growing global digital economy. The digital economy is now worth \$11.5 trillion globally, equivalent to 15.5 percent of global GDP, and has grown 2.5 times faster than global GDP over the past 15 years. The digital economy is expected to account for almost a quarter of global GDP by 2025, and is estimated to present an additional US\$10 trillion global opportunity over the next ten years.³⁸

Australia is in a strong economic position having experienced 27 consecutive years of economic growth. This growth was catalysed by microeconomic reform and a terms-of-trade boom. **However, as its terms of trade fall and productivity growth stagnates, Australia must find new sources of competitiveness to ensure the economy's future prosperity.** On current form, Australia's place in the global economy is forecast to plummet from 19th to 28th in 2050, and Australia is also falling down the ladder on rankings of global resilience and global innovation.³⁹ The tech sector offers a significant economic opportunity to boost Australian GDP and real wages growth by driving both productivity and export-led growth.

³⁸ Huawei, Oxford Economics (2017), *Digital Spillover: Measuring the true impact of the Digital Economy*

³⁹ PwC (2018), "Why the lucky country must become a digital one"

Technology-led innovation drives productivity growth

Digital technologies have reshaped the global economy by enabling firms to get work done faster, more effectively and more cheaply. This improves productivity, which is critical to growing national economic output, as highlighted by the ABS:

Key to long term improvements in Australia's living standards is productivity growth and therefore enhancing national productivity is one of the basic goals of economic policy.

— Australian Bureau of Statistics⁴⁰

Technology is an essential component of driving productivity growth. As shown in Figure 21, industries and firms that have embraced new digital technologies have achieved significantly higher productivity gains in recent years than industries and firms with lower take up of these technologies. In particular, the top 5% of technology and digitally intensive firms are strongly outperforming the rest of the market. In Australia, productivity gains from digital innovation accounted for 3.5% of GDP in the eight years to 2018.⁴¹ Tech sector innovation may drive productivity improvements throughout the economy in two ways:

■ **Providing new forms of capital assets and technology to install in production processes.** For example, a retailer may install an automated, self-service point of sale, or a mining company may use sensors and geospatial mapping to better optimise exploration, often referred to as “capital deepening”. New investments allow firms to increase output for a given stock of labour. Over the past two decades, digital capital investments accounted for over a third of the total economic value generated by digital innovation in advanced economies.



■ **Adapting business models to make better use of digital technology to drive productivity improvements.** These productivity gains are also referred to as improvements in “multifactor productivity”, which increases outputs relative to inputs. For example, a manufacturer may go beyond the simple automation of a production line and also change the product development and marketing strategy to better capture the benefits of the automation. These marginal improvements accounted for 6 percent of the total economic value generated by digital innovation in advanced economies between 2000 and 2018.⁴²

As noted in Section 1.4 on SMEs, technology-driven value comes not only through technical breakthroughs, but also through innovation in business models, production processes, and development of new sources of value that proliferate throughout the economy. For example, innovative business models have enabled the growth of the e-commerce and sharing economy. Innovation, brought about by social media, benefits businesses by enabling new forms of customer engagement and interaction. In addition, new technologies frequently create benefits beyond what was initially envisaged. For example, blockchain technology was initially developed for digital and cryptocurrencies, but is now being used to improve supply chain and logistics tracking.

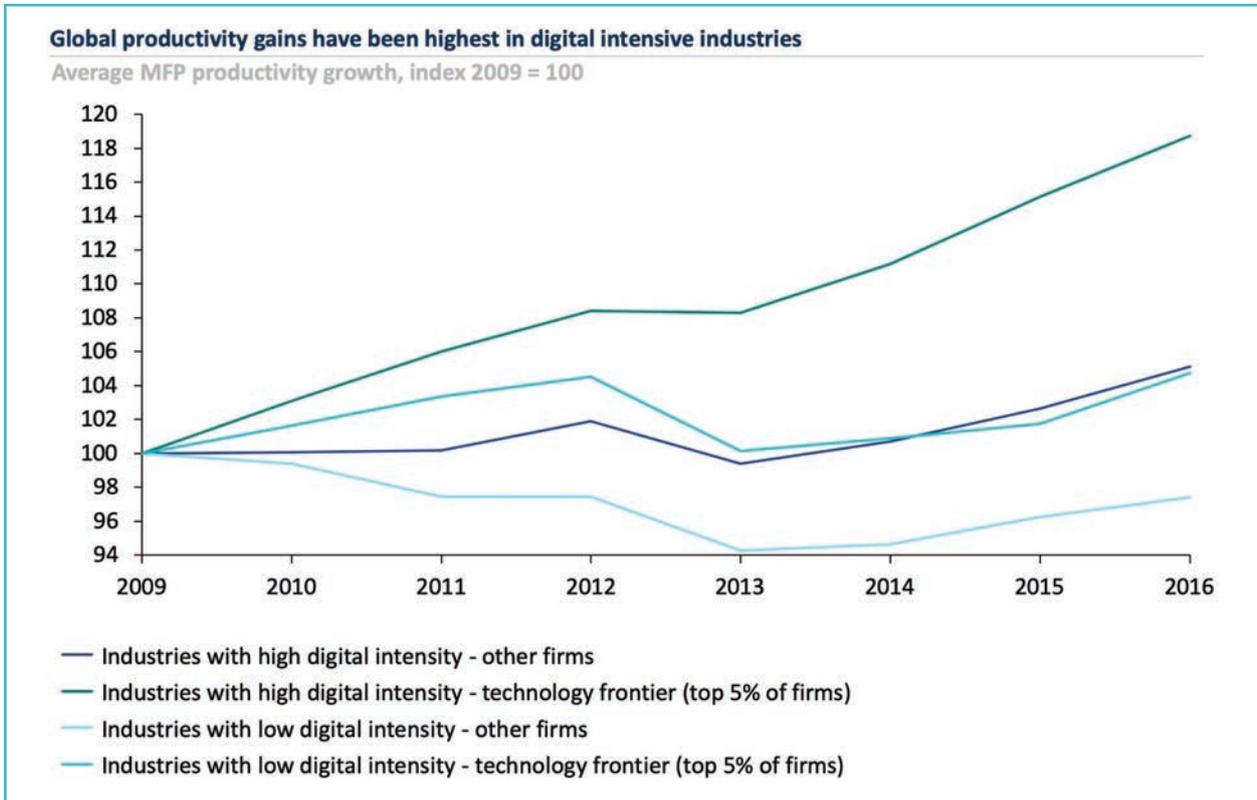
⁴⁰ ABS, Submission no. 16, p.2, as cited by the House of Representatives Standing Committee on Economics

⁴¹ AlphaBeta (2018), “Digital Innovation: Australia’s \$315B Opportunity”

⁴² AlphaBeta (2018), “Digital Innovation: Australia’s \$315B Opportunity”

FIGURE 21

A strong tech sector drives productivity growth



SOURCE: OECD

NOTE: MFP refers to multifactor productivity which is a measure of goods and services produced relative to the combined inputs used to produce these

FLAMINGO AI DRIVES PRODUCTIVITY AND IMPROVES THE CUSTOMER EXPERIENCE



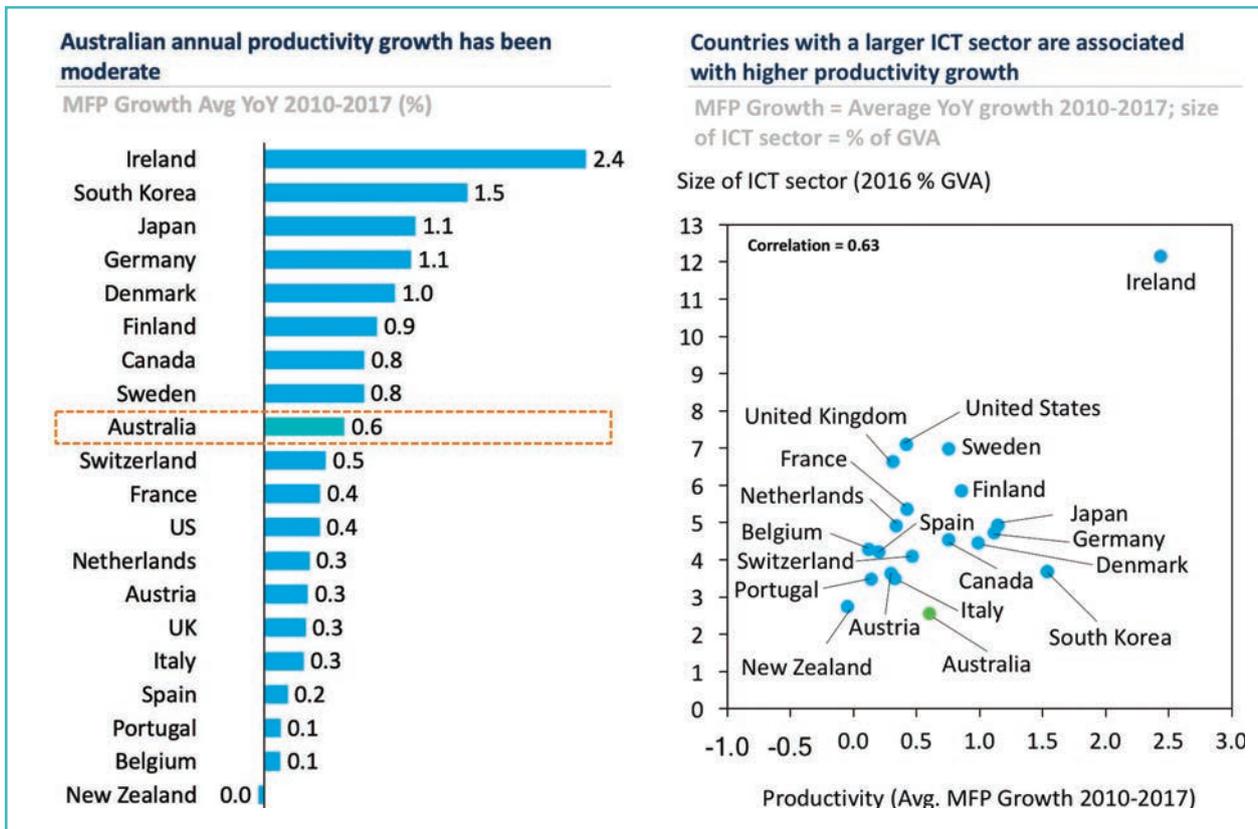
Artificial intelligence (AI) is transforming customer-service across a range of industries improving productivity as well as customer experience. Flamingo Ai was founded in March 2014 by entrepreneur Dr Catriona Wallace as a platform that can partner with and empower organisations and employees through human-centred AI. Flamingo Ai uses machine learning Virtual Assistants that improve customer experience and human interactions. For example, Flamingo Ai's Employee Virtual Assistants enhance the employee's performance by using native AI allowing an organization and employees to access, manage, mine and share compliant information and expert knowledge, fast and at scale, maximizing productivity and enabling 360 collaboration workflows.

Customers benefit by receiving up-to-date and accurate information quickly. In addition, businesses have benefited by automated workflows, reduced operational costs and knowledge silos, improved customer response times and experience; this frees up staff to concentrate on higher value work, improving organisational agility.

Compared to other advanced economies, Australia's productivity growth has been moderate in recent years. The tech sector is fundamental to Australia's future productivity growth as it has the potential to transform all sectors of the economy, adding new forms of capital into the production process, improving connectivity with international markets, and revolutionising business processes. As shown in Figure 22, there is a positive correlation between countries with a larger ICT sector and average year-on-year productivity growth. Ensuring that Australia continues to leverage the opportunities from the tech sector will enable businesses to grow and succeed, and governments to operate more efficiently.

FIGURE 22

The technology sector is associated with higher productivity



SOURCE: OECD

NOTE: MFP refers to multifactor productivity which is a measure of goods and services produced relative to the combined inputs used to produce these

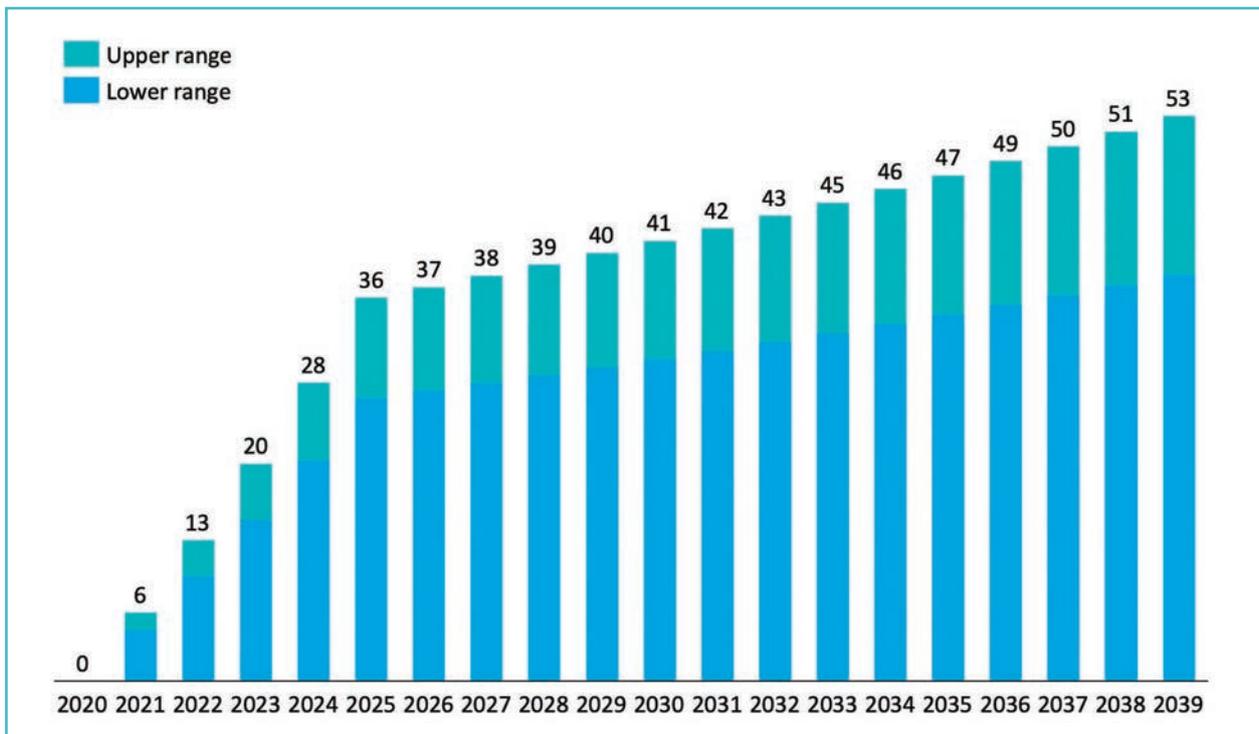
2.3. AUSTRALIA'S TECH SECTOR COULD GROW TO \$207B IN GDP PER YEAR BY 2030

While Australia's tech sector is currently falling behind global leaders, Australia could achieve significant economic gains by catching up. We estimate that Australia could add \$50 billion per year in GDP over the next 20 years, boosting GDP by 1.2-1.5%, by growing its tech sector in line with global leaders (Figure 23).

FIGURE 23

The tech sector could add an additional \$50 billion to GDP per year by 2037 if Australia caught up to global leaders

\$ billion Gross Value Add (GVA) per year (additional to current contribution)



SOURCE: AlphaBeta analysis 2019; OECD, ABS National Accounts 2019

This \$50 billion opportunity represents the value to the Australian economy of growing its tech sector in line with global leaders. We take a top-down and bottom-up methodology to quantify the economic potential. The top-down approach (upper range) takes the difference in GDP contribution of the tech sector of global leaders and quantifies the potential of Australia growing the tech sector to this size. The bottom-up approach (lower range) quantifies the technology employment gap required to catch-up with global peers and determines the uplift in economic output and new jobs resulting from capturing this opportunity (see Appendix for further details). In terms of total tech sector contribution this means the sector could contribute over \$200 billion to GDP per year over the next 20 years (Figure 24).

FIGURE 24

The tech sector could contribute \$207 billion to GDP per year by 2030 if Australia caught up to global leaders

\$ billion gross value add per year



SOURCE: AlphaBeta analysis 2019; OECD, ABS National Accounts 2019

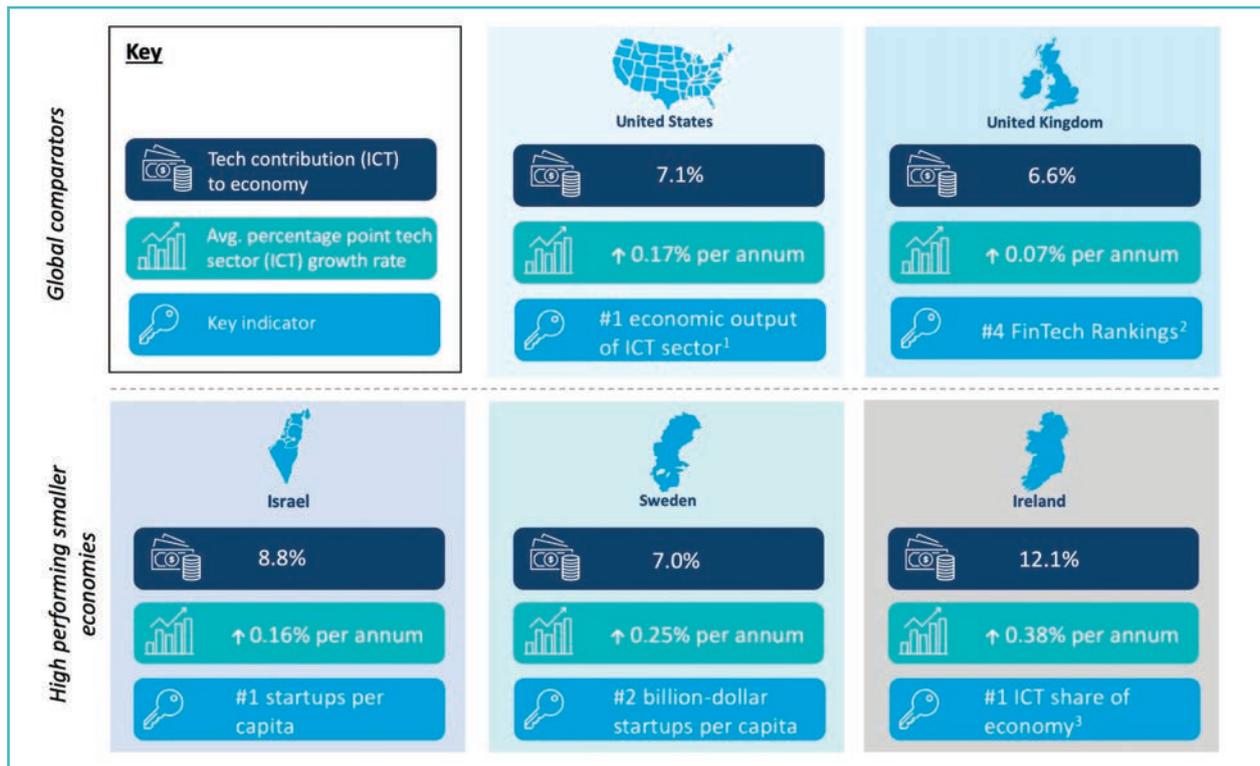
By growing Australia’s tech sector in line with high-achieving global comparators, Australia could significantly boost GDP and economic growth over the next 20 years. These economic gains are not assured, or even likely, on Australia’s current tech sector trajectory. However, with the right policy settings and a collaborative approach between government, industry, and others including academia and the non-profit sector, Australia can become a leader in the next major wave of global economic growth, ensuring its economic strength for decades to come.

A PRAGMATIC, PARTNERSHIP-BASED APPROACH TO POLICY REFORM WILL HELP AUSTRALIA REALISE TECH SECTOR OPPORTUNITIES

Given the tech sector evolves far more rapidly than traditional industries, regulators around the world have faced challenges with the scale and scope of change.⁴³ Our analysis has found that countries with high-performing tech sectors tend to rely on strong partnerships between government, industry and academia to enable commercialisation, innovation and sophisticated and agile policy reform. Evidence from the world’s high-performing countries has shown that rapid tech sector growth can add up to 0.4 percentage points to economic output each year.

FIGURE 25

A range of countries are capitalising on the opportunities of the tech sector



SOURCE: OECD 2019

Notes: (1) economic output of the tech sector was measured as the total gross value add of the ICT sector in USD amongst OECD countries (2) FinTech rankings were based on a comprehensive research study undertaken by the Institute for Financial Services Zug (IFZ) analysing indicators related to financial technologies, entrepreneurship and innovation (3) Based on the share of gross value add of the ICT sector amongst OECD countries (4) Based on rankings of multifactor productivity growth amongst OECD countries (5) Five-year average percentage point increase in ICT Gross Value Add (GVA)

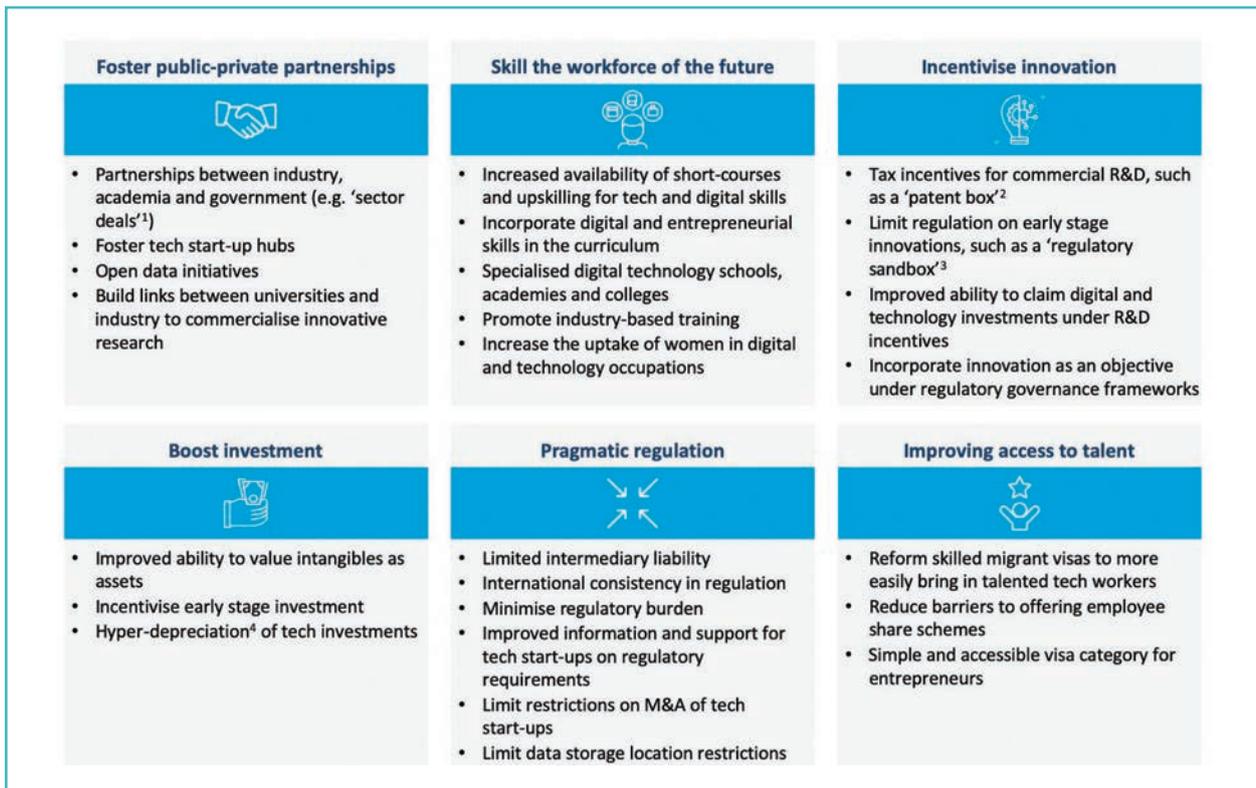
⁴³ World Economic Forum (2018), 'The law can't keep up with new tech. Here's how to close the gap'

Experience from countries with high-performing tech sectors reveal a **number of opportunities for Australia to improve its tech sector policy framework** and seize this future potential. The key lesson is that governments need to take a coordinated approach to the digital economy. Our current policy environment is a legacy of a previous era with fragmented and overlapping responsibilities across multiple government departments and agencies. As the digital economy becomes a larger part of all Australian industries, we need a more coordinated approach to developing the foundational policy and regulatory frameworks to ensure our success.

Leading countries recognise the benefits of the technology sector, and have established policy frameworks, applicable to their own country which foster and welcome technology and innovation. Examples of successful policies in these countries have been characterised by encouraging collaboration between business, government and academia; establishing strong skills and visa frameworks to support the sector's need for talent; and provision of incentives for innovation and R&D, as summarised under six key themes below. It should be noted that Australia is making advancements in a number of these areas and the evidence from these countries does not necessarily reflect inaction in Australia.

FIGURE 26

Six key lessons can be learned from analysing leading countries



SOURCE: AlphaBeta analysis 2019

Notes: (1) Sector deals refer to partnerships between the government and industry on sector-specific issues which can create significant opportunities to boost productivity, employment, innovation and skills (2) A patent box is a special low corporate tax on revenues attributable to a patent (3) The regulatory sandbox allows eligible companies to test certain products or services without regulations such as a licence (4) Hyper-depreciation allows a much higher depreciation rate on eligible assets to incentivise investment

3.1. FOSTER COLLABORATION BETWEEN GOVERNMENT, ACADEMIA AND BUSINESS

As discussed in Section 2.1, Australia produces a good volume of high-quality, peer-reviewed research, but is not converting this body of work into commercial opportunities.⁴⁴ This is an issue that can only be addressed jointly, by industry, academia and government. In addition, the development of appropriate policy for a sector evolving as rapidly as the tech sector requires cooperation from the private and public sector.

Countries like the UK and Sweden have established tripartite deals that bring together these key groups to improve innovation, funding and commercialisation of technology. In the UK, these deals are an avenue for industry to come to Government with proposals around regulation, competition, exports and commercialisation. The 2018 Artificial Intelligence Sector Deal matches £300 million in public investment with £700 million in contributions from industry and academia to establish the UK as a global leader in AI. In addition, councils of industry and academia with ministerial representation convene to develop policy, oversee implementation and advise government. It follows previous, multi-billion-pound deals for the UK's Life Sciences sector that successfully funded new pioneering treatments and medical technologies produced in the UK, improving patient lives and driving economic growth.

The UK Catapult programme is another example of a government-led initiative to foster and encourage innovation through collaborative networks. The Digital Catapult programme, established in 2013, brings together businesses and academia to promote the development and early adoption of advanced digital technology in areas including AI and machine learning, virtual reality, and future networks.

Sweden's tech sector successfully employs the 'triple helix' model of innovation, which effectively transfers knowledge between academia and industry with government support. This is exemplified in Sweden's advanced education sector, where PhD candidates are moved into industry to complete their research and industry-based researchers are moved into universities to obtain higher degrees.⁴⁵ Another example of the triple helix model is the VINNVÄXT competition, which aims to promote sustainable regional growth by developing internationally competitive research and innovation environments in specific growth fields.⁴⁶ Teams are actively encouraged to be composed of participants representing private enterprise, research and the public sector.

This model, along with Sweden's leading education system and broadband infrastructure has fostered a thriving innovation ecosystem. Stockholm is known as one of the world's best cities for entrepreneurship, with a range of startup hubs including The Factory, SUP46, Things, Epicentar and Norrskén House that are backed by venture capital firms and include coworking spaces, labs, innovation centres, events, retail and community spaces.

Similarly, in Israel, the government's early investments in attracting entrepreneurs and investors have paid off.⁴⁷ Israel has the world's highest number of startups per capita and the highest R&D investment as a share of GDP. This is due in large part to collaboration of industry and government, starting with tax cuts in the mid-1980s. The 'Yozma program' created a homegrown VC sector in 1993 by investing locally and attracting foreign investors by providing insurance and tax benefits. The Israel Innovation Authority, through initiatives such as the technology-focused Incubators Incentive Program, supported 1,115 projects from 650 companies in 2016 alone, awarding average grants of £290,000 (\$514,000 AUD).⁴⁸

Israel's Office of the Chief Scientist (OCS) is a major policy-making body which has built robust ecosystems for funding research and innovation such as the R&D Fund, the Technical Incubators Program, and the Magnet Program. It includes international partnerships such as the Israel-Europe R&D Directorate, which manages the Israeli side of the Seventh Framework Program for R&D, Horizon 2020, as well as the Israeli Industry Center for R&D (MATIMOP), which manages all international R&D partnerships including bilateral agreements with international governments and corporations.⁴⁹

The European Union has established 'MERLIN' as way to support researchers, SMEs and startups to develop innovations into market-ready and commercial products. The program provides workshops and training to help EU researchers, SMEs and startups understand the possibilities of commercialisation and effectively shape their ideas and innovations to bring them to market. The program is a partnership between incubators, universities and industry.⁵⁰

44 Note this refers to general research which includes but is not limited to, technology related research

45 Etzkowitz et al (2007), "The triple helix model of innovation"

46 European Commission (2016), Vinnväxt programme - Regional growth through dynamic innovation systems

47 World Bank (2016), "Best Practices and Lessons Learned in ICT Sector Innovation: A Case Study in Israel"

48 The Guardian (2018), "Sun, sand, sea and ... unicorns? Why Tel Aviv is the world's new startup capital"

49 World Bank (2016), "Best Practices and Lessons Learned in ICT Sector Innovation: A Case Study of Israel"

50 MERLIN, available at: <https://merlin-ict.eu/>

3.2. INCENTIVISE RESEARCH, DEVELOPMENT AND INNOVATION

Australia spends proportionally less on ICT-related R&D than its global peers. Current R&D tax incentives (RDTI) require compliance with definitions of R&D such as ‘developing new products or services’ and generation of new knowledge. There is a lack of clarity on how software development fits into this general definition. In addition, formal documentation is required to prove the compliance of R&D activity. The fast-paced, iterative software development process makes it difficult in some cases for these projects to comply with these R&D tax incentive requirements.⁵¹

More consistent tax and incentives policies can boost commercialisation of R&D. The UK and France, which have ICT patent rates of almost four times Australia’s on a per capita basis, have a ‘Patent Box’ policy that enables companies to apply a reduced 10 percent rate of corporate tax on profits earned from patented inventions. Similarly, Ireland’s ‘Knowledge Development Box’ offers a tax discount on the income generated after an R&D project has ended as well as the intellectual property resulting from the R&D activity.

Some of Australia’s most prominent technology companies were established with the help of government grants. In addition, research and development partnerships that combine industry, educational institutions and government have shown to be a successful way of driving innovation. The UK supports about £1.3 billion a year in digital R&D through the private sector, public investment by the Research Councils and Innovate UK, and research carried out by the government itself.⁵² This support has been instrumental to the success of some of the UK’s leading digital startups, including Swiftkey and Magic Pony.

Government R&D incentives may also help advance government priorities by focusing on target areas, on startups or SMEs. In 2018, Ireland created the Disruptive Technologies Innovation Fund of €500M available over a 10-year period. Disruptive Innovation Grants support projects that leverage Irish research for commercial impact within a series of priority areas.⁵³ Qualifying projects must include an SME. Meanwhile, in Sweden, the government offers various seed fund programs, and provides grants to help startups get their companies off the ground. There are also Swedish government-funded technology incubators that encourage innovation and entrepreneurship.

The academic sector also has a strong part to play in this area. In 2015, the UK committed £42 million to its launch of the Alan Turing Institute, a joint venture of leading UK universities to undertake research using advanced mathematics, computer science, algorithms and big data. The institute had a further £25 million in funding from universities at launch, and its projects have since attracted more support from industry, academia and government.⁵⁴

If Australia could increase its investment in R&D compared to global peers, business investment in ICT-related research and development could be increased by \$3-10 billion per year⁵⁵



⁵¹ StartupAUS (2019), “Policy Proposal – R&D Tax Incentive”

⁵² UK Department for Digital, Culture, Media & Sport (2017), “The digital sectors – making the UK the best place to start and grow a business”

⁵³ Department of Business, Enterprise and Innovation (2018), “Disruptive Technologies Innovation Fund”

⁵⁴ University of Cambridge (2015), “Alan Turing institute up and running”

⁵⁵ See Appendix ‘Potential Policy Benefits’ for details on the methodology

3.3. ENCOURAGE GREATER INVESTMENT IN TECHNOLOGY AND INNOVATION

Global investment in digital innovation is rapidly growing. Many of the world's leaders are investing heavily in areas such as artificial intelligence. China has committed to becoming a world leader in AI by 2030, envisioning a \$210 billion domestic industry, while the United States has attracted \$15-23 billion in private sector AI investments in 2016 alone. Similarly, the EU has targeted a \$20 billion investment program in AI for 2020.⁵⁶

The success of these programs rely not only on the amount invested but also on their implementation and supporting structures. R&D investment programs tend to be much more effective when businesses are involved in shaping their aims and requirements. Businesses typically have a better understanding of which innovations will have market demand and can also be an additional source of funds.⁵⁷ Countries with high-performing tech sectors tend to have both public and private sectors that are willing to invest. Private sector investors are typically encouraged by robust M&A activity, strong seed and angel investment, as well as incentives to invest in intangibles and data.

Dynamic merger and acquisition (M&A) activity is critical to enabling investment ecosystems. Ensuring that startups can successfully exit and obtain sizeable exits, including through global technology companies, is key to ensuring growth and development of the sector. Successful technology companies tend to create a 'virtuous cycle', as founders and entrepreneurs exit and start their next venture. The US provides an example of an active technology start up ecosystem – most famously, the 'PayPal mafia', or the founders and early employees of PayPal, have gone on to establish and invest in many other successful technology firms, including Tesla, YouTube and Palantir⁵⁸. This is beginning to emerge in Australia with the founders of Atlassian and Seek establishing investment funds and venture firms such as Square Peg Capital, Grok Ventures and Skip Capital.

Leading global countries with strong tech sectors have a robust seed and angel investment sector to support scaling and commercialisation of innovation. Recent policy initiatives such as tax incentives for early stage innovation companies (ESICs) have been introduced in Australia to a narrow set of companies and are beginning to support development in this area.

In the UK, the Seed Enterprise Investment Scheme (SEIS) offers tax benefits to individuals who invest in small and early stage startups. It complements the Enterprise Investment Scheme (EIS), which offers tax relief to investors in high-risk and growing companies. Sweden allows business angels who invest in startups to deduct half of what they pay for their shares. In Ireland, the Employment & Investment Incentive (EII) provides tax relief on investments made, in each tax year, into EII certified qualifying companies. Israel's Technological Incubators Program provides support to inexperienced entrepreneurs to develop innovative technological ideas and commercialise them. From 1991 to 2013 1,900 companies had been supported by the program, with 1,600 maturing and leaving the incubators. Six in 10 of these companies successfully raised private investment, with total cumulative private investments surpassing \$4 billion.

Increasing Australia's seed and angel investment in line with global high performing countries could add up to \$200 million per year in investment

⁵⁶ AlphaBeta (2018), "Digital Innovation: Australia's \$315B opportunity"

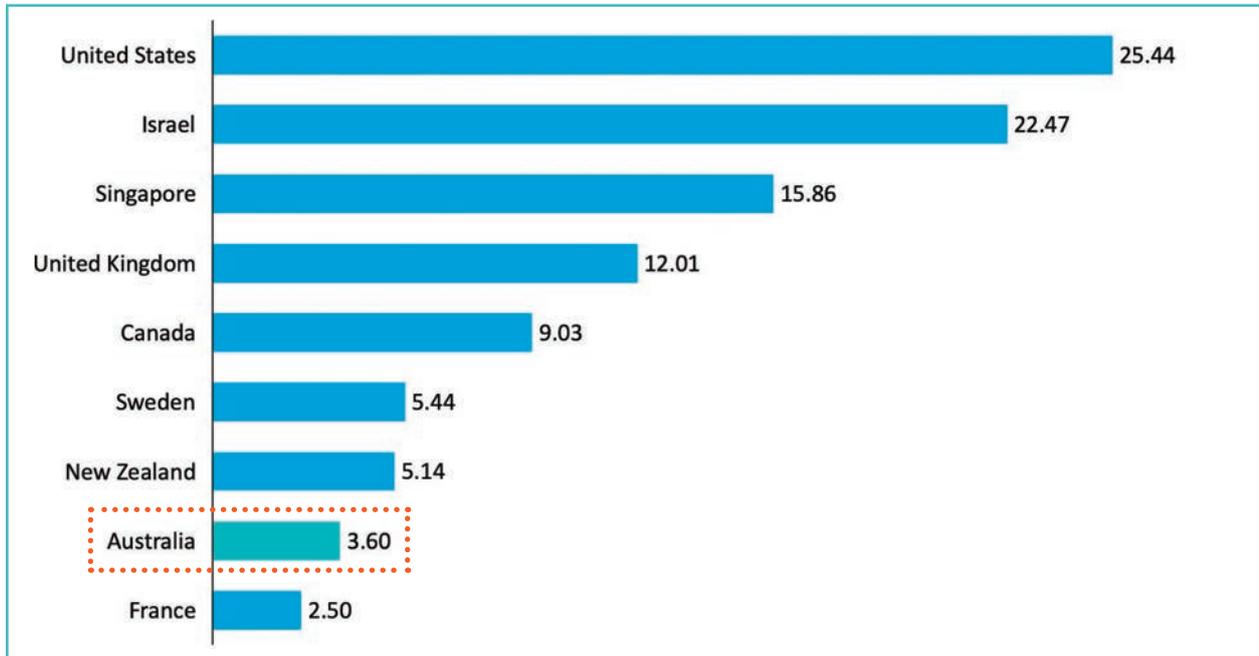
⁵⁷ Innovation and Science Australia (2017), "Australia 2030: Prosperity through innovation"

⁵⁸ Gelles, David (April 2015), "The PayPal Mafia's Golden Touch", New York Times, accessed at: <https://www.nytimes.com/2015/04/02/business/dealbook/the-paypal-mafias-golden-touch.html>

FIGURE 27

High performing countries have a strong seed and angel investment sector

Seed and angel investment per capita 2017-18



SOURCE: StartupAUS (2019), "Crossroads"

Investment in data and other intangible intellectual property is becoming increasingly important, as these types of assets are accounting for higher contributions to company market valuations. However, as data is often produced by a company rather than purchased, it is often not captured in book values. Evidence has shown that IT related intangible assets have a market value that is 10 times higher than their book value⁵⁹. Moreover, investment in intangibles is showing to be an increasingly important driver of GDP growth. Evidence in the US and Europe has shown capital deepening is the main driver of growth between 2000-13, with over 40% driven by investment in intangibles.⁶⁰

Improving accounting standards to enable companies to appropriately value their IT-related assets will enable increased access to finance and improved ability to appropriately depreciate and lower their taxable income. The United States is currently considering this, with the Financial Accounting Standards Board (FASB) considering updating the GAAP accounting rules to potentially record data as an asset. The Italian Government has considered this issue and has set a 'Hyper Depreciation' allowance of 150% on 'industry 4.0 enabling technologies'.

Listed IT companies in Australia could increase their value of intangibles by up to \$1.2 billion if they could appropriately account for their assets

⁵⁹ Saunders & Brynjolfsson (2016), 'Valuing Information Technology Related Intangible Assets', MIS Quarterly

⁶⁰ Corrado et al. (2018) "Intangible investment in the EU and US before and since the Great Recession and its contribution to productivity growth"

3.4. ENSURE POLICIES AND REGULATIONS ARE PRAGMATIC AND GLOBALLY CONSISTENT

Globally harmonised frameworks remove some of the frictions of participating in the digital economy across jurisdictions. The Australian Government has made some positive moves in this area, such as joining the APEC Privacy Framework and Cross Border Data Privacy Rules System.

The United States Section 230 (S230) of the Communications Decency Act (CDA) has been foundational to the development of many facets of the internet over the past two decades⁶¹ while the EU's eCommerce Directive has been noted as a 'bedrock' of the internet since 2002. These types of policies underscore the importance of a clear, predictable and stable policy framework that foster growth of technology firms and startups. S230 of the CDA and Articles 12-15 of the EU eCommerce Directive limit legal liability of intermediaries over third party content and thus safeguard user rights to create content by providing legal process and appropriate protection to open platforms of all sizes.⁶² A key theme in United States and European Union law is that of 'notice and takedown', which requires online hosts to expeditiously remove content upon notification that it is illegal.

International standards are also important in areas such as copyright law, where Australia does not provide safe harbour protections provided by most global tech leaders. The Digital Millennium Copyright Act (DMCA) in the US, which includes Title II: Online Copyright Infringement Liability Limitation Act, is a good example of best practice in safe harbour protections for online service providers, which sets out a process for rightsholder to notify valid claims and a timeframe for platforms to take down infringing content.

Pragmatic steps should be taken to embed user data privacy rights, which are increasingly important in order to build trust and confidence as the digital economy evolves and expands. The European General Data Privacy Regulation was introduced in 2018 to improve data governance and user transparency, although stakeholders have since raised concerns. An initial analysis of the first year of the GDPR's adoption concluded that "the GDPR is not entirely adaptable to new developments in the digital economy" and cautioned against overreliance on user consent for all data processing, noting that this is "unrealistic in our data driven society and economy."⁶³

New regulatory approaches are being used to minimise disincentives for early stage companies and start-ups during testing and early-stage innovation, as a way to reduce barriers to innovation and deliver optimal outcomes for customers. In the UK, which is considered the global capital for 'FinTech' (financial technology), the Financial Conduct Authority has a mandate to promote innovation and competition, as well as its traditional mandates of financial stability and consumer protection.⁶⁴ As part of this, the FCA launched its Project Innovate in 2014 which encouraged innovation in the interest of consumers. One of the initiatives within this was the 'Regulatory Sandbox' which allows firms to test innovative products and services within a controlled environment without onerous regulation. The UK is also supporting the banks to deliver Open Banking through a fully open application programming interface (API).

Ireland has also become a technology hub thanks in part to a favourable tax regime and Enterprise Ireland, a body that provides tailored advice to Irish businesses on how to innovate, expand and succeed globally. Similarly, Singapore has recognised the potential opportunity of the tech sector and is developing policy frameworks that support this through favourable tax rates, well-developed IT infrastructure, strong investment opportunities, and robust regulatory regime.⁶⁵

⁶¹ Kosseff (2016), "Section 230's Evolution", *The Columbia Science and Technology Law Review*; Keller D (2018), "Intermediary Liability", *Stanford Law School*

⁶² Keller D (2018), "Intermediary Liability", *Stanford Law School*

⁶³ Available at <https://www.informationpolicycentre.com/uploads/5/7/1/0/57104281/cipl_report_on_gdpr_one_year_in_-_practitioners_take_stock_of_the_benefits_and_challenges.pdf>

⁶⁴ The UK fintech sector generated £6.6 billion in revenue and raised over £500 million of investment in 2015 alone.

⁶⁵ Macaulay T, 'How the Singapore government supports the country's tech scene', *CIO*

3.5. SKILL THE WORKFORCE OF THE FUTURE

The labour market is rapidly changing and increasingly requires workers to have digital and technological skills in order to participate in the economy. **Demand for these skills is set to grow by almost 100,000 by 2023, by which time almost 1 in 4 Australian workers will be employed in occupations that require technology and digital-based skills.**⁶⁶

The tech sector requires occupational skill sets that may not have existed even five years ago in areas such as data analytics, product development and management, artificial intelligence, machine learning, cybersecurity and robotic process automation. With a relatively limited domestic technology workforce and restrictions on skilled migration, difficulties in finding talented technology workers is leading to many firms restricting their operations in Australia.

Skilling the workforce of the future will better position Australia to capture the great opportunities the tech sector has to offer. However, this requires an agile education system that is linked with industry in order to keep pace with rapid change.

|| We do a lot for the local industry here. We have about 75 grads coming in next year to Atlassian. But we just can't find the senior talent that we need in Australia. And so we recruit them from all around the world to come and work in Sydney ... Developers, product managers, designers, people in the technology industry with five and 10 years' experience – we don't have them in Sydney in the numbers that we need. ||

– Scott Farquhar, Co-founder Atlassian⁶⁷

Leading countries ensure their workforces meet the needs of the digital economy in a range of innovative ways. In 2016, the UK launched Ada, the National College for Digital Skills. The college will train 5,000 students over the five years for a wide range of digital careers, such as software and database developers, user experience designers and technology entrepreneurs. Sweden has four national resource and training centres for teachers which each focus on different areas in the STEM field. In addition, the Stockholm School of Entrepreneurship provides free courses, experiences and incubation for students and alumni of Stockholm's top five universities with a large focus on digital and technology-based courses. Four in 10 graduates of the Stockholm School of Entrepreneurship become entrepreneurs, who now operate a total of 1,500 companies.

At the turn of the millennium, Israel undertook a major review of computing at school which led to its development of the most rigorous computer science high school program in the world. This has been supported by the Machshava Israeli National Computer Science Teaching Centre, which is considered the professional home for all Israeli computer science teachers.⁶⁸

A key challenge involved in developing digital skills is that the pace of change requires more agile education models like short courses and industry-based training, that in a lot of cases are not suitable for a typical university degree model. The UK is currently addressing this issue through the 'Institute of Coding' (IoC), which aims to enhance the education and employability, and ensure that employers and individuals across the UK can access the skills they need to compete in the global digital economy. The Institute brings together industry, universities, training providers and professional bodies to address digital skills gaps, through short courses and accredited degree schemes.

66 Deloitte Access Economics (2018), "ACS Australia's Digital Pulse"

67 Business Insider (2015), "Atlassian's Scott Farquhar explains Australia's skills gap with devastating simplicity"

68 World Bank (2016), "Best Practices and Lessons Learned in ICT Sector Innovation: A Case Study of Israel"

Reaching out to programmes that identify problems and address them, like STEMettes or Girls Who Code in the US, is another thing that is extremely important. They build confidence and empower people through experiences: one little spark and click can change things.

– Jack Dorsey, Twitter CEO

Promoting diversity in the tech sector has also been an important component of driving a strong workforce. The UK’s ‘Tech Talent Charter’ outlines key measures that encourage organisations to think differently in support of a more diverse technology workforce. The Future Digital Inclusion and Widening Digital Participation programs in the UK have been successful in improving digital skills among disadvantaged populations. Girls Who Code in the US (a non-profit backed by industry partners) sees its alumni majoring in computer science at university at 15 times the national average. In addition, the European Centre for Women and Technology brings together governments, business, academia, and non-profits to increase the number of women in all areas of tech.

Skilling Australia’s workforce to take advantage of the tech sector could deliver an additional \$2 billion per year in wages.⁶⁹



3.6. IMPROVE ACCESS TO GLOBAL TALENT

Digital and technology-based skills are increasingly in demand in the global economy, given the importance of digital intensiveness as a driver of growth and profitability. As global competition for technology talent intensifies, governments and business in high-performing countries have joined forces to ensure they have access to the people they need.

Australia is developing a highly skilled local technology workforce which needs to grow at least twice as quickly over the next few years if Australia is to compete in areas such as artificial intelligence, automation, cybersecurity and blockchain.⁷⁰ Bringing in experienced overseas talent is often necessary to help mentor and grow local talent. Australia’s visa system makes this difficult. For example, the Temporary Skills Shortage visa defines occupations using ANZSCO codes, which do not include many new tech sector occupations. Realising these challenges, the Australian Government has initiated a 12-month pilot for a Global Talent Scheme, which aims to attract the best and brightest minds from across the globe.⁷¹

High-performing countries have continued to reform visa arrangements to enable the significant job creation potential of the tech sector. The UK has several visa types that specifically target technology talent. The ‘Tech Nation Visa’ is designed to bring in exceptional and promising workers and includes fast tracks for those settling in regional areas or accepted into accelerator programs. The UK also has the Innovator visa to create a path for those with an established business or at least £50,000 in investment funds.

⁶⁹ This is based on estimating the skills gaps in digital occupations and estimating the uplift in wages that would occur as a result of filling this gap. A detailed methodology is outlined in the appendix

⁷⁰ Deloitte Access Economics (2018), “ACS Australia’s Digital Pulse”

⁷¹ The Hon Karen Andrews MP (2018), “Australian businesses sign on to Global Talent Scheme”

Israel has a 'High Tech Visa' which allows high-tech companies to expedite the visa process for employees with IT skills (a skill set for which there are currently no visa quotas). Between 1990 and 2009, approximately 1.25 million people immigrated to Israel, with a significant proportion of these holding advanced degrees and technical training. This wave of immigrants included more than 100,000 scientists and engineers, giving Israel the highest number of engineers per capita in the world. In addition, Ireland and Sweden both have entrepreneurial visa programs which give residence to entrepreneurs who with high potential startups.

Successful technology companies and startups often rely on equity in their business as a way to incentivise high quality talent and compete with larger businesses. This particularly prevalent in the US which offers accessible and attractive employee share schemes which incentivise talent to work in startups.

Another key driver of talent development is the prominence of global multinationals, which typically bring with them an experienced workforce that can mentor and develop local talent, as well as creating high-quality local jobs.⁷² The experience of working at multinationals allows staff to develop important digital, technological, project management and entrepreneurial skills that may allow them to start their own businesses. For example, many former Google employees, referred to as 'Xooglers' have started a number of successful startups such as Productiv, Node, Coda, Armis and Lucidchart.⁷³

Global technology leaders have helped attract multinationals to their countries through foreign direct investment policy. For example, Ireland's investment promotion agency (IPA) is highly regarded for investment promotion and ongoing development of capability, through working with both public and private sector stakeholders.⁷⁴ Israel has had favourable foreign capital investment programs since it established the 'Law for the Encouragement of Capital Investment (LECI)', which attracted multinationals and with them brought employment, as well as technology, know-how, operating procedures, managerial skills and export channels. This strategy led to Microsoft, Cisco and Motorola developing their first R&D facilities outside the US in Israel.⁷⁵

Increasing Australia's access to global talent could add up to \$6 billion to GDP per year.

|| We are excited for entrepreneurs to come into Redbubble, learn the ropes, become experienced and go off to start their own business. As we get more and more of that, we suddenly have a whole ecosystem and economic powerhouses in Melbourne ... Our number one way to give back to Melbourne is not just employing our own employees but have them go off start their own business and employing another 100 plus jobs themselves. ||

– Barry Newstead, Redbubble CEO

⁷² Javorcik (2013), "Does FDI Bring Good Jobs to Host Countries?"

⁷³ Business Insider (2019), "20 of the hottest enterprise startups of 2019 founded by former Google employees"

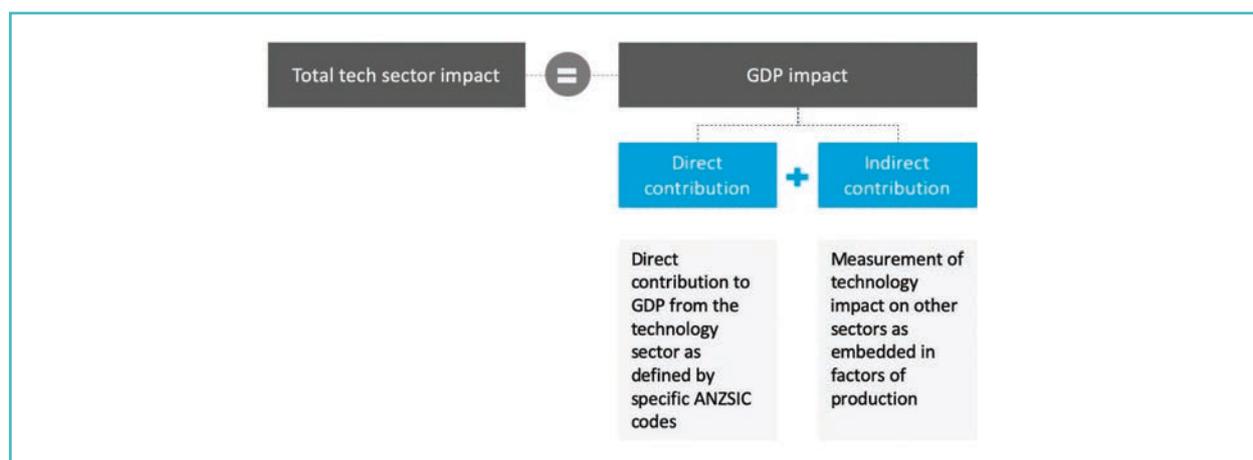
⁷⁴ Department of Jobs, Enterprise and Innovation (2014), "Policy Statement on Foreign Direct Investment in Ireland"

⁷⁵ World Bank (2016), "Best Practices and Lessons Learned in ICT Sector Innovation: A Case Study of Israel"

Economic contribution

We utilise the income method for calculating the contribution of the tech sector in Australia. This comprises both the ‘direct’ and ‘indirect’ contributions as shown by the figure below.

FIGURE 28



SOURCE: AlphaBeta analysis 2019; ABS (2016), Census of Population and Housing; ABS (2017) Business Use of Information Technology, 2015-16, ABS National Accounts 2019

The direct contribution involved deriving the GVA of a defined set of sub-industries sourced from ABS, which included:

- Internet publishing and broadcasting
- Telecommunications services
- ISPs web search portals and data processing services
- Computer system design and related services

In addition, we also add the internet-related share of profits from the wholesale and retail trades. The internet related share was apportioned based on the ABS series 8129.0 – Business Use of Information Technology, 2015-16.

Given the importance of the tech sector to the broader economy, we estimate the impact of the sector as embedded in the factors of production in other industries. The ever-evolving nature of the tech sector, and limited data sources, means that this is notoriously difficult to estimate. Given these constraints, we estimate the share of gross operating surplus and employee compensation using wage data from the ABS Census. The underlying assumption to this methodology is the share of profits to employers and share employee compensation is proportionate to the value of wages in technology related occupations. Outside of the direct tech sector, this equates to approximately 3%, and is a conservative estimate when considering that approximately 20-30% of income is now through online channels.⁷⁶ In addition, Oxford Economics take an innovative approach to measuring digital ‘spillovers’ in both developing and advanced economies and find that digital spillovers could equate to up to 13.1% of GDP in advanced economies.⁷⁷

⁷⁶ ABS 2017, 8129.0 – Business Use of Information Technology, 2015-16

⁷⁷ Huawei, Oxford Economics (2017), Digital Spillover: Measuring the true impact of the digital economy

Employment estimation

Our employment estimation of the tech sector again considers all employees in the direct definition of the tech sector as defined in the preceding section. In addition, we also quantify the employees in technology-related occupations in other sectors as defined by the table below. Employment data was gathered from the ABS Census of Population and Housing 2016, and then escalated to 2018 estimates using average employment growth between 2016 to 2018.

- ICT Managers
- ICT Trainers
- ICT Sales Professionals
- Graphic and Web Designers, and Illustrators
- Electrical Engineers
- 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
- ICT Network and Support Professionals, nfd
- Computer Network Professionals
- ICT Support and Test Engineers
- Telecommunications Engineering Professionals
- Engineering, ICT and Science Technicians, nfd
- Electrical Engineering Draftspersons and Technicians
- Electronic Engineering Draftspersons and Technicians
- ICT and Telecommunications Technicians, nfd
- ICT Support Technicians
- Telecommunications Technical Specialists
- Electrotechnology and Telecommunications Trades Workers, nfd
- Electronics and Telecommunications Trades Workers, nfd
- Electronics Trades Workers
- Telecommunications Trades Workers
- ICT Sales Assistants

Note: nfd refers to 'not further defined'

Consumer surplus

The tech sector delivers a range of goods and services to consumers that are either free or cheaper than other goods or services, such as online video content, ability to access information, online mapping and travel tools as well as educational and health access. In the context of online services, consumer surplus is the additional value consumers attach to access to online services, measured as the difference in what they are willing to pay and what they are actually paying.

FIGURE 29

CONSUMER CATEGORY	VALUE DELIVERED
Information and learning	Access to information, education and job resources through services such as web search portals, job seeking platforms and online course content
Communications and social media	Access to social media platforms, messaging and video calls
Online entertainment	Entertainment delivered through online platforms such as YouTube, Netflix or Stan
Online shopping and banking	Improved choice and accessibility, convenience and time savings through the ability to purchase goods and services online
Maps	Improved travel routing and journey planning through online mapping tools
Home convenience	Smart devices in the home, ability to work from home
E-health and other	More accessible healthcare, health tracking devices

We utilise data from a discrete choice experiment which estimated consumer's willingness to pay for internet services.⁷⁸ This data provides estimates of consumer surplus values over and above the price paid for internet services. In order to gather broader estimates derived from other sources of value such as mobile broadband, we use the consumer value derived from internet services, as a ratio of spend) and apply this to the broader telecommunications spend by the average household.⁷⁹

⁷⁸ AlphaBeta (2018), "Connecting Australia: The impact of the nbn on Australian lives and the economy"

⁷⁹ This is aligned to the approach to estimating consumer surplus for communication in the Australian Government's 2013 report 'Benefits for High-Speed Broadband for Australian Households'

In order to estimate the value of information and learning and maps categories we use two-step approach that takes the average of both the consumers perceived value and time savings. The table below shows the sources of information.

We then undertook a top down validation of our estimates on a per household basis. On the basis of five studies, average consumer surplus from the internet and online media range between \$3,130 and \$8,841 on a per household per year basis in 2018 AUD values.⁸⁰ This is consistent with our overall estimate of consumer surplus of \$5,013 per household per year.

We also validate our estimates against other studies for more granular components of consumer surplus. For example, a 2018 study from the International Monetary Fund (IMF) using a willingness to accept method found that US consumers would be willing to pay up to half their disposable income for access to free digital technologies. These estimates may also vary with national context; for example, a 2019 study from Brynjolfsson et. al. found that the median willingness to accept value for losing access to Facebook for one month in the Netherlands was more double the median figure in the US.⁸¹ Brynjolfsson et. al. 2019 also found that the welfare gains (which refers to the value consumers gain from free goods and services) of Facebook alone would have added between 0.05 to 0.11 percentage points to GDP growth per year.

FIGURE 30

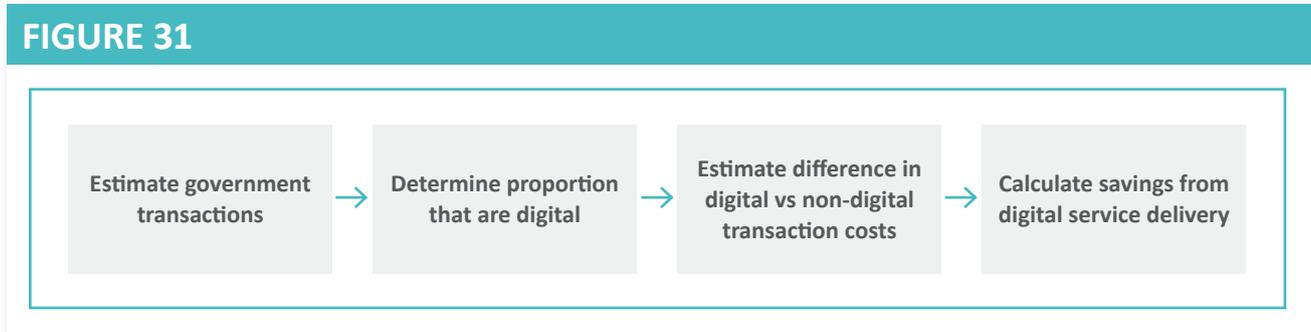
Category	Metric	Source
Information and learning	Consumer’s perceived value	McKinsey (2011), The Web’s €100 billion surplus McKinsey (2014), The mobile Internet’s consumer dividend AlphaBeta, Google Economic Impact Australia 2015
Information and learning	Value of time saved	Yan Chen (2013), A day without a search engine: an experimental study of online and offline search Nielsen Online Landscape review ABS 6302, average weekly earnings AlphaBeta, Google Economic Impact Australia 2015
Information and learning	Number of users	ACCC (2018) Digital Platforms Final Report
Maps	Consumer’s perceived value	McKinsey (2011), The Web’s €100 billion surplus McKinsey (2014), The mobile Internet’s consumer dividend AlphaBeta, Google Economic Impact Australia 2015
Maps	Value of time saved	TNO (2007), Independent research by Dutch research institute Australian Bureau of Statistics (2014) 9208.0 – Survey of Motor Vehicle Use AlphaBeta national survey, weighted for key ABS demographics including age, gender, geography and employment status ABS 6302, average weekly earnings AlphaBeta, Google Economic Impact Australia 2015
Maps	Number of users	Telstra (2010), Smartphone Index Fact Sheet Kantar World Panel Smartphone OS market share Australia data ASYMCO (2015), Where are Maps going? ACCC (2018), Digital Platforms Inquiry

⁸⁰ Corrigan et al. (2018), “How much is social media worth? Estimating the value of Facebook by paying users to stop using it”; BCG (2013), “Follow the Surplus, How US Consumers Value Online Media”; BCG (2012), “Culture Boom, How Digital Media are Invigorating Australia”; Australian Government (2013), “Benefits of High-Speed Broadband for Australian Households”; Deloitte Access Economics (2011), “The Connected Continent II”

⁸¹ Brynjolfsson, E, Collis, A, Diewert, W.E., Eggers, F and Fox K.J. (2019), “GDP-B: Accounting for the value of new and free goods in the digital economy”, NBER Working Paper No. w25695.

Government benefits

Our approach to estimating savings from government online service delivery is summarised in Figure 31 below. We estimate the number of government transactions each year in Australia, then determine the proportion that are digital. The difference between digital and non-digital transactions is estimated, given that digital transactions are typically much cheaper to process than non-digital. We then estimate the savings of digital transactions relative to if they were undertaken in a non-digital channel (e.g. phone, in person, mail).



The data sources for this methodology are shown below.

FIGURE 32

Parameter	Source
Estimate government transactions	We take average digital transactions per person and apply to the Australian population based on data from the UK Government (UK Government, ‘Services Data’, available at https://www.gov.uk/performance/services)
Determine the proportion of transactions that are digital	We look at government targets of online transaction delivery which estimate that approximately 70% of transactions should be digital ⁸¹
Estimate difference between cost of digital and non-digital transactions	UK Government 2012, Digital Efficiency Report

In order to estimate the benefits of telehealth we draw on third-party reports which have calculated the benefits to the Australian economy.⁸³

⁸² Carroll & O’Dea Lawyers (2017), “NSW Government Encourages more Transactions Online”

⁸³ Booz & company (2010), “Optimising E-Health Value: Using an investment model to build foundation for program success”; Medical Technology Association of Australia (2011), “Connecting health services with the future: Modernising Medicare by providing rebates for online consultations”

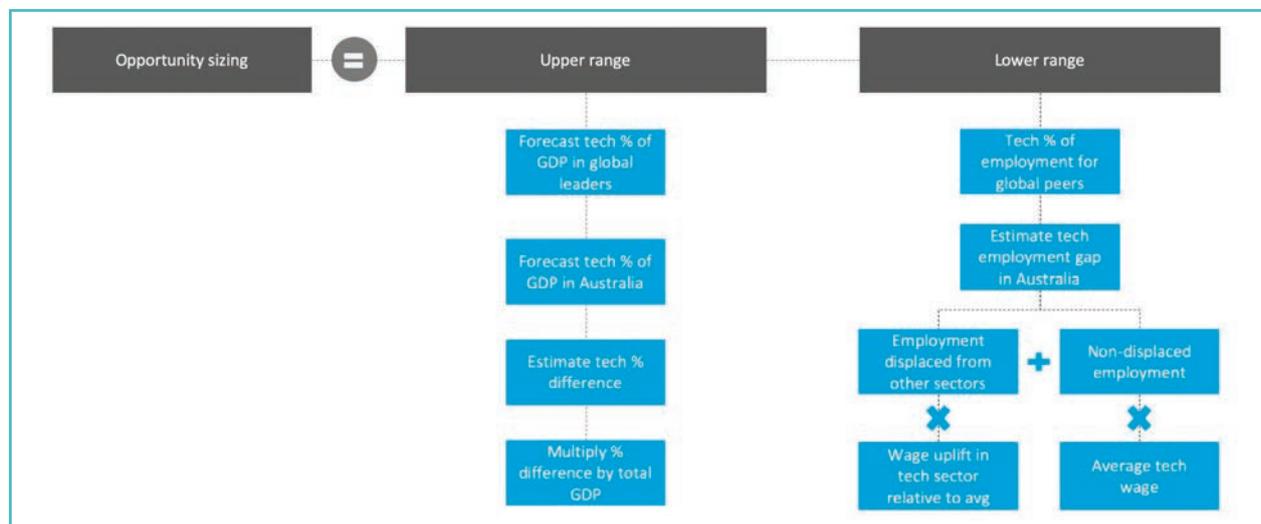
Opportunity sizing

We take two approaches to estimating the opportunity for Australia catching up to tech sector global leaders. We select global leaders that are comparable to Australia using three criteria:

- Tech sector contribution is greater than 5%
- The size of the country's GDP must be at least as high as 60% of Australia's, to ensure the countries we include are large diversified economies that are comparable to Australia

This filtering process resulted in four benchmark countries: the US, UK, France and Japan. In estimating the upper range, we forecast the percentage contribution of the tech sector for global leaders based on five-year historical growth rates. We then compare this to Australia and take the net difference each year in the percentage contribution. We assume that Australia can then add this percentage contribution to GDP each year after a five year 'catch-up' period. Under the lower range approach, we estimate the difference in the percentage size of the technology workforce. We then quantify the impact of Australia addressing this gap over a five-year period. A portion of this will come from existing sectors as a displaced workforce, and this is multiplied by the difference in the tech sector wage relative to the average. The non-displaced portion is multiplied by the full tech sector wage.⁸⁴

FIGURE 33



The sources are listed in the table below.

FIGURE 34

Parameter	Source
Proportion of tech sector contribution to GDP in leading countries	OECD (2019)
Direct economic contribution of tech sector in Australia	Estimated by AlphaBeta 2019
Forecast of GDP	IMF (2019)
Tech sector proportion of employment for global peers	OECD 2019, ICT employment
Size of tech sector employment (technology occupations only)	Estimated by AlphaBeta 2019
Ratio of displaced and non-displaced workers	Estimated by AlphaBeta (2019), based on estimates from Deloitte Access Economics (2018), ACS Australia's Digital Pulse

⁸⁴ We use estimates of the technology workforce gap from Deloitte Access Economics (2018), "ACS Australia's Digital Pulse" to determine the non-displaced workforce.

Potential policy benefits

A range of potential benefits are illustrated throughout Section 3. These are based on Australia achieving benchmark performance against a range of indicators including investment, skills and reduction of red tape. These are not necessarily expected to be interpreted as precise forecasts but rather as indicative potential sizing of benefits of policy reform in various areas. The table below outlines the methodology to calculate the benefits.

Benefit	Methodology	Data sources
Investment in business investment in ICT-related research and development	Calculate the net difference between Australia's investment in software R&D as a proportion of GDP and compare to global peers.	ABS (2019) National Accounts IMF GDP forecast US BEA (2019)
Increase seed and angel investment	Calculate the average seed and angel investment per capita for high-performing countries that exceed Australia's rate and estimate the incremental difference to the current rate. This is then multiplied by the total Australian population.	StartupAUS Crossroads V
Increase value of data assets	Estimate the book value of listed IT companies in Australia and increase by rate at which they are estimated to be undervalued.	Sentio comparables (2019) Saunders and Brynjolfsson (2016), Valuing Information Technology Related Intangible Assets Deloitte Access Economics (2018), Australia's Digital Pulse
Skilling the workforce of the future	Estimate the technology skills gap in Australia and then multiply by the difference in tech sector wages relative to the average.	Deloitte Access Economics (2018), Australia's Digital Pulse ABS (2016), Census of Population and Housing
Increasing Australia's access to global talent	Estimate the technology skills gap and then multiply by average GVA per worker in the tech sector (using the Information, Media and Telecommunications sector)	ABS (2019), National Accounts Deloitte Access Economics (2018), Australia's Digital Pulse

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