Tech Council of Australia

Turning Australia into a regional tech hub

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About the Tech Council of Australia

The Tech Council of Australia is the peak industry body for Australia's tech sector. Providing a trusted voice for Australia's technology industry, with over 160 members, the Tech Council comprises the full spectrum of tech companies.

We aim to advise and engage with Australian governments, businesses, and the wider community to help support the ongoing creation, development, and adoption of technology across industries.

Our vision is for a prosperous Australia that thrives by harnessing the power of technology.

Authorship

This report has been authored by the Tech Council of Australia. The Tech Council would like to thank McKinsey & Company whose research helped inform this report and acknowledge AirTree and Techboard for their contribution of data.

Note: All dollar figures are in Australian dollars and accurate as of January 2022. Although specific dollar values may have changed with market movements, the findings regarding comparative advantage remain relevant given these are primarily relative assessments.

Contents

Foreword

In the last decades, Australia has launched globally successful tech companies from Sydney to Perth to Townsville. This includes success stories such as Atlassian, Canva, Afterpay, WiseTech, SEEK, REA, Airwallex, NearMap, SafetyCulture, Go1, Cultureamp and Employment Hero. Australia has also attracted some of the largest global tech companies and investors to Australian shores.

What is so exciting about the players converging in the Australian tech ecosystem is the common traits they possess. These are businesses who have dreamed big from the beginning, sought to solve complex problems, have challenged the status quo, taken risks, failed, succeeded, grown, and prospered. They have reimagined the way we do business.

The success of Australian originated tech companies means that 2.3% of the world's tech unicorns ($1Bn companies) have come from Australia, even though our share of global GDP is just 1.6%. It shows Australia punches above our weight in the global tech race. It also highlights Australia has gained an important, new industrial strength in our economy: software development.

This is good news for Australia, because the tech sector is one of the fastest growing sources of jobs, opportunity and economic growth in Australia and globally. Being good at tech strengthens and future-proofs our jobs, broader industries, our economy, and way of life.

When we create leading, global tech companies here at home, we create good, secure job opportunities for Australians, and future sources of sustainable growth.

When we attract leading global companies to locate and invest in Australia, we grow the size, strength and skills of the Australian ecosystem.

By building a vibrant Australian tech ecosystem, we can also determine the problems we want tech to help us solve and shape the outcomes we want technology to produce for our society.

However, while Australia has shown its potential in the tech sector, we still have room to grow. The direct tech sector in Australia is still only 3.8% of GDP. In Canada it's 6.8%, in the UK 8.1% and the US 10.2%.

If Australia can combine our strength in software with our industry and research strengths in areas such as mining and resources, quantum, energy, the environment, education and construction and property, we can accelerate our success even further.

We can grow the tech sector as a share of our economy and strengthen the position of other industries.

But these successes can only be accelerated through a systematic and considered approach to growing the Australian tech ecosystem and jobs. It means making sure our training and education system readies Australians for 21st century skills and jobs. It means ensuring that we encourage investment – including from leading global companies and funders – and commercialisation, get our regulatory frameworks right, and help businesses and communities around the country to adopt technology that works for them.

This report asks where Australia has a comparative advantage in tech, how we can make the most of these opportunities, and how each of us can be the change that revolutionises Australia's technology sector.

Every four years at the Olympic Games we see Australia high up on the medal tally punching above its weight. There's no reason we can't do the same in the tech sector.

Robyn Denholm
Chair
Tech Council of Australia

Executive summary

Australia has shown in the last three decades it can create world-class tech companies and jobs, and attract global talent and investment. Over the next decade, Australia can build on this success to create a new generation of industries, jobs and investment.

This will mean leveraging Australia's areas of comparative advantage to support the growth of locally originated companies and industries that can compete globally, and attracting the best global and regional tech companies to Australia to build a secure and successful Australian tech ecosystem.

After strong investment over the past 30 years, Australia has developed a deep and robust tech sector.

- **The tech sector, direct and indirect, is now 8.5% of Australia's GDP,** with overall activity valued at $167 billion, contributing more than 860,000 jobs directly and indirectly.
- **Australia has established globally successful companies here in our own backyard.** Australia has produced 21 of the world's ~920 global tech 'unicorns' (companies valued at $1 billion or more), a 2.3% share well above Australia's 1.6% share of global GDP.
- **The value of the sector is growing rapidly to over $640 billion.** Listed companies have reached a $570 billion market capital with a 35% compound annual growth rate (CAGR) in the last 5 years. Value funded by Australia's venture capital market has contributed another ~$71 billion.

Australia's tech ecosystem has clear specialisations and is demonstrating it can launch successful global companies.

- **Australia has been most successful at originating companies in five segments of the Australian tech ecosystem.** These are Business Software, Biotech, Medical Devices, Media & Design and PayTech. These segments have the strongest track record of creating globally successful companies, creating jobs, and attracting investment.
- **These 5 segments are each valued at >$30bn and amount to ~72% of the Australian originated tech sector's total value.** From largest to smallest, these segments contribute considerably to Australia's Tech sector. Business Software (25% of total tech sector value), Biotech (21%), Medical Devices (11%), Media & Design (9%) and PayTech (5%).
- **In each of these segments, there is a significant locally created company with a global footprint that has become the anchor point for local ecosystem creation** highlighting the ecosystem effect that we have seen occur since the arrival of the global tech companies. These companies are Atlassian for Business Software, CSL for Biotech, Cochlear for Medical Devices, Canva for Media & Design and Afterpay for PayTech.
- **Australia excels in creating start-ups that complement our industrial strengths.** Australia's share of start-ups in 18 segments exceeds our global share of GDP. Segments where Australia is producing a higher-than-average level of start-ups often coincide with industries which are traditional areas of strength in the Australian economy, such as Mining Tech, Lending, AgTech and EdTech segments. Mining and banking and insurance are the first and second largest industries based on their share of GDP in Australia. Mining, Agriculture and Education are some of Australia's leading exporting industries.

The success of Australia's tech sector has been underpinned by strong growth in venture capital, and other sources of global and local investment.

- **Capital raised by both the ASX and venture capital (VC) funding have strongly contributed to growing the Australian tech ecosystem.** Overall, VC has grown faster than capital raised via the share market, averaging 65% CAGR against 35% CAGR for ASX-listed companies. This private funding has also supported the success of many presently ASX-listed segment leaders.
- **Australian VC funding favours globally scalable solutions.** Australian VCs invest more in Business Software, PayTech and Diversified Fintech relative to global VC funding allocations. This has contributed to these areas becoming sources of comparative advantage for Australia, building on other factors such as their global, remote sales and distribution models – in which Australia's geographic location is less of a disadvantage – their ability to scale quickly, and their capacity to build on strong local ecosystems and capabilities.
- **The world is betting on Australia's success in four areas** that have secured a larger share of global VC funding than Australia's 1.6% share of global GDP: Quantum Tech, Lending Tech, Energy Tech and Media & Design. This is a sign of confidence by global investors including the investment by global tech companies in research, in Australia's comparative advantage in building and commercialising tech in these segments.
- **Australia has shown it can attract leading global tech companies to Australia to establish operations here, and to make investments in local R&D activities.** However, foreign direct investment in tech activity in Australia is still relatively low versus peer countries such as Canada.
- **The success of Australia's tech sector has coincided with the availability of the hyperscale cloud by trusted providers in Australia.** World-class cloud infrastructure has made essential information technology accessible and affordable which enables businesses to scale globally. Australia has benefited from significant investments by global providers from an early stage of market development. Australia has the potential to attract a greater regional share of the Cloud & Datacentres segment, aided by Australia's large land mass and potential to generate an abundance of cheap, renewable energy, and new security alliances. However, this will depend upon continuing to maintain a competitive and fair policy framework.

Exciting new tech sector segments are emerging with the potential to create and attract the next wave of future industries to Australia.

- **The future success for Australia's tech sector is likely to come down to two factors:** the first is the extent of **domain expertise** in Australia's local tech ecosystem (from research, talent, adjacent industry expertise or the presence of large domestic or global customers or companies). The second is the **global growth pathway** for that sector (either because Australia is an attractive initial market, or the segment is particularly easy to scale globally).
- To understand where Australia has a current comparative advantage, or could do in future, this report analyses 37 different tech segments against these two criteria.
- It finds **Australia currently has 5 globally leading segments ("Head Starts").** These are Business Software, Biotech, Medical Devices, Media & Design and PayTech. These segments have already shown they can produce globally successful companies.
- **Six other segments represent "Potential Stars".** These are Mining Tech, EdTech, Diversified Fintech, Gaming & e-Sports, Blockchain & Crypto and AR/VR. These are the sectors on track to produce and attract the next round of Australian high-value companies because Australia has domain expertise and there is a favourable incubation path for them.
- **Another 13 segments of the tech sector evidence either strong domain expertise** (such as Quantum Tech) **or have a convincing global growth pathway** (such as AgTech and Energy Tech). These sectors also have high potential to become areas where Australia could be globally competitive, but they may need specific interventions to grow them, such as improved access to funding.

Australia has shown its potential to create and attract global tech companies in the last three decades. Over the coming decades, Australia can further strengthen its regional position in strategic tech industries. However, to do this, Australia must take three key actions:

- **Setting a clear vision** supported by rigorous analysis of Australia's comparative advantage and developed with the support of a National Reference Group comprised of an independent advisory group that is representative of the whole tech ecosystem. Having an aligned vision will drive public and private sector engagement and future sector-enabling policy development.
- **Making systematic improvements** to improve foundational policy settings that help; boost jobs through training, retraining and skilled migration support, promote and encourage investment by local and global companies (including through a fair playing field), tax relief and research and development (R&D) incentives, and modernise regulatory models to meet sector goals.
- **Identifying and addressing sector specific market failures** to reduce barriers such as regulatory obstacles and funding gaps redressed through new funding models and innovative public investment support, such as the Critical Technologies Fund.

Australia can and should aspire to grow our tech ecosystem, and through this, to create more high-value jobs and activity.

The Tech Council is committed to the goals of having 1.2m people in tech jobs by 2030, having tech sector activity contribute $250bn to GDP by 2030, and making Australia a great place to found and scale a company. We look forward to working with partners across the economy to realise this vision.

SECTION 1

Understanding the field

Over several decades, Australia has built a globally successful tech sector which has become a significant contributor to the nation's economy. However, there has been little work published on where Australia has and can develop a global or regional comparative advantage.

This information is essential for policy-makers who want to ensure that Australia is maximising its jobs and economic growth opportunities. It's important to share with Australians so they understand the new types of jobs and opportunities available to them and have confidence that these opportunities are based on genuine and permanent strengths in the economy.

Therefore, this chapter begins by analysing the Australian tech sector to understand its current composition and where Australia has already developed areas of existing and emerging comparative advantage. The report identifies 10 main subsectors and 37 segments in the Australian tech sector based on economic analysis and interviews with industry leaders, VC funds, and researchers. It compares the size and growth of each segment, nationally and globally, in terms of its market capitalisation, funding, and number of players.

Overview of the tech sector

Strong local and global contribution

In the past decade, Australia's tech sector has emerged as one of the nation's strongest performing sectors and an important part of the domestic economy. It is now one of the main sources of new growth and high-value companies and jobs creation in Australia. Overall, it contributes almost $167 billion in GDP, or 8.5% of Australia's GDP in 2020.

The sector currently boasts more than 860,000 jobs, both directly (within tech companies) and indirectly (through the tech-related activities of non-tech organisations). There are over 135,000 computer scientists working from Australia, twice as many per capita as India.

Australia has produced 21 of the world's ~920 tech 'unicorns' – companies worth US$1 billion or more – a 2.2% share that exceeds Australia's 1.6% of global GDP. These unicorns include companies specialising in business software, consumer applications and scientific innovations that promise to improve most aspects of our daily lives.

Around 100 companies with a valuation of $100 million or greater have been founded in the past three decades, 67 of them since 2010. They have been supported by publicly listed and venture capital markets. The value of publicly listed Australian tech companies is now $570 billion, while the value of companies funded by Australia's venture capital market has risen more than 120-fold over the past 10 years, from $0.58 billion in 2010–11 to $70.1 billion in 2020–21, growing the total value of the sector to over $640 billion.

This has been a remarkable transformation that has taken place over several decades. Australia's tech foundations were laid by commercial tech companies, including IBM which first began its Australian operations in the 1930s and Microsoft which arrived in the 1980s. The next wave came in the mid-1990s with the emergence of local dotcom boom companies such as Seek, realestate.com.au and carsales.com.au. The 2000s marked the growth of the local software sector, which has accelerated rapidly from 2010. It also saw continued investment by global firms, with Google opening its second only office outside the US in Australia in 2002, and AWS entering Australia in 2010.

One of the features driving the rapid growth of the Australian software sector over the last two decades have been the foundational investments in cloud infrastructure by global tech companies such as Microsoft, Google and AWS. While these companies bring significant economic contributions of their own, their global hyperscale cloud capabilities have enabled the emergence of Australian-based SaaS platforms and supported Australian software companies to scale globally. This is important because tech companies are born with the intention of becoming global – operating in multiple regions

and nations, having a diversified workforce and tapping into a global market of customers.

Previous Tech Council research highlights that both Australian starts-ups and scales-ups, and large global tech companies, will play an important role in helping grow the economic contribution of the tech sector to meet the targets of delivering $250 billion per annum to Australia's GDP, and seeing 1.2 million people in tech jobs by 2030 as shown below, in Exhibit 1.

Local tech sector growth has also coincided with rapid growth in the venture capital market. Some of this growth can be attributed to shifts in government policy over the last two decades that have sought to encourage more venture capital investment, starting with the introduction of the Venture Capital Limited Partnership program in 2002, followed by the Early Stage Venture Capital Limited Partnership Program in 2007 and the Early Stage Innovation Company tax incentive in 2016, though this report has not attempted to quantify the impact of these measures.

Composition of the Australian tech sector

A company is considered part of the direct 'tech sector' if it develops or sells technology, rather than simply uses it (which virtually all companies do in one form or another). Developing proprietary technology is at the heart of their business model.

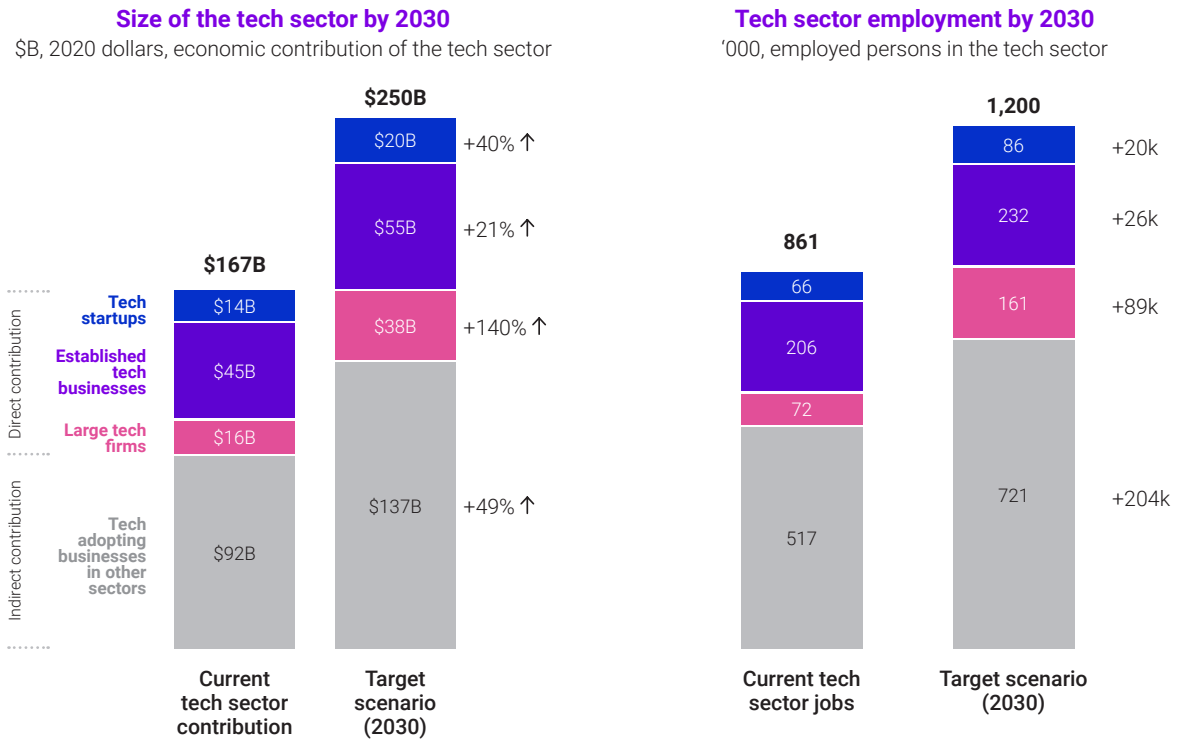
Exhibit 2 sets out a taxonomy for classifying companies active in the Australian tech sector into subsectors and segments. The subsectors identify a broad tech market; the smaller segments identify where specific businesses directly compete. It identifies ten subsectors, in which there are 37 market segments.

The subsectors are defined as follows:

- **the Consumer/B2B2C subsector:** this includes tech companies that have a consumer or retail focus, for example the Gaming & e-Sports segment. It also includes companies that connect other businesses and their customers, for example Marketplaces, or Property Tech.

EXHIBIT 1: *Building a thriving tech sector*

Australia can achieve these targets by growing its direct tech sector, scaling more large companies, and encouraging tech investment across the economy



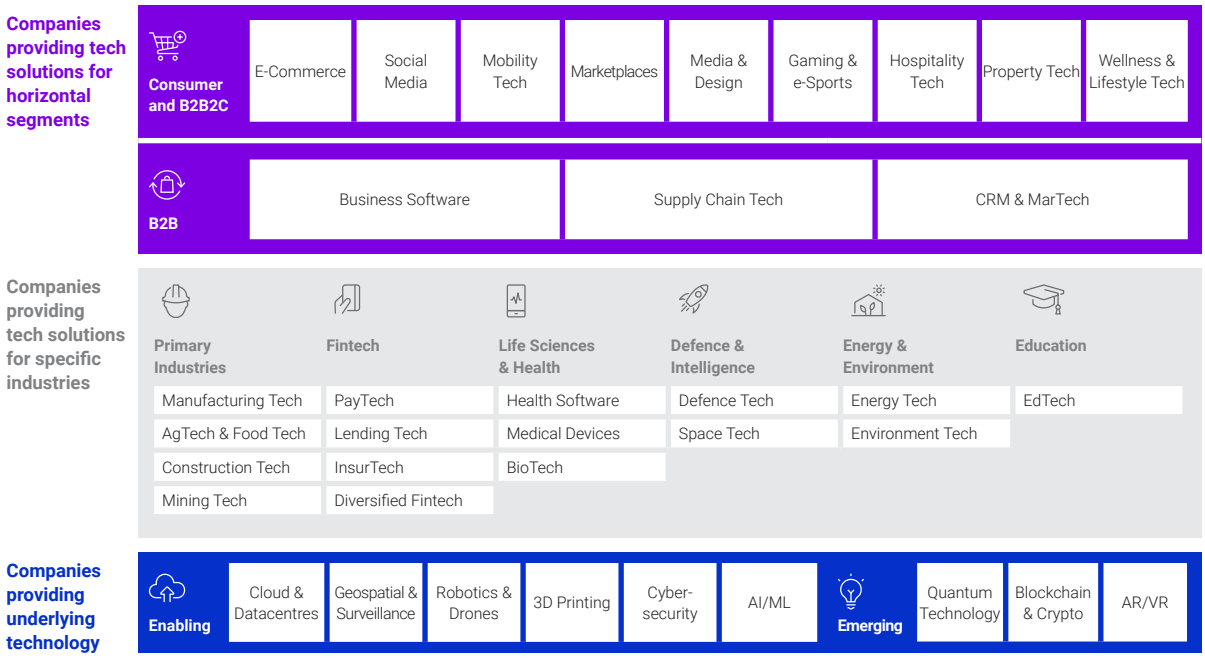
Notes: Tech startups are defined as businesses with annual turnover <$2m, large tech firms are defined as businesses with >200 employees, and remaining direct tech businesses are classified as established tech businesses.

Source: Statistics Canada, Business counts with employees; Statistics Canada, Employment by industry; ABS, Australian Business Counts by employees; ABS, Australian Business Counts by turnover; Accenture 2021, The Economic Contribution of the Tech Sector.

- **the B2B subsector**: this includes tech companies that support enterprise and business functions, for example software that supports Supply Chain, HR, legal or accounting processes.
- **Industry segments:** this includes tech companies that support six specific industries: Primary Industries, Fintech, Life Sciences & Health, Defence & Intelligence, Energy & Environment and Education; for example, PayTech is a segment within Fintech, or Construction Tech is a segment within Primary Industries.
- **Enabling:** this includes tech companies that enable other technologies and other tech players developing specific solutions, for example, Cloud & Datacentres.
- **Emerging:** this includes tech companies that are developing capabilities with leading edge technologies of the future, for example Quantum Tech.

We developed this taxonomy as a useful starting point to more precisely identify the composition of the Australian tech sector and areas of strength. No taxonomy will be perfect and none should be static – especially in a dynamic and fast-moving area such as the tech sector. We expect and hope the framework will be debated, iterated and updated over time with stakeholders.

EXHIBIT 2: *The tech sector can be broken into 10 subsectors and 37 segments*



Value of the Australian-originated tech sector companies

This report analysed 348 companies listed on the ASX, and 6,526 start-up companies funded by venture capital, to reveal where Australia already has a comparative advantage in founding companies in the tech sector.

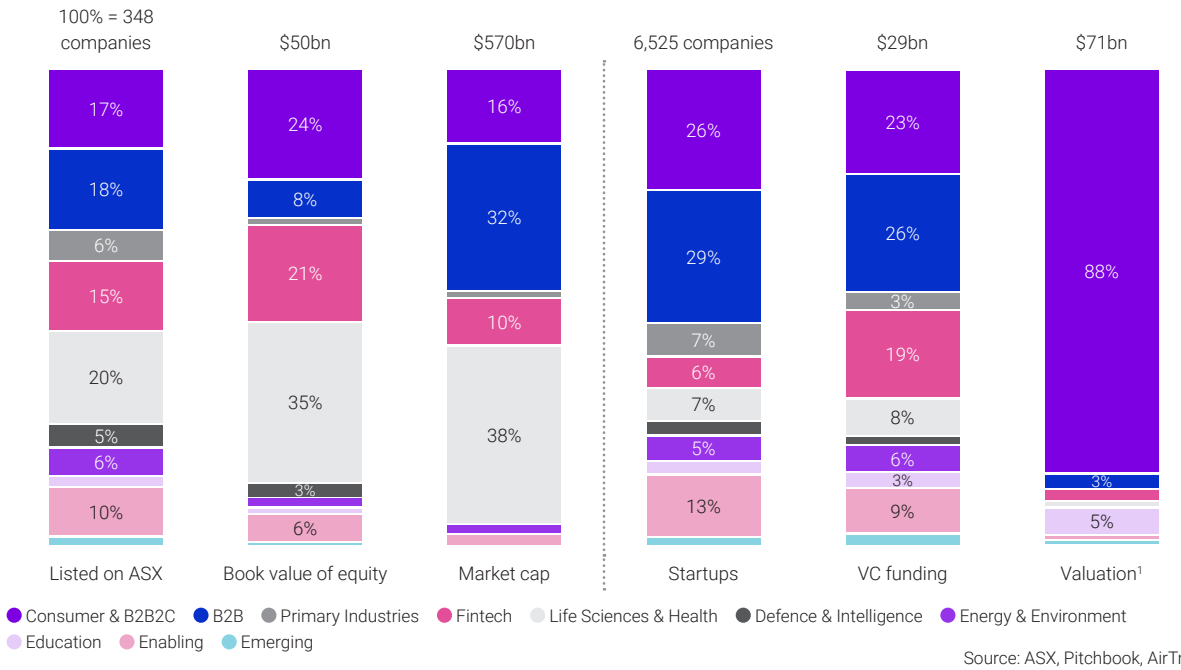
The total value of the sector is estimated to be $640bn, with $570bn of value being publicly listed and $71bn privately held.

The analysis shows Australia's two strongest tech subsectors are Life Sciences and B2B software, followed by B2C software and Fintech. These four key subsectors represent ~95% of the total tech sector value.

- **Life Sciences and Health** (38% of total ASX market cap)**:** Life Sciences and Health has the largest single share of the sector's market capitalisation. This is largely driven by CSL, ResMed and Cochlear, that have a significant global presence due to their ability to innovate. Start-ups in this subsector receive a much smaller share of VC funding (6%) because R&D is more likely to be funded directly by established companies and publicly funded research. Less than half of the companies in this sector seek injections of private venture capital.
- **B2B** (32% of total ASX market cap): B2B and in particular Business Software is the other market giant, almost entirely due to Atlassian, Xero and WiseTech's combined market capitalisation.
  - VC interest in the B2B subsector is the largest with $6.4bn (26% of total VC funding over the past 5 years), outpacing Life Sciences on this measure. Business Software as a segment is drawing in the most venture capital, with a 61% share of the B2B sector's $6.4 billion over the past 5 years. It also has a large number of active start-ups (see Exhibit 5).
  - Business Software covers diverse solutions including employee experience and culture (CultureAmp), collaboration and productivity (Atlassian), workplace safety (SafetyCulture), rostering (Deputy), HR and payroll (Employment Hero), supply chain management (WiseTech) and accounting (MYOB). This is reflected in the ~1,200 start-ups it contains: almost three times more than the second-most active segment (Social Media, at ~450 start-ups).

EXHIBIT 3: *The value of the sector is $640bn, with $570bn publicly listed and $71bn privately held*

Comparison of number of players, raised capital, and value for listed companies vs startups in Australia



Source: ASX, Pitchbook, AirTree

1. Based on top 75 non-listed tech companies per AirTree valuation

- **Consumer/B2B2C** (16% of total ASX market capitalisation)**:** This sub-sector spans both direct B2C and B2B2C companies, and includes segments that are home to many large, listed companies (e.g., SEEK in Marketplaces, and the REA Group in Property Tech), as well as segments with a particularly high number of start-ups (e.g., E-commerce with 350, and Social Media with 450 respectively). It also includes companies that run both B2C and B2B2C business models in parallel: Canva (in the Media/Design segment) started attracting its 60 million consumers as a freemium solution, but now derives most of its revenues from 500,000 paying corporate accounts.
- **Fintech** (10% of total ASX market capitalisation)**:** Fintech ranks highly (3rd or 4th position) in every measure of the sector – listed valuation, VC funding and number of start-ups – driven by PayTech and Diversified Fintech companies such as Afterpay, Airwallex, and Judo Bank. The size of the financial sector in Australia creates an extensive pool of experienced talent. Both Airwallex and Judo Bank (reaching unicorn status in 2019 and 2020 respectively) show how industry veterans can establish successful, disruptive businesses in their fields.

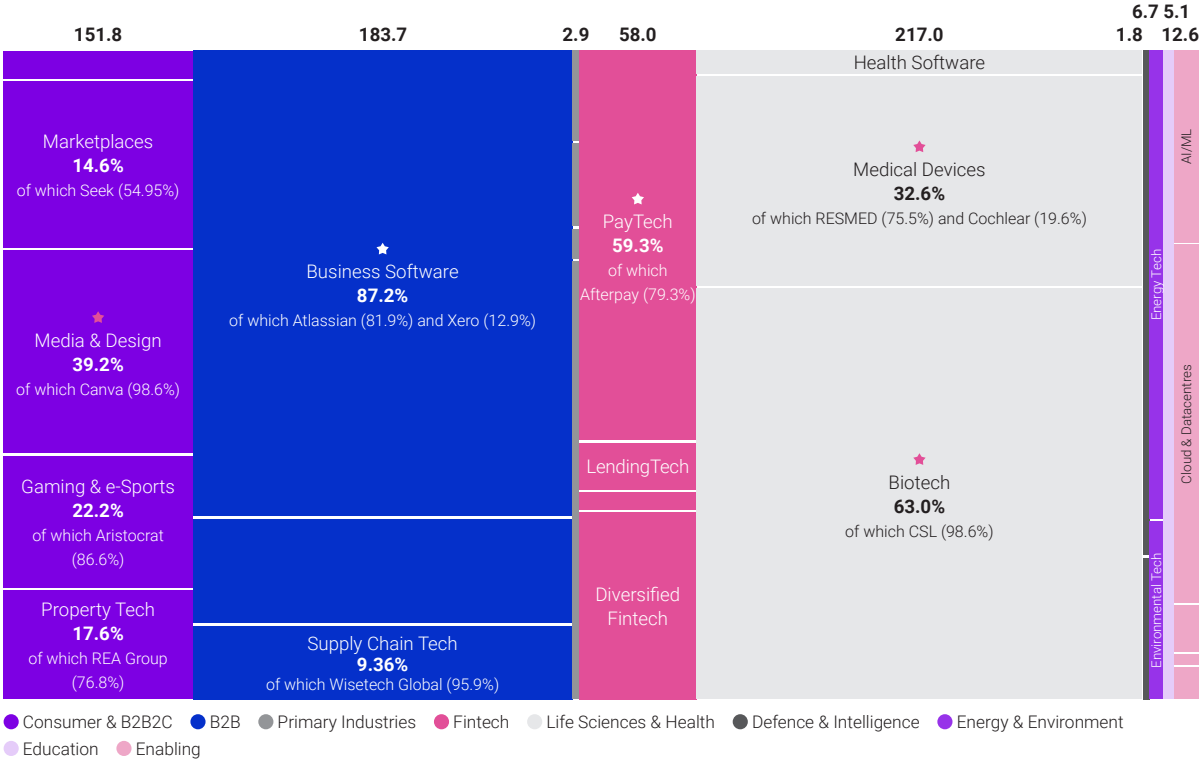
Leading tech segments

Understanding the areas of the tech sector where Australia has local and global comparative advantages is critical to determining a future strategy to grow the sector, as different segments have different characteristics and needs. For example, companies offering software-based B2B services (such as Xero in Business Software) have relatively lower capital requirements compared to Biotech companies (such as AVITA Medical) which require more extensive upfront R&D. While some companies can distribute their solutions at scale quite easily (e.g., Canva in Media & Design using global app stores), others are hampered by physical go-to-market constraints (e.g., Mining Tech solutions may require demonstrations or deployments on-site).

EXHIBIT 4: *The value of the tech sector is concentrated in 5 key segments*

Listed Australian tech companies[2] Market Cap and valuation[3], as of 7 December 2021, AU$ Bn

100% = AUS640.6 Bn



2. Includes ASX-listed companies, Australian headquartered TCA members listed on overseas exchange (e.g., Atlassian), and top 75 non-listed startups per AirTree valuation
3. Market cap based on ASX and valuation based on AirTree

Top 5 tech segments

To determine the segments in which Australia already has a comparative advantage, the report analysed the market capitalisation of listed companies and value of VC funded companies in each segment, along with the number of start-ups.[4] Exhibit 4 shows the overview of the total value of the sector by sub-sector and by segment. The total value of the publicly listed and privately held tech companies in Australia is estimated to be $640bn.

The analysis shows five segments have the largest share of the sector's $640.6 billion in value. These are Business Software, Biotech, Medical Devices, Media & Design and PayTech. Each segment is significant and valued at more than $30 billion. Together, they make up ~72% percent of the sector's $640.6 billion listed market valuation.

Strong champions in top 5 segments

In each of the top 5 segments, there is a significant company with a global footprint that has become the anchor point for local ecosystem creation.

- **Business Software** (87% of B2B subsector and 25% of the Tech sector): This segment incorporates a number of subsegments including Collaboration & Productivity companies, Tech Management & Development solutions, and Accounting & ERP services. The segment boasts the largest number of start-ups and is in the top of the pack for venture capital funding. Atlassian and Xero have put Australia on the map as serious players in Business Software and the market believes that Australia has a comparative advantage.
- **Biotech** (63% of Life sciences & Health subsector and 21% of overall Tech sector): This subsector is dominated by one globally successful listed company, CSL, which is responsible for nearly the entire value of the sector. Only 5% of the start-ups analysed were from the Biotech sector and thus the relative amount of venture capital funding has been small. However, with a global driver of the segment, the ecosystem effect of the lead player could help support growth across the other players.
- **Medical Devices** (32% of Life Sciences & Health subsector and 11% of the Tech sector): Despite being a relatively small segment with <1% of both ASX listed companies or start-ups analysed, the Medical Devices segment has experienced strong growth in the past few years with CAGR >25%. ResMed and Cochlear represent ~95% of value in the segment.
- **Media & Design** (39% of Consumer/B2B2C subsector and 9% of the Tech sector): Canva has driven significant segment value and has captured 4% of the overall venture capital funding and remains the highest valued private company in Australia's Tech sector.
- **PayTech** (59% of Fintech subsector and 5% of the Tech sector): For the last decade, Australia has been a global leader in adoption of new payment technology thus driving innovation and growth. This segment has received 8% of all VC funding for the last 5 years. This funding has helped grow Afterpay, now a global powerhouse competing with international rivals such as Klarna and PayPal.

Creating, funding and growing start-ups

From creating and incubating successful start-ups to funding and growing them, the Australian Tech sector boasts a diverse collection of companies across the 37 segments.

This section evaluates the segments through a variety of different lenses to provide different insights about the relative position of segments and where to place bets on future segment leaders. The analysis will broaden the scope beyond existing leaders to the rest of the pack and will start to identify the next generation of Australian stars.

Creating start-ups

Australia's share of start-ups in a segment, relative to the number of start-ups globally in that segment, is an interesting indicator of Australia's relative strength and entrepreneurship in that segment (see Exhibit 5). Overall, Australia has a similar share of global start-ups to its share of global GDP (1.7% and 1.6% respectively).

There are 18 segments where Australia's share of global start-ups is higher than its share of start-ups overall. The standout area is Mining Tech, where Australia has 8.2% of global start-ups, followed by Quantum Tech (3.2%), Lending Tech (3.4%), AgTech and Food Tech (2.8%) and Construction Tech (2.7%).

Australia is good at creating start-ups in dominant areas of the traditional economy. It is notable that Australia tends to have a higher rate of start-up creation in segments that serve industries which are significant to Australia's economy, such as mining

4. Defined here as a company having received VC funding and not publicly listed yet.

EXHIBIT 5: *Australia is good at creating start-ups in dominant areas of the traditional economy*

Australia # of startups as share of # global startups, %

Domain	Share of global startups, %	# of Aus startups
MiningTech	8.2	33
QuantumTech	3.8	6
LendingTech	3.4	8
AgTech & FoodTech	2.8	130
ConstructionTech	2.7	249
PayTech	2.6	142
Property Tech	2.5	111
Energy Tech	2.5	93
Marketplaces	2.1	18
Environment Tech	2.0	240
Business Software	1.9	1616
Diversified Fintech	1.8	231
Edtech	1.8	157
Cybersecurity	1.8	125
Defence Tech	1.7	28
Cloud & Datacentres	1.7	100
InsurTech	1.7	42
Wellness & Lifestyle Tech	1.7	334
Geospatial & Surveillance	1.6	389
Space Technology	1.6	15
E-Commerce	1.6	376
Hospitality Tech	1.6	90
Social media	1.5	448
Health software	1.5	60
Supply Chain Tech	1.5	38
CRM & MarTech	1.5	231
3D Printing	1.5	22
AR / VR	1.4	53
Medical devices	1.4	49
Biotech	1.3	332
Manufacturing Tech	1.3	31
Robotics & Drones	1.3	53
Media & Design	1.3	245
AI / ML	1.3	307
Mobility Tech	1.2	19
Gaming & eSports	1.1	78
Blockchain & Crypto	0.5	27
	Total	**~6,500**

Australia's contribution to global GDP (1.6%) and to # of global tech start-ups (1.7%)

Source: Pitchbook

(which is Australia's largest industry measured by contribution to GDP) with Mining Tech having an 8.2% share of global start-ups as noted above, and banking and insurance (Australia's second largest industry) with Australian Lending Tech representing 3.4% of global start-ups.

Having a link between Australia's economic drivers and start-ups serving the sector may reflect a higher presence of larger domestic customers, greater expert talent, and stronger research strengths in these areas. It highlights the value of combining Australia's software engineering strengths with domain expertise in traditional industries. The relevance of domain expertise to success will be covered in more detail in the next section, Assessing the Odds.

Funding start-ups

Analysing Australian VC funding patterns can also shed light on the areas in which local investors believe Australia has an advantage in originating companies. To understand these dynamics, this report analyses Australian VC funding allocations versus global VC funding allocations.

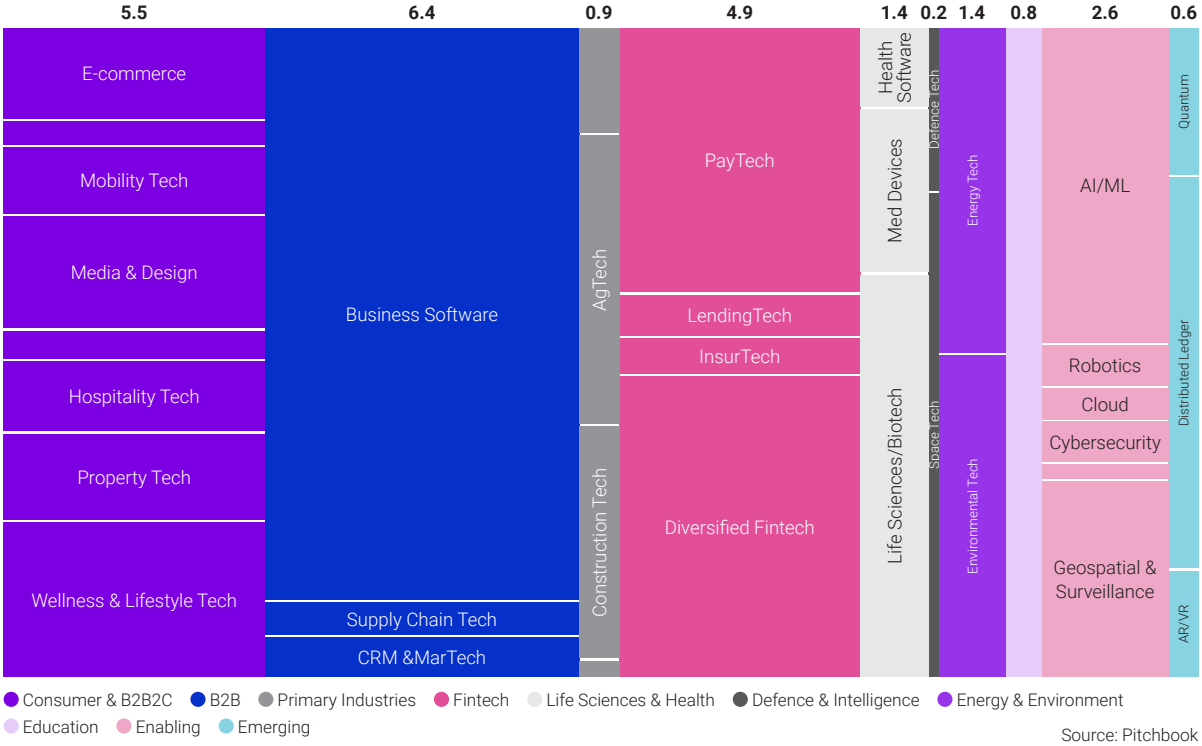
Exhibit 6 provides a deep dive on the VC funding and shows the breakdown of the $24.6 billion of venture capital invested in the Australia's tech sector from 2017-2021 (which is a large portion of the total VC funding invested of $29bn, as per Exhibit 2). B2B and B2C software, plus fintech, are the primary funding recipients, although other emerging sectors receive a higher share of funding versus listed capital. Life Science is notably lower in its share versus listed market capitalisation.

Exhibit 7 compares Australian VC funding with global VC funding by segment and identifies the segments that receive above global share of VC funding. Segments above the line fare better in Australia, and those below the line attract a smaller share of funding in Australia. This shows that Australia's VC market has mostly invested in scalable solutions such as Business Software and Fintech and that it has been effective at allocating capital in areas where Australia has a comparative advantage such as Business Software and PayTech. Smaller and more specialised segments, such as Quantum Tech, Media/Design and Energy Tech, have also drawn a relatively competitive share of funding in Australia versus global allocations – recognising Australia's strengths in these horizontal solutions, and Australia's expected role in the global energy transition.

EXHIBIT 6: *Australian VCs favour scalable digital solutions such as Business Software and Fintech*

Australian VC funding, 2017-2021, AU$ Bn

100% = AU$24.7 Bn



Source: Pitchbook

For the Consumer Tech segments of E-Commerce, Gaming & e-Sports or Hospitality Tech, a lower share of capital allocations may be because of Australia's relatively small consumer market.

For some more specialist or deep tech sectors, such as AI/ML and Biotech, Environment Tech, Geospatial & Surveillance and Cybersecurity, it may reflect a lower number of specialist, or thesis driven funds in Australia, relative to other markets. In other areas, segments may still be relatively nascent or have longer commercialisation timeframes. Otherwise, they may be more specialised, or more subject to sovereign risk, and therefore they may be attracting a lower share of VC funding both domestically and globally. This includes areas such as Energy Tech.

These technologies will be critical to a nation's ability to develop innovative businesses in any other segment. In Section 2, we explore the segments that have global potential but for which Australia may yet lack domain expertise at scale. Structural under-investment in them could hamper Australia's future economic growth.

Growing start-ups

External funding, whether venture capital investment or through ASX listing, has played an important role in driving the development and growth of many segments. This section analyses the intersection of growth and funding and the impact it can have on creating new leaders. Stark growth in market capitalisations

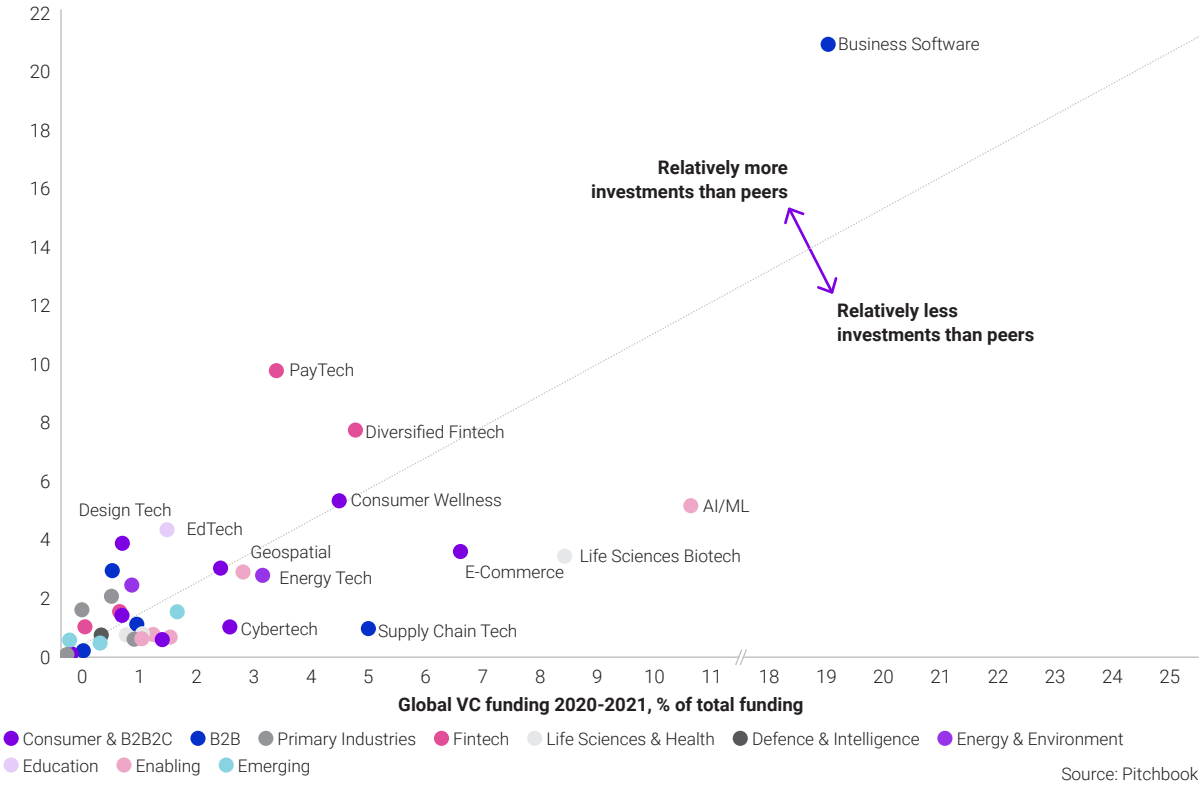
The listed market capitalisation of the 37 tech segments have risen by an impressive average of 35% p.a. over the past 5 years (compared with 6.8% for the ASX overall and 23.1% for the S&P North American Technology Sector Index). Almost all segments sustained double-digit growth[5], testament to the continued success of well-established companies, and to the successful transition of smaller companies from their start-up phase.

Between segments, the trends in global market growth are only partially reflected in market capitalisations. There is a wide range of segment performance, often reflecting the size of the starting base: see Exhibit 8.

EXHIBIT 7: *Business Software and Fintech receive above fair share of funding in Australia vs. globally*

Comparison of VC funding in Australia and globally

AUS VC funding 2020-2021, % of total funding



Source: Pitchbook

5. This includes new entries of previously unlisted companies within the observed time period.

EXHIBIT 8: *Market capitalisation of listed tech companies has grown at a 35% CAGR over the past 5 years*

Listed Australian tech companies[6] Market Capitalisation growth, 2016-2021, %

Domain	CAGR (%)	Market cap 2016 (AU$ Bn)	Market cap 2021 (AU$ Bn)
AgTech & FoodTech	134	0.01	0.36
Hospitality Tech[7]	102	-	0.41
QuantumTech	100	0.01	0.26
E-Commerce	86	0.19	4.16
PayTech	77	2.01	34.43
LendingTech	76	0.24	4.01
Business Software	74	13.20	162.15
Edtech	55	0.16	1.47
Supply Chain Tech	55	1.94	17.22
Energy Tech	53	0.58	4.91
Blockchain & Crypto	53	0.02	0.15
AI / ML	48	0.45	3.23
MiningTech	39	0.36	1.88
Cloud & Datacentres	39	1.34	6.91
Environment Tech	37	0.36	1.77
Health software	35	1.92	8.72
Property Tech	32	6.92	27.22
Medical devices	29	19.72	70.88
Gaming & eSports	26	10.67	33.77
Cybersecurity	26	0.29	0.90
Biotech	25	44.63	136.90
Diversified Fintech	24	5.70	16.67
InsurTech	23	0.07	1.52
Marketplaces	22	8.28	22.24
Space Technology	20	0.15	0.37
Geospatial & Surveillance	20	0.30	0.75
Manufacturing Tech	17	0.18	0.40
Social media	17	0.02	0.04
CRM & MarTech & AdTech	15	1.13	2.23
3D Printing	13	-	0.09
Media & Design	9	0.50	0.78
Defence Tech[8]	8	0.95	1.38
Wellness & Lifestyle Tech	7	0.27	0.37
AR / VR	5	0.05	0.06
Mobility Tech	4	0.63	0.77
ConstructionTech	-9	0.20	0.13
Robotics & Drones	-28	1.61	0.32

Total tech sector **~35%**

Source: ASX / Capital IQ

6. Includes Australian headquartered TCA members listed on overseas exchange (e.g., Atlassian)
7. 4-year CAGR with 2 listed companies, first company listed in 2017
8. 2-year CAGR with 3 companies listed, first company listed in 2019

The fastest growing segments are AgTech, Hospitality Tech and Quantum with the impressive CAGRs of 134%, 102% and 100% respectively, but from a small base. Hospitality Tech, for example, had no listed company until the entry of Digital Wine Ventures in 2017 (up from $8m to $107m in market cap) and then My Food Bag in 2021 ($270m). By comparison, the listing of Afterpay saw PayTech grow at 128% CAGR from a more sizeable base to become one of the largest tech segments. Strong growth could also be seen in the largest subsectors: Business Software has grown by more than 50% annually, and Biotech grew at 25% per year since 2016, despite already being dominated by CSL.

This strong growth across listed companies highlights the appetite the share market has for the tech sector including the high potential segments.

Accelerated growth in venture capital funding

The extent to which Australian tech segments are attracting venture capital funding is an indicator of where investors believe there will be future growth. The data suggests they are expecting more winners from the segments that are already doing well. Exhibit 9 shows that 11 of the 15 segments growing fastest in market capitalisation have also seen venture capital funding pick up speed in the past two years. Defence Tech, for example, has received almost all its venture capital funding since 2020. In fact, all but four of the segments have received more funding in the past two years than the previous three, even though the pandemic has reduced the opportunity for face-to-face demonstrations and pitches. Even segments with already large market capitalisation – such as PayTech, Business Software, AgTech – have seen an increase in VC funding in those years.

The limited amount of VC funding prevents definitive conclusions in segments such as Mining Tech, Defence Tech and Cloud & Datacentres; these segments typically rely on alternative funding mechanisms such as direct revenue generation (through upfront commercial contracts that help finance proofs of concept or pilots) or government budgets. However, EdTech, Hospitality Tech and AgTech are sizeable segments that have also attracted most of their capital in the past two years.

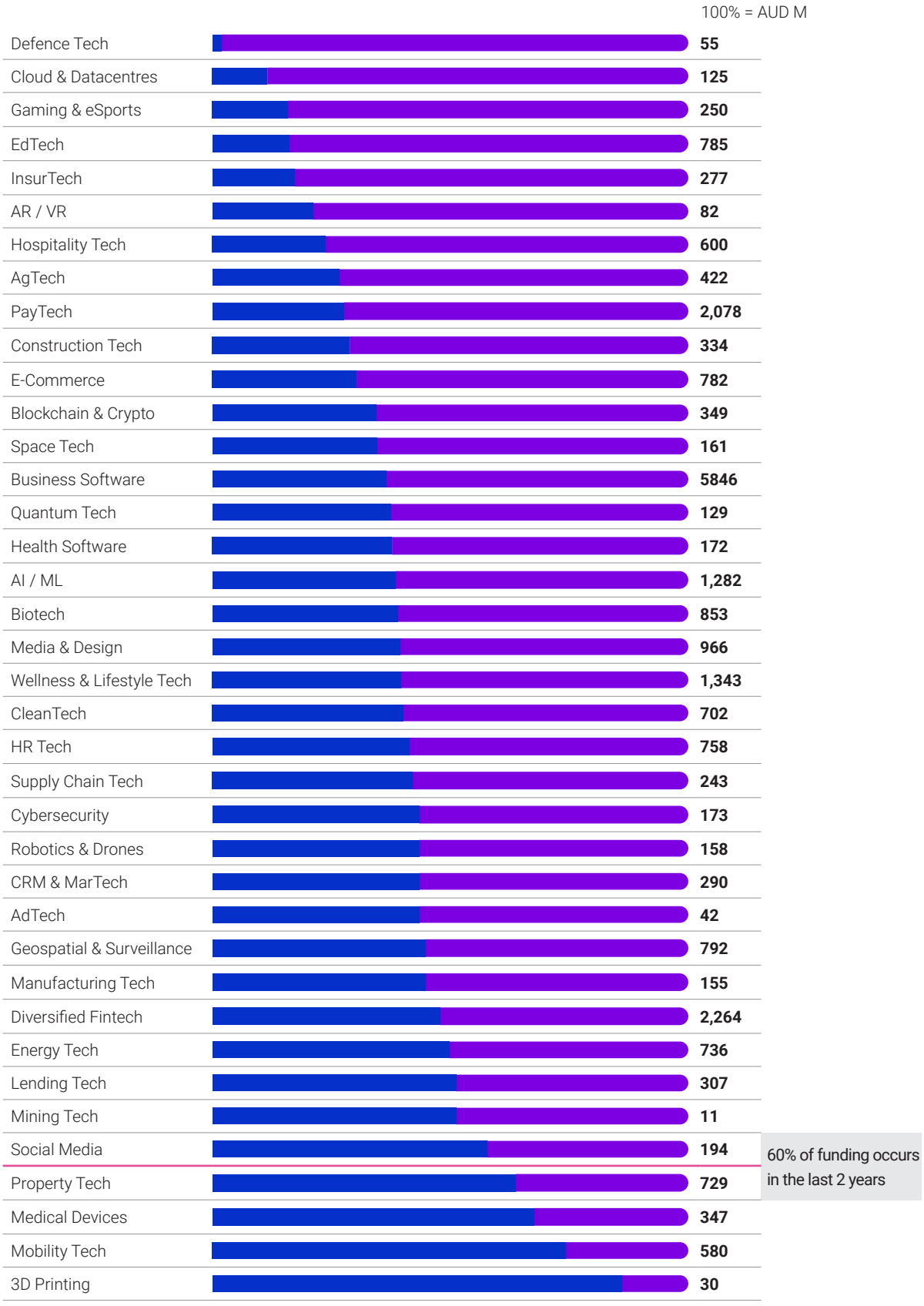
Winning on a global scale

Exhibit 10 compares a segment's competitiveness at attracting global funding allocated to their segment by global VC investors. There are four Australian segments whose start-ups attract a higher share of global funding than Australia's share of global GDP: Quantum Tech, Lending Tech, Energy Tech and Media & Design. This indicates that global investors believe Australia has a comparative advantage in these areas. It may also mean these sectors are more sensitive to critical technology / foreign investment rules, given their ability to attract global investment flows.

These initial snapshots of the sector confirm the segments in which Australian businesses have been successful so far. They also identify high potential future areas, by assessing their market or funding momentum. The following section seeks to identify the segments most likely to succeed by analysing each segment against the two criteria most tuned to predict success.

EXHIBIT 9: *A large majority of segments have seen funding accelerating over the past 2 years*

Australia VC funding in last 5 years

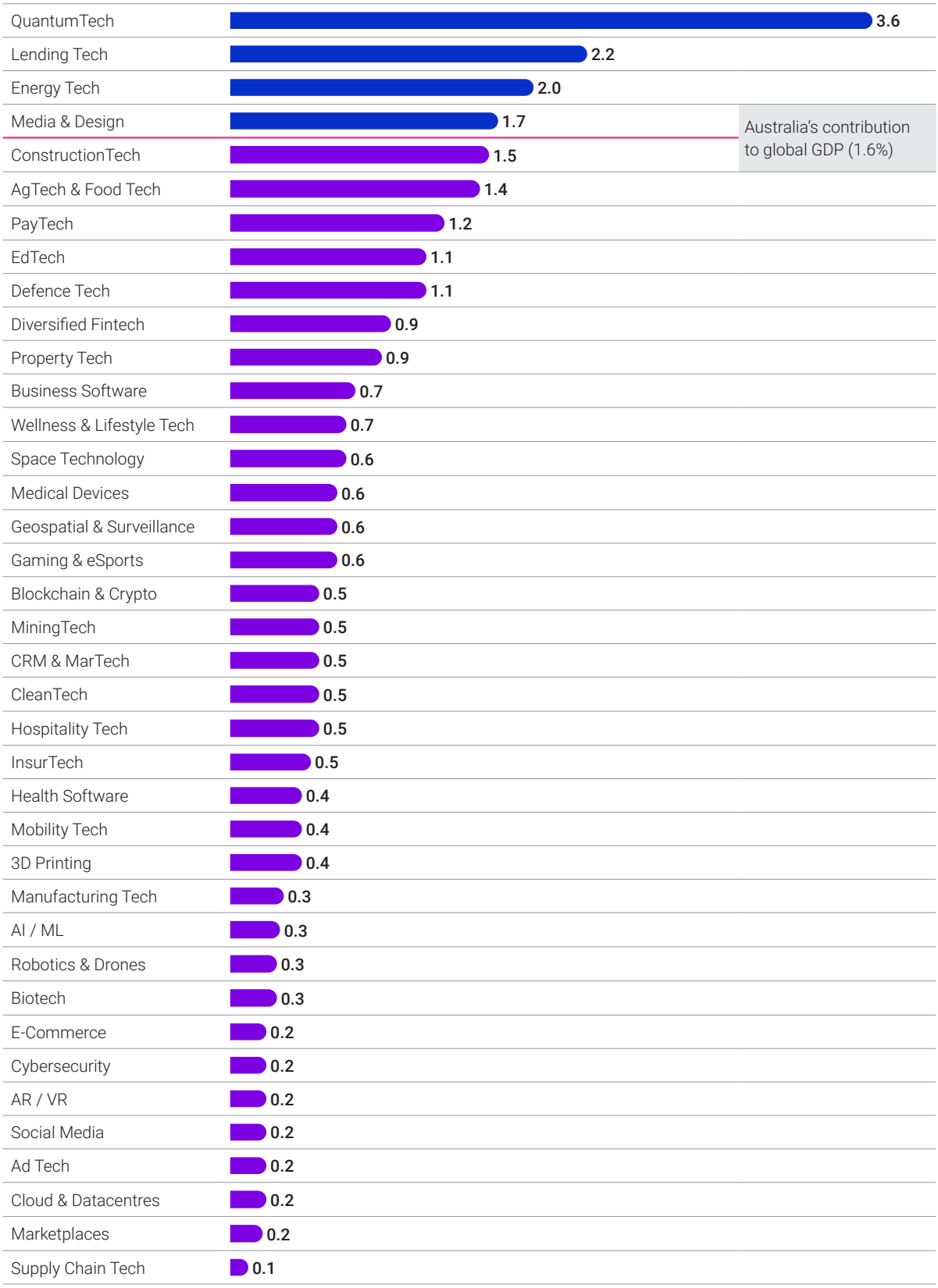


Note: MarketplaceTech category removed as no data captured between 2017-2019

Source: Pitchbook

EXHIBIT 10: *Four segments attract a high share of the global funding*

Australia VC funding as share of global VC funding, %, 2017-2021



Source: Pitchbook

SECTION 2

Assessing the odds

Australia's success in software shows it can create and attract world-leading companies and industries. The key question now is where will the next wave of companies, investment, jobs and growth come from in the tech sector?

From the analysis of the tech sector outlined in the previous chapter, two drivers stand out – the domain expertise in the Australian tech ecosystem (including domestic and global capability) in a given sector, and the favourable incubation conditions for scaling, attracting and retaining companies in a given sector.

Australia has shown it is particularly good at creating and attracting companies in areas where it has strong domain expertise, such as financial services. It has also shown it can grow companies and win on international arena in these sectors. A good example of that is Afterpay, which leveraged the deep knowledge of the financial services to create a global successful player in payments.

Australia has also shown that its Venture Capital is most likely to fund scalable solutions that can either be global from day one, or can grow domestically leveraging a strong domestic market and then scale globally as a second step. Using Afterpay as an example again, Afterpay first built on a strong domestic market and then scaled internationally, but had a globally scalable business model from the start.

Based on these two dimensions, we developed a framework to identify which tech segments score well on these criteria for success and could have a comparative advantage in the future.

Our analysis revealed that eight segments have a strong likelihood of success, scoring well in both sets of criteria – Business Software, PayTech, Mining Tech, EdTech, Diversified Fintech, Gaming & e-Sports, Blockchain & Crypto and AR/VR (see Exhibit 12).

Another seven segments score particularly highly in domain expertise alone, and a further nine have a favourable incubation pathway. The analysis identifies these 16 segments as high-potential serious future candidates, and indicates that their chances may increase if the other criteria was strengthened.[9]

EXHIBIT 11: *We defined two criteria for success based on historical success of the tech sector*

DOMAIN EXPERTISE

3 pathways to achieve domain expertise

Strong ecosystem in the tech domain, measured by
- Market capitalisation
- Number of companies
- Amount of funding

Large talent pool in adjacent industry, measured by
- Relative size of industry in Australia (compared to other countries)

Prominence of Australian research, measured by
- Patent activity
- Academic publications
- Universal rankings
- Recognised leading researchers

FAVOURABLE INCUBATION

2 pathways to achieve domain expertise

Globally scalable business model from the start, assessed by
- Nature of the solution (digital/physical)
- Need to localise
- Importance of in-person sales and demonstrations

Attractiveness of Australia as a domestic market, assessed by
- Size of the local market and potential customers
- Natural endowments
- Favourable environment (e.g. regulations)

9. Other possible criteria that focused on the global market itself were rejected. For example, the global size of a segment may not be a critical factor, as capturing a large share of even a small global segment would still represent a sizeable opportunity for Australia. Similarly, the strength of incumbents in a segment may not be critical (particularly if network effects are not a dominant factor) as the tech sector moves rapidly, with disruptive technology and relatively low capital requirements always making room for emerging players.

Domain expertise

The first criterion focuses on whether the Australian tech sector has the expertise to succeed in a particular domain. That expertise might be drawn from an existing ecosystem, an adjacent industry, or core research:

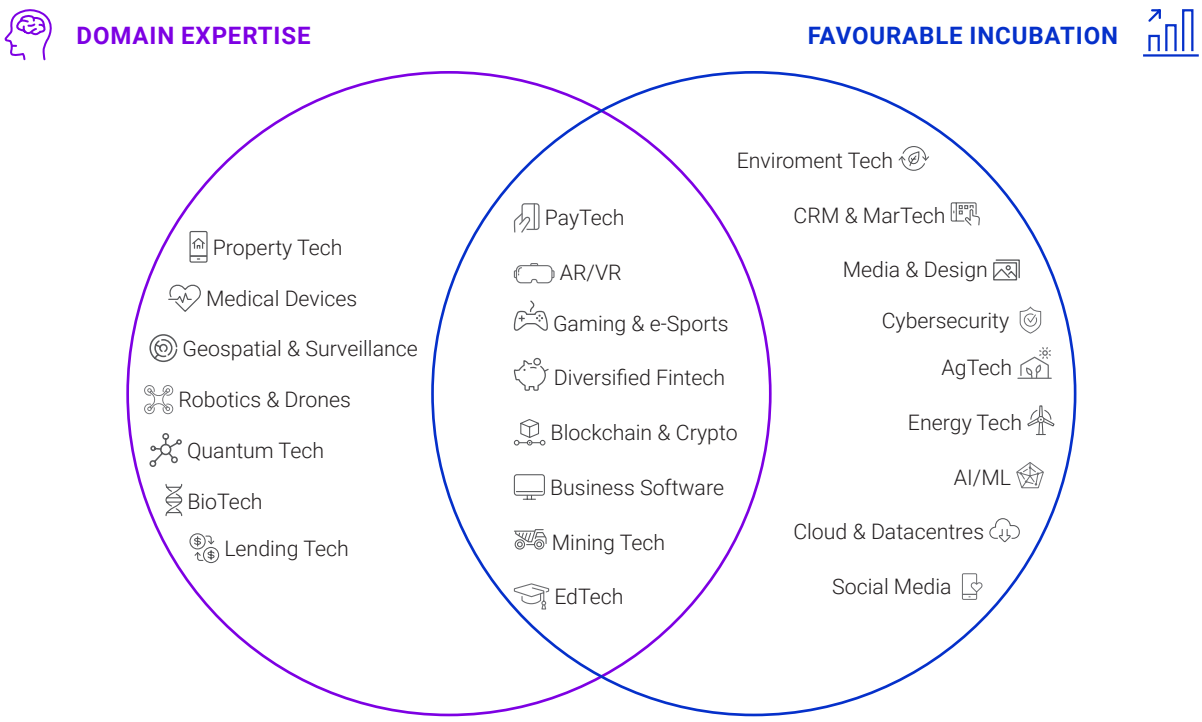
- **A strong ecosystem in the tech segment itself.** There are two measures that best indicate a strong ecosystem. Strong market capitalisation may indicate high levels of investment in the research, facilities and skills needed to succeed in that segment. Where a segment has produced multiple high-value companies, and they have issued employee share plans to staff, it will also create a pool of informed investors and potential new founders with the capital to create their own businesses. This can trigger a virtuous cycle of ongoing new company creation and investment in the area. Segments with a disproportionate share of valuation (start-ups) or market capitalisation (listed companies) include Business Software, Biotech, Medical Devices, PayTech, Gaming & e-Sports and Property Tech – each with at least one Australian company valued at more than $25 billion.

  A large cluster of start-ups may also indicate broad pools of talent and experience. These nascent ecosystems are able to harness the experience of successful entrepreneurs as well as founders whose start-ups have not survived – and both experiences are equally valuable. For example, the Business Software segment is home to almost 1,200 start-ups – almost 20% of the total Australian start-up scene.

- **A large talent pool and significant customers in the adjacent industry.** Australia has deep reserves of skilled talent in prominent industries like mining, financial services and education. For example, Australia represents ~12% of the global mining industry's market capitalisation and is home to one of the world's largest reserves of qualified experts. The prospects are strong if technology experts and innovators can match up with those who know these industries well.

- **The prominence of Australian research and researchers in that segment.** The next wave of investment may be directed to tech segments that are still in the research stage, with no sizeable companies or even ecosystems yet to draw on. Six segments hold a strong promise in that regard.
  - In **Quantum Tech**, Australia's prominence dates back to the pioneering work of Robert Clark in the 1990s. Australia has a number of leading researchers, including former Australian of the Year, Michelle Simmons, and already scaling quantum companies, such as Q-CTRL, Quintessence Labs, Silicon Quantum Computing, and Quantum Brilliance. Today, Australian talent can be found in some of the world's top R&D programs, including at IBM and Google. The Australian National University ranks as the 6th best university globally for quantum engineering and was the first to offer a specialist undergraduate program.

EXHIBIT 12: *Overview of top-scoring segments*



- In **Blockchain & Crypto**, RMIT has been ranked 2nd best university in the world for blockchain research, and Australia ranks 6th globally on the number of blockchain-related patent filings.
- In **Biotech**, CSL is one of the world's most valuable companies, and has spent above $1.4 billion in R&D annually in recent years to ensure it remains near the industry's summit.
- **Robotics & Drones**, especially unmanned vehicles and machinery, is another area of expertise, with CSIRO winning 2nd place at the prestigious 2021 DARPA robotics challenge. The Australian mining sector has invested considerably in automation for remote operations, seeking greater safety and efficiency, and to overcome the high housing, transport and labour costs needed for fly-in-fly-out and remote locations.
- **AR/VR**, the University of South Australia has published more research papers on AR than any other university or research organisation.
- **Geospatial & Surveillance**, RMIT received recognition as the Geospatial Research Institute of the Year in 2019 by the Geospatial World Forum, a prominent industry body.

Exhibit 13 identifies the top-scoring segments in the assessment of expertise. The three criteria are independent alternatives, so Biotech and PayTech appear twice, confirming their strength in Australia.

Favourable incubation

Having strong expertise is an important start but does not guarantee an industry can successfully commercialise and scale. Therefore, the second criterion the analysis applies is to look at the prospect of a successful incubation pathway to global success. The two key indicators are that the segment can scale irrespective of the home market location (assuming that companies founded in Australia remain here) and the second is whether Australia is an attractive market in which to launch.

> **Home location is irrelevant to delivering solutions to the global market**. Most of Australia's first unicorns have been globally focused from the start, finding success abroad before eventually entering the Australian market. This includes Atlassian, Canva and WiseTech. Segments that offer software-based solutions are the most likely to be able to launch directly into a global market – especially in the era of software-as-a-service (SaaS), as they rarely need physical proximity for sales, distribution, installation or even customer support. Where they need to be tailored for a particular market (with language or additional features), Australia's multicultural workforce has the capabilities and international relationships to do so. Even segments with physical products can launch directly if they offer solutions that are unique or cannot easily be sourced elsewhere. However, for a segment to scale multiple companies – rather than produce a single winner - they do require efficient, specialised supply chains – including to source inputs - major customers, and a level of harmonisation in global regulation so it is efficient to serve many global markets

EXHIBIT 13: *15 segments score high the dimension of Domain Expertise*

Assessment of Domain Expertise

ASSESSMENT CRITERIA	TOP-SCORING DOMAINS	
Strong ecosystem in the tech domain, measured by > Market capitalisation > Number of companies > Amount of funding	> Business Software > Biotech > Medical Devices	> PayTech > Gaming & e-Sports > Property Tech
Large talent pool in adjacent industry, measured by > Relative size of the Australian industry vs global	> Mining Tech > EdTech > Diversified Fintech	> PayTech > Lending Tech
Prominence of Australian research, measured by > Patent activity > Academic publications > Recognised leading researchers	> Quantum Tech > Biotech > Blockchain & Crypto > Robotics & Drones	> AR/VR > Geospatial & Surveillance

- **Australia is an attractive local market.** Some segments require physical proximity to their customers to succeed, or to gain their first and second key customers. Lower-value physical goods such as wearables depend on long and potentially vulnerable global supply chains to deliver consistently to new customers and build brand loyalty. In segments linked to traditional industries such as mining, face-to-face demonstrations and negotiations may be needed to shift purchasers from their existing solution. Further, industries that are large overall in the Australian economy (e.g. mining and banking which are large domestic industries measured by their GDP contribution), or are large exporting industries (e.g. agriculture, education) are also more likely to have sizeable Australian companies which may be first customers and even investors for start-ups.

  For these segments, Australia will be a favourable incubation environment if the domestic market is large enough, or if there are attributes that make Australia uniquely attractive.

  A large domestic market simply gives a company the opportunity to secure economies of scale that can underpin its expansion abroad (Mining Tech and Diversified Fintech being prime examples). Afterpay is an example of a company that achieved considerable success in the domestic market due to modern regulatory frameworks, and consumers adaptable to innovative digital payment solutions. Alternatively, the segment might leverage a range of natural or institutional endowments:

  - Australia's minerals and arable land favour a strong mining and agricultural export industries, and so their corresponding tech segments (Mining Tech, AgTech)
  - Australia's landmass and its solar and wind resources give Australia strong opportunities in Energy Tech and Environmental Tech. In turn, the abundance of cheap, renewable energy may attract tech segments with high power consumption, in particular hyperscale Cloud & Datacentres and the resource-hungry servers used by cryptocurrency mining and other Blockchain & Crypto applications.
  - Australia's superannuation system is the platform for the world's 3rd largest funds management industry, a thriving sector for financial services that directly benefits the PayTech and Diversified Fintech segments.

Exhibit 14 indicates the top-scoring segments for favourable incubation, after considering the two potential pathways to global markets. It is unlikely, though not impossible, for a segment to score strongly in both indicators. The analysis extends the field of potential global leaders, introducing CRM & MarTech (a B2B horizontal segment currently less explored by Australian start-ups) and Environment Tech (a key enabler of decarbonisation across Australian industries). These segments have not yet become VC favourites, suggesting that closing this funding gap could be key to accelerating these emerging and high-potential segments.

EXHIBIT 14: *17 segments score high on the dimension of Favourable Incubation*

Assessment of Favourable Incubation

ASSESSMENT CRITERIA	TOP-SCORING DOMAINS
Globally scalable business model from the start, addressed by > Nature of the solution (digital/physical) > Need to localise > Importance of in-person sales and demonstrations	**Global digital products** > Gaming & e-Sports > EdTech > PayTech > Media & Design > Social Media **Horizontal enterprise solutions** > Business Software > CRM & MarTech **Digital enabling tech** > Cybersecurity > AI/ML > Blockchain & Crypto > AR/VR
Attractiveness of Australia as a domestic market addressed by > Size of the local market and number of potential customers > Natural endowments > Favourable environment (e.g. regulations , socio-demographics)	**Geography/natural resources** > Mining Tech > AgTech **Potential for renewables** > Energy Tech > Environment Tech > Cloud & Datacentres **Superannuation system** > Diversified Fintech > PayTech

Understanding where Australia has existing and emerging areas of comparative advantage in the tech sector is a critical first step for Australia to ensure it is taking full advantage of them. But as with the Olympics, having a starting strength in an area of competition does not guarantee medal success. Rather, that takes persistent development of the strength over time.

The next chapter therefore asks how Australia can maximise its advantage in the existing and emerging areas of comparative advantage in the tech sector. The next section looks at how the whole field is positioned and explores those potential stars in more detail.

SECTION 3

Maximising Australia's advantage

The previous sections identified segments where Australia has already proven its ability to launch globally successful companies, and 16 high-potential tech sector segments in which Australia has an advantage in either domain expertise and / or a favourable incubation pathway – the two criteria that best indicate their potential for success.

There is some overlap in these segments, e.g. where a segment is one where Australia already has a comparative advantage, but also has potential for future growth.

This section analyses five tech segments in which Australia has already shown a comparative advantage by producing high value, globally successful companies, i.e. 'Head Starts' (from Chapter One) and the 16 high-potential segments identified in Chapter Two and maps them into four groups of high-potential tech segments in Australia (see Exhibit 15 above and Exhibit 16 below):

- the **Head starts** have already shown they can produce companies with a global comparative advantage in Australia today (see Section 1)
- the **Potential stars** are segments that rated highly in potential future success because Australia has domain expertise and a favourable incubation path in them.
- the **Fair shots** are segments that are strong in domain expertise or favourable incubation.

Of course, a company may emerge from a sector not on this list, creating a surprise win. However, that is less likely versus a company emerging from an area of comparative advantage.

EXHIBIT 15: *The proposed categorisation accounts for both past and forecasted success*

EXHIBIT 16: *Categorisation of high-potential segments*

Head starts

There are five segments in the tech sector in which Australia has already built thriving, globally competitive industries. These are highlighted in Section 1 and are Business Software, Biotech, Medical Devices, Media & Design and PayTech.

Business Software

Business software is strong across the board, consistently producing the most high-value companies, a large number of start-ups and attracting the most investment. Recognising Australia's comparative advantage in business software development is important because it can be an enabler of other industries, and because the regulatory and skills settings needed to grow digital industries differ from traditional, physically based industries. Business Software covers business-to-business solutions that are used to streamline and automate business processes and enforce data management across a wide range of business activities. Australia's domain expertise is evidenced by global household names such as the privately held MYOB and New Zealand-based Xero, which has a significant Australian presence. Business Software ventures are able to scale globally and quickly, through completely virtual software, with projected CAGRs of ~6-7%+ over the next 5-10 years.

MEET THE PLAYERS

ATLASSIAN

Atlassian is a global software company, founded in Australia, that helps teams organize, discuss and complete shared work through its team collaboration and productivity software.

Founded: 2002 **HQ:** Sydney **Employees:** 8,000+

technologyone

An ASX150 company whose global SaaS Enterprise Resource Planning solution transforms business and makes life simple.

Founded: 1987 **HQ:** Brisbane **Employees:** ~1100

deputy

Australia's leading cloud-based rostering & timesheets platform, designed to help small, medium, and enterprise businesses build thriving workplaces for shift workers.

Founded: 2008 **HQ:** Sydney **Employees:** ~325 globally

Biotech

The biotech segment in Australia has been anchored by CSL's global success, representing over 98% of the segment's value, and has driven development of a respected ecosystem. Australian biotech stands out on a world stage ranking 4th for scientific publications and has also attracted the attention of foreign companies. Moderna, for example, has selected Australia for development of one of its largest manufacturing facilities outside of the US due to the many favourable factors including the quality of the domestic talent pools.

Medical Devices

Australia is recognised as a leader in health research, with four institutions ranking in the top 100 globally. The strength of life sciences overall in Australia including this world leading research and deep talent pools has produced life changing medical innovations and global success for the companies who developed them. ResMed (CPAP machine for sleep apnoea) and Cochlear (bionic ear) are at the heart of the Medical Devices segment and represent 95% of the segment's overall value.

MEET THE PLAYERS

harrison.ai

harrison.ai is a clinician-led technology company combining human intelligence with artificial intelligence (AI), building a range of ventures to change the face of healthcare and benefit millions of patients every day.

Founded: 2018 **HQ:** Sydney **Employees:** ~200

vexev

The Vexev vision is to shift the approach to vascular medicine from reactive to proactive. That starts with better, simpler and highly accessible imaging. Vexev automates ultrasound to deliver consistent diagnostics, while using fluid dynamics and AI to prevent deaths from vascular disease at scale.

Founded: 2018 **HQ:** Sydney **Employees:** ~10

Media & Design

Australia has also produced globally successful companies in the Media & Design segment, most notably Canva. They developed strong B2C and B2B product offerings by tapping into a local design talent pool and establishing a business model that gave it global traction. Canva also benefitted in its early days from the Commercialisation Australia program, which doubled the funds raised during its first VC round.

MEET THE PLAYERS

Canva

Creates online design and publishing tools with a mission to empower everyone in the world to design anything and publish anywhere.

Founded: 2012 **HQ:** Sydney **Employees:** ~3000

envato

A world-leading online community where users buy and sell creative assets, use smart, design templates and learn creative skills, making creative success accessible and achievable for all.

Founded: 2006 **HQ:** Melbourne **Employees:** ~600

PayTech

Finance and Insurance is Australia's second largest industry based on contribution to GDP capitalising on high levels of wealth and in particular the large pool of capital made available through mandatory superannuation. Australia now has an extensive talent pool in financial services, and the market is quite willing to adopt innovative solutions (many services considered Fintech in the US are considered standard banking in Australia). PayTech players have been particularly successful, both locally and internationally. However, other Fintech segments will prosper in this attractive environment.

MEET THE PLAYERS

tyro

An innovative payments company that is the largest EFTPOS provider outside the big four, as well as providing business banking and lending solutions.

Founded: 2003 **HQ:** Sydney **Employees:** ~600

zepto

Zepto is a real-time, data-driven, account-to-account, open banking payments platform. A light-touch, single API integration with Zepto enables merchants to receive, manage and make payments by connecting them directly to their customers' bank accounts. They can also identify parties, establish consent, create virtual accounts and reconcile everything in an instant.

Founded: 2015 **HQ:** Byron Bay **Employees:** ~90

till.

Offers a unified payments solution that digitises payments for all types of businesses so they can accept every type of payment in any channel, including online, in-store or a combination of both.

Founded: 2012 **HQ:** Sydney **Employees:** ~330 globally

Potential stars

These are the segments most likely to produce Australia's next wave of globally successful companies because they rate highly in both domain expertise and favourable incubation opportunities. These segments are: Mining Tech, EdTech, Diversified Fintech, Gaming & e-Sports, Blockchain & Crypto and AR/VR. It is noteworthy that these sectors combine Australia's track record in software development, with domain expertise and favourable incubation to offer strong potential for success.

Mining Tech

Mining Tech includes technologies such as advanced analytics and sensors, robotics and semi-autonomous equipment, and software that enable more productive, cost-efficient and safe mining environments.

MEET THE PLAYERS

micromine

Micromine is a global leader of technology for mining solutions spanning the breadth of the mining cycle from geological exploration and data management, to resource estimation, mine design, planning, scheduling and production control.

Founded: 1986 **HQ:** Perth **Employees:** ~300

MAXMINE

MaxMine delivers more mining tonnes. A next generation, vertically integrated technology as a service built on industrial IoT, automated machine learning, operator performance gamficiation and data driven improvement.

Founded: 2016 **HQ:** Adelaide **Employees:** ~60

Baraja

Develops LiDAR technology for autonomous vehicles, designed for high reliability, range, resolution, and lifespan, tested in the most extreme environments.

Founded: 2015 **HQ:** Sydney **Employees:** ~150

Australia's domain expertise in Mining is clear. The sector represents more than half of Australia's total exports and ~10% of its GDP. Within the global market, Australia is also an important player, holding ~12% of the global market capitalisation of the Metals and Mining industry and containing ~20% of the world's active exploration mines.

Mining Tech has a forecast CAGR of ~12-18% across the next 5-10 years, with a number of potential applications.

Published funding data is likely to under-represent Mining Tech companies, as several skip the funding stage in favour of striking deals directly with customers to develop proof of concept and scale new solutions (e.g., Baraja supplemented their Series B raise with a multi-year deal with Hitachi Construction Machinery to co-develop mining products). This makes for a particularly attractive, revenue-generating segment. Additionally, many of the large mining players invest in technology, without necessarily commercialising their innovations (e.g., BHP's next-generation South Flank iron ore mine).

However, growth has historically been hampered by the conservative nature of the industry (justifiably risk-averse given the potentially lethal dangers of mining operations), the complexity of enabling network connectivity in remote environments, the need to customise most solutions for the quirks of every individual mine and to conduct mine-by-mine sales, and the difficulty to attract and retain talent in the remote areas where mines are located.

EdTech

Educational technology (EdTech) includes online curriculum, learning management platforms, and any other tools (software or hardware) that may improve the experience of either teachers or students.

MEET THE PLAYERS

go1

Go1 makes it easy for organisations to learn, with the world's most comprehensive online library of learning resources. Go1 pulls the world's top online learning providers into one place, delivering all the learning an organisation needs in a single solution. With over 5 million learners – and growing – Go1 is a world leader in online learning.

Founded: 2015 **HQ:** Brisbane **Employees:** ~600

openlearning

Provides a lifelong learning platform that enables education providers globally to design and deliver transformative online courses and micro-credentials that prepare learners for the future of work.

Founded: 2012 **HQ:** Sydney **Employees:** ~70

lumination

Creates cutting-edge immersive learning technologies and services, including Living Labs to create smart, interactive classroom experiences, and software for guided, immersive learning experience

Founded: 2011 **HQ:** Adelaide **Employees:** ~80

COVID-19 and the associated global lockdowns across 2020-2021 has accelerated digitisation and technology, as the education industry (as so many others) had to adapt quickly to remote solutions. Aided by this trend, the EdTech sector is expected to grow at ~15% CAGR over the next 5-10 years.

Australian EdTech companies are in an enviable position to springboard off the Australian education sector to pursue global growth. Australia has a track record of success in the education sector, earning Australia $20 billion a year in GVA as Australia's largest services export, with 7 of the top 100 universities in 2021, and ~7% of the global

market capitalisation of public education services companies. While English is the de facto standard language in many educational fields, Australia's cultural diversity can be leveraged to develop solutions that appeal across borders, and the large local market can be accessed to gain experience and scale before entering the global fray.

Diversified Fintech

Within the Fintech sub-sector, payments, lending, and insurance solutions are large enough to form segments in their own right. Diversified Fintech is home to the myriad other solutions such as investment and wealth management, crowdfunding, asset management, personal finance, electronic market making and billing. These solutions are well supported by regulation in the sector, which typically provides the right frameworks and incentives for new business models to appear and compete. For example, Open Banking regulations create mechanisms for third parties to access transactional data, from which they can design added-value services.

MEET THE PLAYERS

Airwallex

Created a global payments and banking infrastructure for businesses of all sizes. Solutions include global accounts, multi-currency Visa debit cards, foreign exchange at low rates, payment acceptance and expense management – accessible via a one-stop-shop platform and an API suite.

Founded: 2015 **HQ:** Melbourne **Employees:** ~1200 globally

Brighte

Launched an innovative platform that offers consumers a fast and easy way to pay for solar, battery and home electrification.

Founded: 2015 **HQ:** Sydney **Employees:** ~215

Gaming & e-Sports

Games, e-Sports, and gambling technologies all fall within this segment. Video games alone represent a more than $200 billion global market, 48% of which derives from the Asia-Pacific. Many may still have in mind the traditional image of console and computer games produced by major publishers. However, independent developers are behind some of the most successful games of the past decade, and mobile gaming is now as large as console and computer gaming combined. While wagering technology is a separate niche altogether, Australia is home to one of its leading players – Aristocrat Leisure.

Apart from the need to localise language, games tend to be global in nature – and their digital nature makes it easy for Australian developers to reach a global audience. Gaming companies can tap into Australia's edge on design and its multiculturalism – developing games that can resonate with a broad audience, especially in the region, and offer a different perspective from the large American or Japanese studios.

MEET THE PLAYERS

MIGHTY KINGDOM

Develops console, PC and mobile platform games, with experience working with big player such as Disney, LEGO and Snapchat.

Founded: 2010 **HQ:** Adelaide **Employees:** ~160

Blockchain & Crypto

Blockchain technology is most known for its use storing and verifying transactions. However, distributed ledgers span a large array of applications, including securing personal information, identity management, supply chain tracking and auditing, data storage, smart contracts and IoT encryption.

While cryptocurrencies are infamous for their volatility, the broader Blockchain segment has seen sustained global market growth (~80% CAGR in the 3 years since 2018) and is expected to continue its trend over the next 5-10 years, with the market size expected to grow between 50-80% CAGR.

There is a clear window of opportunity for Australia to become a leader in Blockchain & Crypto businesses. It is an emerging technology, it ties in well with Australia's strong financial sector (with many companies playing equally in blockchain development and related Diversified Fintech activities), and Australia has world-class researchers in the field. RMIT has been ranked the 2nd best university in the world for blockchain research, and Australia ranks 6th globally on the number of blockchain-related patent filings.

MEET THE PLAYERS

Mycelium

Mycelium is the connective tissue for global digital markets. With expertise in derivative smart contracts and on-chain data, Mycelium is building blockchain-based financial exchange infrastructure to improve financial markets. Mycelium's products make markets more capital efficient, transparent, secure, and accessible to all.

Founded: 2019 **HQ:** Brisbane **Employees:** ~70

swyftx

Developed a digital assets trading platform that allows users to buy, sell and trade digital currencies while being protected by two-factor authentication and biometric logins.

Founded: 2017 **HQ:** Brisbane **Employees:** ~290 globally

AR/VR

AR/VR is an emerging technology gaining momentum in Australia. It has the highest forecasted growth of any other sector in Australia with a CAGR of >110% in the next decade. Over 65% of VC funding has occurred in the past two years likely due to the increase in use cases for diverse industries including eCommerce, automotive and retail.

Fair shots

There are a number of segments in which Australia has a 'fair shot' at success in the tech sector, and we should expect to capture at least an even share of global value. These segments are identified based on whether they score highly for domain expertise or favourable incubation, but not both (see Exhibit 16).

For segments in which Australia has domain expertise (e.g., Quantum Tech, Robotics & Drones), the challenge will often be to confirm if the segment has a genuine global market and realistic pathway to commercialisation. If so, local businesses may need support to build a robust local ecosystem, and to be supported in their global expansion stage, so they are not limited by the size of the Australian market. This may include via support from specialised funding sources, such as the proposed new National Reconstruction Fund discussed more in the next section.

The support may also need to come from an infusion of international talent, capital or partnerships. International talent experienced in scaling up business, distinct from the ability to develop world-class products, is still a rare skill in Australia. Quantum Tech is succeeding in attracting a higher share of global VC capital than any other Australian sector, but the Australian Foreign Investment Review Board (FIRB) rules introduced in 2020 added up to 7 months to the review process for every VC investor seeking to participate in a round. Partnerships with large multinational companies may provide a more streamlined vehicle to export Australian-made IP.

For segments with a more favourable incubation pathway, the challenge will be to develop or import a large enough talent pool to uncover and pursue global opportunities. This will include supporting local R&D, including through the Research & Development Tax Incentive (RDTI) program, investing in education, and retaining Australian talent.

AirTrunk, a hyper-scale Cloud infrastructure provider, found an interesting approach to resolving the talent issue. Australia's low-cost renewable energy makes it

a favourable geography for large-scale datacentres, and AirTrunk's first clients insisted on having infrastructure in Australia. However, the company initially struggled to find the type of experts that were more abundant in Singapore. Attracting foreign talent proved a critical and necessary step to sustain the business – pointing to the importance of holistic strategies on human capital that go beyond simply developing the talent locally, as the lag time before education programs come to fruition would be too long to support immediate opportunities.

Surprise wins

In other segments, the odds are not necessarily in Australia's favour, but the right overall system settings including access to capital may enable unexpected successes to emerge.

In particular, some segments may become future high-potential segments once they or the global industry they are part of have matured. Construction Tech is one such example. Construction is the biggest industry in the world, representing 13 percent of global GDP, yet it has seen a meagre productivity growth of just 1% annually for the past two decades. It remains an industry where traditionally slow adopters of technology solutions have not yet chosen the clear "winners" to serve them. When they do, Australia is well placed to benefit, with ~250 active start-ups or ~2.7% of the global Construction Tech start-ups.

This section ranked tech segments based on the existing or emerging comparative advantage they offer to Australia. The next section discusses potential shifts in Australia's regulatory and investment environments that would improve the odds for those segments, and increase the likelihood of Australia becoming a leading regional tech hub.

SECTION 4

Preparing for success

The tech sector is one of the fastest-growing sources of jobs and growth in Australia. However, to maximise this advantage, Australia needs to put in place an investment environment and regulatory framework that will continue to grow and attract new future jobs, companies and industries.

There are three key actions Australia needs to take to benefit from its comparative advantages in the tech sector:

1. **Set a clear vision**: Australia needs to set a clear vision for the segments of the tech sector in which it can excel globally. This should be grounded in commercial and scientific evidence as to the sectors where Australia has a comparative advantage. It should support a culture of entrepreneurship and the creation of new industries and jobs in Australia.
2. **Make systematic improvements** to the regulatory and investment environment, to grow jobs and companies in the tech sector, and to increase productivity and investment across the economy. This includes by creating new tech jobs and solving skill shortages, encouraging investment by local and global companies, and making Australia a digital economy regulatory leader.
3. **Identify and address sector specific market failures:** Australia needs to identify where there are specific barriers facing high-potential sectors, such as access to funding that may require targeted interventions to address.

Setting a clear vision

Australia needs a clear, national vision for the existing and future industries in which it has a comparative advantage. This vision should be based on world-class, economic, technological and scientific analysis to identify where Australia has a global, comparative advantage in existing and emerging industries. It should explain how growing these industries can generate an economic return while achieving social and security objectives.

Once the vision of Australia's sources of advantage are clear, it can be used to:

- Create a clear, credible public narrative on where Australia can grow future industries, the jobs this will create, and how Australians can benefit from these developments;
- Enable deep industry and stakeholder engagement around the measures needed to realise the vision;
- Inform policy development and design of measures needed to realise the vision, including the design of the National Reconstruction Fund recently announced by the Federal Government;
- Help to gain buy-in to the vision and to coordinate measures, particularly on proposed fund priorities and complementary policy action.

We propose that Australia creates a National Reference Group to help develop this vision, supported by the Federal Department of Industry and Science. The Reference Group would have the following four elements:

- An independent expert panel, including a nominated chair. The panel would be comprised of world-leading Australian business and scientific leaders. It would provide overall strategic direction, identify workstreams and ensure that the research and analysis of the Reference Group is focused on high priority areas and takes into account world-class insights into trends in future industries.

- A well-resourced public service taskforce based in the Department of Industry and Science, with secondees from other relevant agencies as needed. The taskforce would conduct the policy and research work of the Reference Group.
- Close involvement and consultation with industry, academics, investors, unions and professional associations.

The Reference Group would help inform a national strategy identifying future, sustainable industries in Australia.

The Reference Group would be able to conduct its work concurrently with the establishment of the Critical Technologies Fund to inform a rigorous investment mandate once the fund is ready to commence.

The use of expert commissions or reference groups to assist in developing new industry strategies is common overseas. For example:

- New Zealand is currently developing a 'Digital Technologies Industry Transformation Plan (ITP)' in collaboration with industry. The ITP is supported by specialist workstreams and steering groups, which contain a diverse mix of government and industry experts.
- Singapore is developing a S$4.5 billion Industry Transformation Program with specific industry priorities underneath it, closely mirroring this Government's Reconstruction Fund and the priority areas it has identified. To support this work, Singapore has created a 'Future Economy Council' with 7 subcommittees, each involving political officeholders and the private sector. These subcommittees are responsible for creating industry roadmaps that will target funding and drive complementary actions across government.
- The EU recently adopted a 'Path to the Digital Decade' policy program that sets out practical steps to achieve its tech sector ambitions by 2030. This program was coordinated by the European Commission and involved contributions from business associations, academics, government agencies and unions.

Making systematic improvements

Australia has a growing and diverse set of tech sector segments in which it has, or could have, a comparative advantage. Fortunately, despite their diversity, many of these segments benefit from the same basic set of inputs and regulatory and investment settings to grow. By focussing on getting these foundational policy settings right across the economy, Australia can boost the chances of success for all high-potential tech segments. These opportunities fall into three areas:

- Boosting jobs and skills in the tech sector
- Promoting investment and growth
- Making Australia a digital economy regulatory leader

Boosting tech jobs and talent

Australia has world-class talent, both for general tech skills like programming and data science as well as for applied sciences. There are now 860,000 Australians working in tech jobs across the economy, including in the direct tech sector (e.g., software companies), in online commerce, and in tech intensive areas of other industries, including banking, mining, government and health, and professional services.

The demand for people to fill tech jobs is increasing at a strong rate. Over the past decade, tech jobs have grown at double the rate of jobs in the broader economy, and vacancy rates are 60% more than the Australian average. These jobs are high-paid, secure and flexible.

The TCA forecasts Australia will have 1.2 million tech jobs by 2030, a goal adopted by Australia's federal government. Meeting that target will require an additional 653,000 new tech jobs and workers, an additional 186,000 tech workers above business-as-usual projections. This will require Australia to:

- **Attract** 19,000 new entrants to tech jobs, such as vocational and university graduates, per year until 2030, which is an extra 4,500 p.a. above business-as-usual approaches
- **Reskill or upskill** 35,000 existing workers into tech jobs per year until 2030, an extra 11,000 p.a. above business-as-usual approaches through partnerships with reskilling organisations such as Generation Australia.

- **Support Australia's tech workforce capability** by attracting 18,000 skilled migrants from overseas per year until 2030, an additional 4,500 p.a. above business-as-usual approaches

To meet these skills needs, and help more Australians enter tech jobs, industry, government and the education and training sector must partner to:

- **Raise awareness of tech jobs and careers,** and the pathways into them, amongst Australians of all ages.
- **Reform training products and pathways** to make sure they are relevant and responsive to learner and industry needs. This is particularly important for newer occupations / skills, for newer models of learning, such as adult reskilling and to modernise traditional training pathways (such as apprenticeships) to ensure they are fit for 21st Century digital trades.
- **Improve the productivity of the skilled migration system**, to reduce processing times and streamline low-risk applications in areas of high need, such as experienced, high-paid, employer sponsored talent in areas experiencing chronic skills shortages.
- **Increase the diversity and representativeness of people working in the sector**, particularly women and older Australians.
- **Improve sector-wide strategic workforce planning and monitoring**, including making better use of data to understand emerging jobs and skills needs, and to track progress against the 1.2 million tech jobs by 2030 goal.

Promoting investment and growth

To grow more companies and create more jobs, Australia needs to increase the amount of investment in the tech activity. Founding and growing more local tech companies can deliver 95,000 new jobs by 2030 and $21bn in new economic growth. Stimulating tech activity in industries outside the direct tech sector could create 258,000 new tech jobs, and $45bn in extra growth by 2030. The jobs and growth created in non-tech sectors is higher because there are more companies in these industries versus the direct tech sector alone.

Key measures Australia could take include:

- **Supporting tech investment and take-up by Australian businesses across the economy** to lift productivity and competitiveness through the Tech Investment Boost measure, and ensuring that it is explained and promoted to small business and their advisers. This will incentivise digital innovation by Australian businesses, and especially SMEs, which lag peers globally in digital investment. It would bring Australia into line with leading digital economies, such as Singapore, which use this approach.
- **Reforming the administration of the Research & Development Tax Incentive (RDTI) for software**. This is particularly important for SMEs as the current system is expensive, lengthy and complex. Software based R&D is now the main form of business R&D in Australia (at 39% of all R&D spend by businesses), although Australia still lags other countries in the level of digital R&D businesses undertake. While other markets have modernised their R&D tax framework to encourage new types of investment, Australia is yet to act. Australia can simplify and improve the incentive by adopting key elements from the system in New Zealand, which was designed with software claimants in mind, and does not include the requirement for a "systematic progression of work", instead requiring a "systematic approach". It also allows for more advanced findings to provide certain outcomes for businesses, and better support for SMEs to navigate the RDTI claims process.
- **Making it easier for trusted foreign investors to invest in high-potential Australian firms**, by improving the administration of Foreign Investment Review Board assessments, and by attracting more global firms to locate high-value regional activities in Australia, e.g. product development, local R&D and APAC regional service and sales hubs.
- **Maintaining settings that are working,** such as the Early Stage Venture Capital Limited Partnership arrangements, and Employee Share Schemes.
- **Maintaining an environment that supports continued investment by global tech companies** in the Australian tech sector, particularly in Cloud and Datacentres. Australia has the potential to attract a greater regional share of the Cloud and Datacentres market if it can generate an abundance of cheap, renewable energy, maintain a level playing field for all companies in the tech ecosystem, and avoid protectionist policies that may deter investment.

Making Australia a digital economy regulatory leader

Australia can be a world leader in creating and adopting new tech products. However, to do this, we need a regulatory environment that is proportionate and predictable, interoperable with other jurisdictions, and that consistently follows a set of best practice regulatory principles.

Making Australia a leader in digital economy regulation will have a direct economic benefit. Modelling by Accenture shows that economies that are leaders in digital economy regulation grow on average by 6.3% per year. Countries that are medium performers grow by 4.3%, while laggards at regulation grow by 2.9%. Australia is currently sitting between a laggard and medium performer. Modernising regulatory models is therefore critical to meeting our jobs and growth goals.

Australia can become a new economy regulation leader by encouraging the safe and early introduction of new products and services with fit-for-purpose, internationally interoperable regulation and by consistently applying best practice regulatory principles.

The principles we propose are that policy and regulation should be:

- Informed and coordinated
- Proportionate
- Timely
- Consistent and interoperable, including with global approaches; and
- Have a bias to innovation and growth

Identifying and addressing sector specific market failures

Economy-wide, structural reforms are generally the best way to accelerate jobs and growth in the tech sector, without favouring particular sectors.

However, there are instances where high-potential segments may face particular barriers, including market or regulatory failures that could hinder their development.

One type of barrier may include segments which require sector specific regulation changes to clarify permissible innovations and provide certainty to consumers, entrepreneurs or investors on new innovations and business models (such as EdTech, Medical Devices, Biotech or some areas of Fintech). Creating regulatory certainty for such new sectors can encourage investment, competition and jobs, while ensuring consumer protections. For example, the Monetary Authority of Singapore has an explicit mandate to turn the country into a leading Fintech hub, translating that mandate into concrete actions and incentives for public officials to achieve that goal, and leading the world in adapting its regulatory framework to deal with emerging financial products.

Another sector specific market failure may include funding gaps in sectors that are more specialised, and with longer term pathways to commercialisation (such as Quantum Tech or AgTech). There is some evidence that these segments find it more challenging to raise private sector funds because Australia has fewer specialised venture capital funds, versus larger overseas markets. They may also receive less private funding globally if the segment is nascent and at an early stage of commercialisation, relative to more mature segments with shorter and more certain paths to investor returns.

To address funding gaps, Australia can create targeted, new funding models to complement private sector investment for high-potential tech segments where there is evidence of a funding gap.

Australia's federal government has announced it will create the National Reconstruction Fund, a loans and equity-based fund to support critical industries and technologies. This includes a $1 billion Critical Technologies Fund. The Fund must be allocated in high-potential, economically sustainable areas that will deliver an investment grade return to ensure that the Fund remains off-budget. The Fund could be used to target emerging, high-potential subsectors that have not attracted sufficient private capital, complementing areas in which private capital is adequate.

Australia has the talent and ideas to build new industries and jobs in the tech sector that can successfully compete on a global stage. This will build on the already strong success Australia has achieved in the sector to date.

To realise Australia's full potential in the tech sector, we need a clear vision of where we have an advantage, and a clear and coordinated plan to realise it.

The Tech Council's goals are to see 1.2 million people in tech jobs by 2030, to have the tech sector contribute $250 billion in tech activity to the economy by 2030, and to make Australia a great place to found and scale a company. We look forward to working with governments, industry and other stakeholders to achieve them.

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