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**Tasmanian Technology sector market
scan and capability mapping**

2022

Deloitte
Access **Economics**

Contents

Glossary and terminology

Acronym	Definition
ABS	Australian Bureau of Statistics
ACS	Australian Computer Society
AI	Artificial intelligence
CRM	Customer Relationship Management
DESE	Department of Education, Skills and Employment
DFAT	Department of Foreign Affairs and Trade
DHA	Department of Home Affairs
GDP	Gross Domestic Product
GVA	Gross Value Added
IMT	Information, Media and Telecommunications
ICT	Information and Communications Technology
NCVER	National Centre for Vocational Education Research
SFIA	Skills Framework for the Information Age
SMEs	Small to Medium-sized Enterprises
WEF	World Economic Forum

Terminology	Description
Technology sector	The technology sector is defined as comprising businesses and economic activity generated by certain sub-sectors (Telecommunication services; Internet Service Providers, web search portals and data processing services; and computer system design and related services) within two of the ABS industry groups: Information, Media and Telecommunications and Professional, Scientific and Technical Services industry.
Tasmanian technology sector workforce	The Tasmanian technology sector workforce is defined as the employees of technology organisations and technology workers in other industries throughout the economy (such as mining, finance and insurance). The report provides breakdowns of the technology workforce employed in technology businesses and those employed in other industries. The workforce includes employees of businesses that are headquartered in Tasmania as well as those based elsewhere that have operations in the State.
Skills Framework for the Information Age	A framework that defines the skills and competencies required by business and technology professionals who design, develop, implement, manage and protect the data and technology that power the digital world.
ABS Australian Statistical Geography Standard	This is a classification of Australia into a hierarchy of statistical areas. It is a social geography, developed to reflect the location of people and communities.

Data sources

Source	Series
Australian Bureau of Statistics	Household impacts of COVID-19 survey
Australian Bureau of Statistics	Labour Force, Australia,
Australian Bureau of Statistics	Australian National Accounts: State Accounts
Australian Bureau of Statistics	Australian Industry
Australian Bureau of Statistics	Counts of Australian Businesses, including entries and exits
Australian Bureau of Statistics	National, state and territory population
Australian Bureau of Statistics	Education and Work
Deloitte Access Economics	Tasmanian Technology Sector Scan Survey
Department of Education, Skills and Employment	uCube
Department of Foreign Affairs and Trade	Trade in services Australia
Department of Home Affairs	Visa Statistics
Economy.id	Industry sector analysis – including Telecommunication services; Internet Service Providers, web search portals and data processing services; and computer system design and related services
LinkedIn	Workforce data
National Centre for Vocational Education Research	VOCSTATS
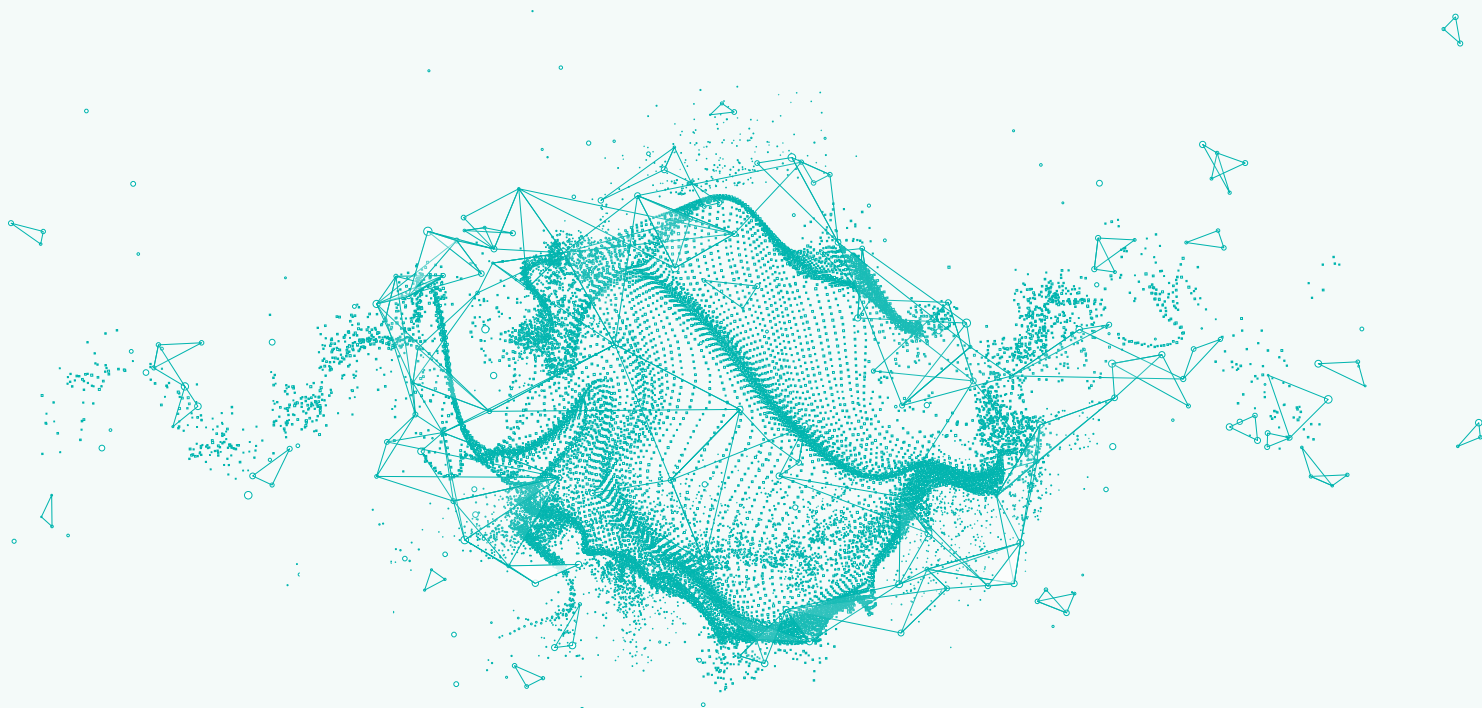
BUSINESS SNAPSHOT

Total revenue associated with the technology sector in Tasmania is estimated to be
$1.7 billion in 2020-21

In 2021 there were
9,663 people
in the Tasmanian technology workforce, which includes **3,647** employed in Tasmanian technology businesses.

Of the technology businesses

headquartered in Tasmania, ABS data indicates that

95% of businesses in the sector were generating **less than $2 million** in revenue per year

61% are sole traders

Survey data indicates
40% of Tasmanian ICT businesses have been operating for 20 year or more

MARKETS

2/3 of Tasmanian businesses have interstate customers

66% of revenue comes from Tasmanian customers

28% of revenue comes from Australian customers (other than Tasmania)

The top 5 international markets for Tasmanian technology businesses are in **North America, Asia and Oceania.**

62% of Tasmanian technology businesses support sectors other than the state government

Tasmanian technology exporters are **growing their revenue twice as fast** as businesses that do not export

SECTOR GROWTH

If the growth in revenue for the sector over the last five years continued, revenue could be expected to increase to reach **$2.1 billion in total revenue by 2024-25.**

Amongst the industry members surveyed, the expected growth is even larger, and if realised, could result in revenue to reach
$3.0 billion in total revenue by 2024-25.

Revenue ($b) chart:

	2020-21	2021-22	2022-23	2023-24	2024-25

$3.5, $3.0, $2.5, $2.0, $1.5, $1.0, $0.5, $0

$3.0 — $2.1

— Business expectations
— Business as usual

TOP THREE CAPABILITY AREAS

The Tasmanian technology sector provides a wide range of capabilities.

73% Systems development

43% Data and analytics

50% Emerging technology

TOP SPECIALISED CAPABILITIES AND CAPABILITIES GAPS

3 out of 5 capability gaps are also in the top 5 capabilities. Demonstrating that some companies have identified they lack expertise in key areas that other companies have identified as their top capabilities.

Top capabilities	Top capabilities gaps
Programming software/development	Cyber security
Systems integration and build	Cloud computing
Cyber security	User experience design
Systems design	Programming software/development
Software design	Systems integration and build

BARRIERS TO GROWTH

Almost **9 out of 10** businesses reported facing a barrier in growing their business.

51% inability to attract suitable staff
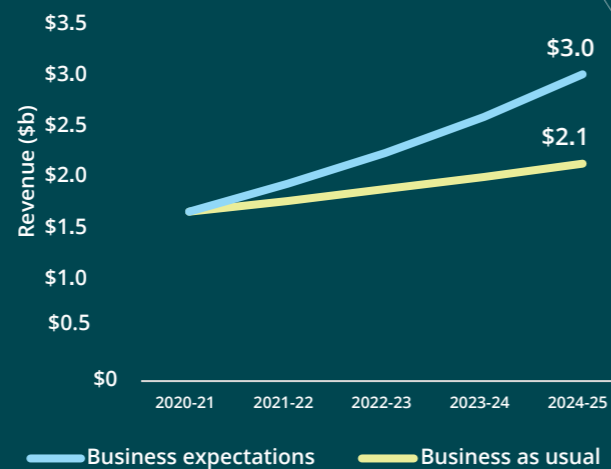
19% economic uncertainty

19% inability to access investment/capital

SECTOR GROWTH OPPORTUNITIES

To realise the strong outlook in the Tasmanian technology sector, businesses will need to grow in these areas.

Developing skills of the technology workforce

Increasing access to external markets

Accessing greater support to scale up technology businesses

Attracting more technology businesses to Tasmania

Executive summary

Technology has become increasingly important for the operations of Tasmanian businesses and the functioning of the State's economy. The internet, cyber security, digital marketing, cloud, data analytics, and customer relationship management (CRM) software are just some of the technology developments that are becoming essential for businesses to remain competitive.

The commercial benefits of technology adoption are significant – one recent study found that advanced levels of data analytics can increase revenue for businesses by 6.7% a year on average,[i] but the full dividend is much broader – including job creation, improved convenience for consumers and higher living standards for Tasmanian citizens.

Technology adoption accelerated during the COVID-19 pandemic of recent years. Physical restrictions meant that many more businesses relied on digital technology to work. Nearly half (46%) of Australians are still working from home at least once a week even after physical restrictions had lifted.[ii]

Tasmania's technology sector – along with the national and international technology sectors – provide the infrastructure, products and services for Tasmania to take advantage of the evolving landscape. The sector also makes an important contribution to the State economy through its own activities. The Department of State Growth commissioned this analysis to provide a snapshot of the Tasmanian technology sector. It also presents a three-year outlook for the industry, potential barriers to growth and the key enablers of growth.

This snapshot reveals a sector with a variety of capabilities that are being increasingly recognised on a national and international level. The analysis also identifies opportunities to further support the sector as it increasingly plays a more prominent role in the future of the Tasmanian economy.

The technology sector is defined as comprising businesses and economic activity generated by certain sub-sectors within two of the Australian Bureau of Statistics (ABS) industry groups: Information, Media and Telecommunications (IMT) and Professional, Scientific and Technical Services industry. Broadly, this includes businesses that provide software and analytics for business use, enabling technology infrastructure and e-commerce and media.

Technology sector scan

The Tasmanian technology sector includes organisations headquartered in Tasmania and those with operations in the State. **Collectively, these organisations generated almost $1.7 billion in revenue in 2020-21**. This is a significant sector for the Tasmanian economy and is similar in size in terms of revenue to other sectors such as accommodation and food services ($1.5 billion) and finance ($1.4 billion).[iii]

A third (34%) of surveyed Tasmanian technology businesses export their products or services internationally and two thirds (69%) have interstate customers. Yet only 5% of the revenue generated by technology sector came from international customers in 2019-20, suggesting significant opportunities to increase revenue from international markets. The geographical reach of Tasmanian technology businesses was broad: the share with customers in each region were 59% in North America, 55% in Asia, 55% in Oceania and 52% in Europe. The top five international markets for Australian ICT exports are the United States, New Zealand, Singapore, India and China and represent further market opportunities for Tasmanian technology businesses.[iv]

Tasmania's technology sector and technology workforce has experienced strong growth both prior to and during the COVID-19 pandemic. ABS data indicates **the number of technology businesses headquartered in Tasmania increased by 18% over the past five years with an increase of 3% between June 2020 and June 2021**.[v] As is the case in most sectors, the majority of technology businesses headquartered in Tasmania are small to medium-sized enterprises (SMEs), with 95% generating less than $2 million in revenue per year. A large share (61%) are sole traders and 38% employ between 1-19 employees with the remaining 1% share having 20 or more employees. **Two in five (40%) of Tasmanian technology businesses have been operating for more than 20 years**, demonstrating considerable longevity.

In 2021, Tasmania's technology workforce consists of 9,663 people.[vi] Less than half (38%) of the workforce are employed by technology sector companies described above. The remaining technology workers are employed in other industries throughout the economy such as agriculture, finance and professional services. The technology workforce also grew during the pandemic, increasing by 3% between 2020 and 2021.
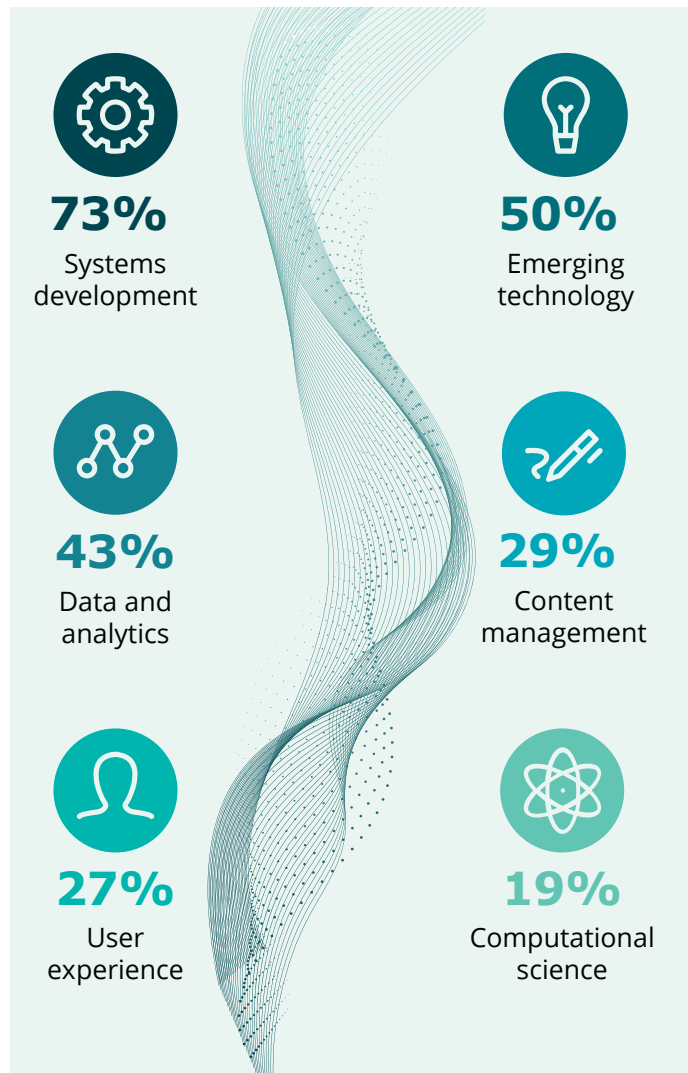
Technology sector capabilities and gaps

To better understand the sector, this report looks beyond the services provided to the underlying capabilities, based on the globally recognised Skills Framework for the Information Age (SFIA framework). These findings relate to data collected from 108 Tasmanian based businesses and organisations that have a Tasmanian presence, including State and local Government entities. **The data reveals the wide variety of capabilities within Tasmanian businesses such as programming and software development (47% of businesses), systems integration and build (38%), and cyber security (36%)**. More broadly, the sector has confirmed capabilities across all six overarching capability areas.

The sector's workforce has a variety of technology skills but also skills gaps:

- six out of the top ten skills gaps are also in the top ten current capabilities reported by businesses, including cloud computing, programming/software development, systems integration and build, testing and product management.

- cyber security was the most common skills gap, as businesses are increasingly looking to enhance their cyber security capabilities. This is despite cybersecurity being the third most common current capability reported by the businesses.

- the business survey conducted for this report also revealed a gap in general business skills such as project management (reported by 21% of businesses), followed by communication skills (14%), and writing (13%).

Figure i: Share of businesses with key capabilities in the Tasmanian technology sector

73%
Systems development

50%
Emerging technology

43%
Data and analytics

29%
Content management

27%
User experience

19%
Computational science

Deloitte Access Economics based on Tasmanian technology business survey (2022)

Technology sector outlook

The outlook for both Tasmanian technology businesses and workforce is a positive one. **If the strong recent growth of the sector continues at its current pace of 6.4% a year, the sector's revenue is set to increase by $467 million to reach $2.1 billion by 2024-25**. Tasmania's workforce is expected to grow strongly at 4.7% on average for the next 5 years. This will mean the number of technology workers in Tasmania will reach 12,362 by 2026.

The business survey undertaken for this report shows that technology businesses are confident about the future outlook, with **81% of businesses expecting to experience revenue growth over the next three financial years** (2022-23 to 2024-25). After accounting for business size, the survey suggests that Tasmanian technology businesses expect average revenue growth of approximately 16% per year through to 2024-25. If this growth rate is realised, the revenue of technology sector would increase by $1.3 billion to reach $3.0 billion by 2024-25.

The sources of revenue growth anticipated by businesses include: increasing demand for products and services (selected by 75% of businesses), increasing market share for existing products (69%) and new products and services (55%), indicating the willingness of this sector to expand, identify new markets, and experiment with innovative products or business models.

There are barriers that the sector will need to overcome to realise the strong outlook. Nearly 9 out of 10 (87%) businesses reported facing a barrier to growth in their business. The biggest barrier is the inability to attract suitable staff, reported by half of businesses and more than double of any other barrier listed (51%). This was followed by economic uncertainty (19%) and inability to access investment/capital (19%) as barriers to growth.

Sector growth opportunities

The survey and industry consultation undertaken for this report suggest there are four main areas to enable growth in the technology sector: skills, markets, scale-ups and regional presence.

Developing skills of the technology workforce

Half of the Tasmanian technology sector cited the inability to attract suitable staff as a barrier to growth. This includes both technical skills (such as software development, cybersecurity and user experience design) and more general business skills (such as project management, communication and collaboration skills).

When businesses were asked about where they are most likely to develop their skills and capabilities to grow their business, almost half of businesses reported being most likely to hire new staff (44%). **For those looking to hire skilled staff, over two thirds (68%) of businesses prefer to hire from within the Tasmanian workforce, rather than hiring from mainland Australia or internationally**. However, only a fifth of businesses are confident that the Tasmanian job market can provide the technology-related skills and capabilities they require. A fifth of businesses also reported that low quality graduates and job applicants was a barrier to growing their technology skills and capabilities. This suggests greater industry input into technology content taught in higher education facilities may be required to continue the strong pipeline of technology talent in Tasmania.

A third (33%) of businesses expect to upskill current staff rather than outsource skills and capabilities to grow their business. There would be benefits from more Tasmanian businesses adopting this strategy. One study suggests those businesses with higher levels of upskilling current staff have nearly half the attrition rate compared to businesses that have low levels of upskilling (14% compared to 25%).[vii]

Increasing access to external markets

Access to external markets can lead to significant economic opportunities and access to a greater number and wider range of customers. Businesses providing technology goods and services to international customers experienced almost twice the growth in revenue (28% growth between 2019-20 and 2020-21) compared to business only serving Tasmanian customers (13%). More than two thirds of businesses surveyed had customers in mainland Australia (69%) and a third had international customers (34%).

Consultations with the sector revealed that support from Austrade in establishing connections to potential customers and understanding support available to access markets was helpful in establishing an international client base.

In particular, there are market opportunities for the Tasmanian technology sector to generate additional revenue from the mainland and international customers, particularly software and ICT services exports and digital media and games. Considering the significant share (73%) of Tasmanian businesses with systems development capabilities, there is an opportunity to increase the share of revenue of these businesses coming from international customers (currently at 10% of total revenue). Meanwhile, digital media and games have over a third of revenue coming from international customers but only make up a small segment of the technology sector (comprising 15% of the technology businesses).

Based on analysis of key export markets for Australia's ICT sector, there are also opportunities for the Tasmanian sector in the United States, New Zealand, Singapore, India and China. These five countries are the largest markets in terms of ICT exports with four out of five of these countries experiencing double digit trend growth and all now having Free Trade Agreements. While these large overseas markets perhaps represent the most lucrative opportunities for growth, this report also notes how interstate customers can be an opportunity to broaden revenue streams in a more familiar environment.

Accessing greater support to scale-up technology businesses

Considering the majority (95%) of Tasmanian businesses generate less than $2 million in revenue per year and 61% are sole traders, there is an opportunity to provide further support to scale-up business.

The business survey for this analysis revealed that 12% of Tasmanian technology businesses have been in operation for less than three years. In addition, a fifth of businesses (19%) reported that inability to access investment/capital as a barrier to business growth.

The Tasmanian Government has a number of support programs for start-up businesses. Enterprise Centres Tasmania provides free business advisors, and the Small Business Incubator and Accelerator Pilot Program provide grants of up to $250,000 to support sustainability of start-ups.

However, there is more that can be done to promote the programs offered to support businesses and start-ups. Consultations revealed a perception by some businesses that Tasmania has comparatively less support for start-ups compared to other states, however the Government has a range of relevant programs in place that provide support for start-ups, including the Enterprize accelerators and hubs. More professional network opportunities to facilitate sharing of ideas, experiences and resources were also suggested to be valuable so that businesses can learn from each other and improve their own operations and business model. Considering 40% of Tasmanian technology businesses have been in operation for 20 years or more, this represents a strong cohort of experienced technology businesses who could play a mentoring role to the new start-ups.

Attracting more technology businesses to Tasmania

Less than 2% of Tasmanian businesses are in the technology sector, lower than in other jurisdictions. Providing greater incentives for mainland technology businesses to have a presence in Tasmania, either by increasing the number of start-ups in Tasmania or encouraging existing businesses to have operations within the State may assist in growing the Tasmanian technology sector. To achieve a greater national presence of technology businesses within Tasmania, this will require the skills gaps identified above to be addressed.

The recent trend towards more remote working – both for workers being remote from the office and businesses being more remote from their clients – following COVID-19 will make Tasmania a more feasible location for business operations.

Progress in these four areas will increase the likelihood of continued growth in this important sector and the associated benefits from a more diversified and innovative State economy.

Deloitte Access Economics

1 Introduction

The technology sector has become increasingly important to the functioning of the economy, business and workforce in Tasmania.

COVID-19 saw an acceleration of investments in technology for everyday operations. For example, nearly half (46%) of Australians were still working from home at least once a week even after physical restrictions were lifted in early 2022.

Tasmania has a diverse set of technology capabilities, many of which are world leading. For example, FortifyEdge uses a machine learning algorithm so personal traits are the 'password' for users of devices and machinery.[viii] Battery Point-based Echoview provides software to organisations in over 60 countries to understand marine and freshwater environments.[ix] Biteable creates high impact videos for businesses and raised $7 million in Series A funding in 2020.[x]

The Tasmanian Government has recognised the importance of the technology sector and workforce and is looking to support its growth and development. In March 2020, it released the State's strategy for digital industry and service transformation – *Our Digital Future*.[xi] The strategy promotes a vision of a digitally-connected and prosperous business community. To help ensure the digital-ready skills that Tasmanian business requires exist in the workforce, the government also has developed the *Tasmanian ICT Workforce Action Plan 2020-2023* in collaboration with sector peak body TasICT, the Australian Computer Society, University of Tasmania, the Departments of Education and Premier and Cabinet, and TasTAFE.[xii]

This study was commissioned by the Department of State Growth following recommendations and actions from these strategy documents. The study provides a snapshot of the Tasmanian technology sector and its capabilities. It also presents a three-year outlook for the industry, and its key enablers and barriers for growth.

The findings from this study aim to enable the Tasmanian Government to:

- Identify opportunities to promote the sector's areas of expertise and innovation

- Find new national and international markets and identify prospects for growth

- Improve the available training, thereby resolving skills pipeline issues.

The report brings together data from many sources, including Australian Bureau of Statistics (ABS), Australian Taxation Office, LinkedIn and others. Survey data was also collected from 108 Tasmanian technology businesses and organisations with key technology functions. This data provides insights into the size of the market and operations, key workforce characteristics and insights around the future expectations. Further details about the survey are available in Appendix A: Industry Survey. Consultations were also conducted with five Tasmanian technology businesses to provide insights into the sector and showcase the diverse capabilities and industries the sector supports.

The report is structured as follows:

- Chapter 2 explores the key features of the Tasmanian technology sector

- Chapter 3 – examines the diverse capabilities of the sector using the Skills Framework for the Information Age (SFIA framework) and identifies areas where these capabilities are strongest

- Chapter 4 – analyses the characteristics of the technology workforce that underpin the capabilities of the Tasmanian technology sector

- Chapter 5 – provides an outlook for the sector and discusses the drivers that need to be supported to realise the strong business expectations of growth.

2 Tasmanian technology sector scan

The technology sector covers a range of different business activities which are evolving over time as innovation creates new products or services that give rise to new business models.

For this report, the technology sector refers to businesses and economic activity generated by certain sub-sectors within two of the Australian Bureau of Statistics (ABS) industry groups: Information, Media and Telecommunications (IMT) and Professional, Scientific and Technical Services industry.

To understand the current state of the technology sector in Tasmania – the products and services they offer, where they are located, who their customers are and how much revenue they generate – this chapter draws on a combination of data gathered in 2019-20 by Economy.id, the ABS and a survey of Tasmanian businesses undertaken in early 2022.

Using the industry structure applied by the ABS, the technology sector can be said to include the following types of activities:
• Software publishing
• Internet publishing and broadcasting
• Wired Telecommunications network operation
• Other telecommunications network operation
• Other telecommunications services
• Internet service providers and web search portals
• Data processing and web hosting services
• Electronic information storage services
• Computer system design and related services.

These businesses can be grouped into three major categories of activity in the sector. These are software and analytics for business use, enabling technology infrastructure and e-commerce and media (see Figure 2.1).

Figure 2.1: Major categories of the technology sector
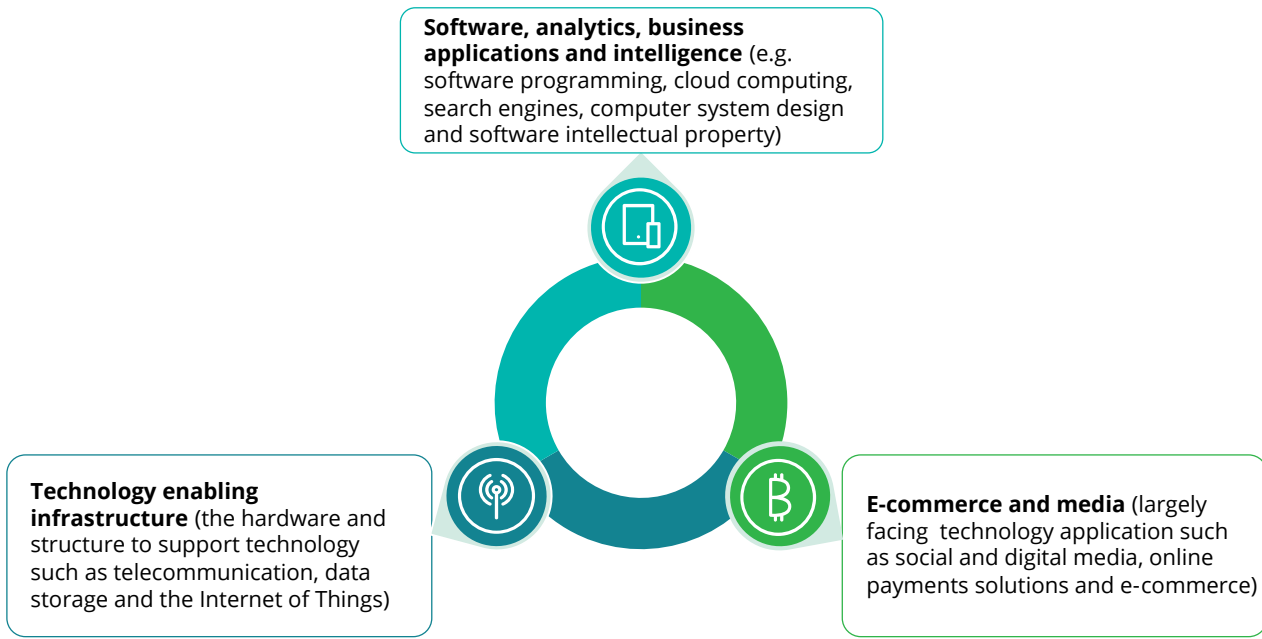
Source: Deloitte Access Economics (2022) and Digital Skills Organisation (2021).[xiii]

We note that the technology sector definition does not include businesses across other industries that might provide technology services as part of a broader business offering (e.g. consulting businesses or advanced manufacturing). This definition is important when considering the data presented in this report. The ABS and economy.id estimates include only technology sectors businesses. The survey undertaken for this study and the workforce figures in chapter 4 include estimates of the organisations and employees with technology functions and occupations across the broader economy.

In addition to being a significant sector itself, the technology sector plays an important role in enabling digital transformation by providing productivity enhancing solutions and essential services to the rest of the economy. Many businesses require technology for their core operations. For example, many government agencies are increasingly providing digital services to citizens while businesses in other industries such as transport or finance are using technology to streamline their operations and provide bespoke interactions with customers. While these businesses are not considered technology businesses for the purposes of this chapter, they will still require workers with technology skills and capabilities (and so they are part of the workforce analysis in chapter 4).

2.1 Market segments

According to the ABS industry classifications described above, there were 698 technology sector businesses with headquarters in Tasmania in June 2021.[xiv] [1] Tasmanian technology businesses represent 1.72% of all businesses in Tasmania. While this is a smaller share than other states and territories, the number of businesses in the Tasmanian technology sector has grown by 18.1% since June 2016, representing a 3.4% average growth rate per year. This growth continued during the COVID-19 pandemic, with 3.1% growth in the number of businesses between June 2020 and June 2021. While the pandemic and lockdowns reduced activity in many other sectors of the economy, technology businesses experienced a growth in demand as their products and services assisted with the continued functioning of the economy.

Most Tasmanian technology businesses (91%) provided software, analytics, business applications and business intelligence products or services to their clients (see Chart 2.1) which is closely aligned to the Australian average of 88%.

Some technology businesses provide a range of products and services and hence straddle different technology categories. Data collected for this report through a survey undertaken in 2022 revealed the diversity in market segments in the sector, with 65% of businesses surveyed confirming they provide multiple types of technology products and/or services.

Chart 2.1: Number of businesses for select market segments of the Tasmanian technology sector
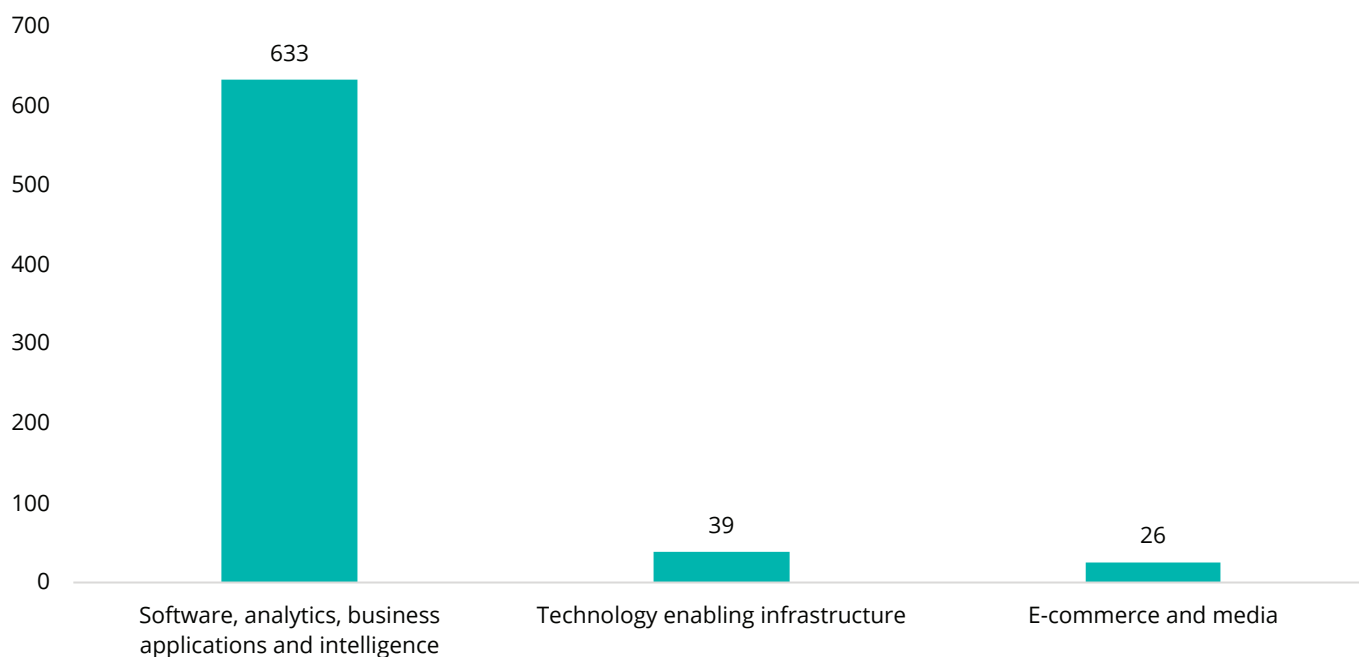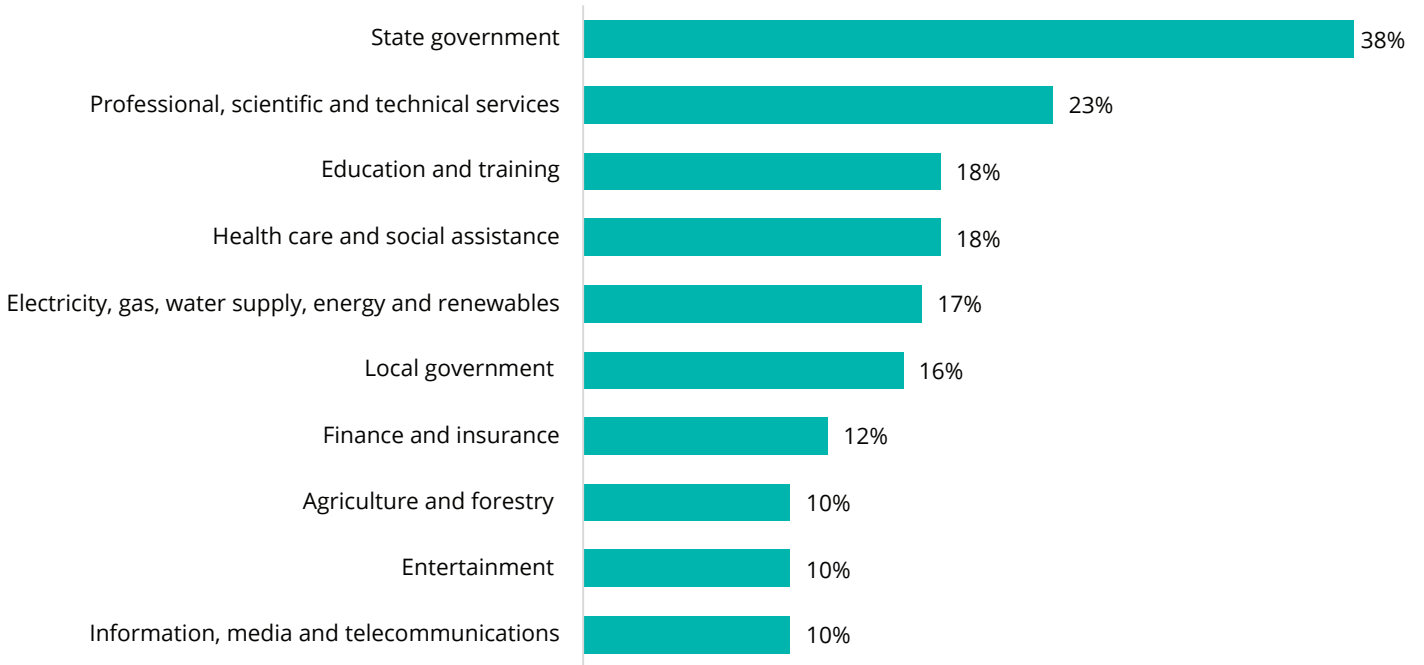

Source: ABS (2021)

Tasmanian technology businesses provide significant support to government and other non-market sectors such as health, education and utilities. Almost two in five (38%) organisations reported that they provided services to State Government. The remaining 62% of organisations indicate they support other industries – including 23% of businesses supporting professional, scientific and technical services, 18% supporting education and training and 18% supporting health care and social assistance (18%) in the State economy. These results reflect that these three key industries (professional, scientific and technical services, education and training and health care and social

assistance), which collectively contribute approximately a third of Tasmanian economic activity as measured through Gross Value Added (GVA),[xv] are transforming through the adoption of new technologies. This concentration may also suggest that there is an opportunity to support more digitisation in other market sectors such as finance, agriculture, construction and transport.

Our business survey revealed 12% of technology businesses commenced operations less than 3 years ago. At the other end of the spectrum, 40% of technology businesses have been in operation for over 20 years.

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[1] The ABS notes that a business may still be counted as actively trading at the end of the financial year even if it has ceased operating, if the associated ABN has not been cancelled and, the business has remitted GST within the last five quarters (or three years for annual remitters). This may mean a proportion of the businesses included by the ABS may be no longer in operation.

Chart 2.2: Top 10 industries supported by technology businesses

Industry	Percentage
State government	38%
Professional, scientific and technical services	23%
Education and training	18%
Health care and social assistance	18%
Electricity, gas, water supply, energy and renewables	17%
Local government	16%
Finance and insurance	12%
Agriculture and forestry	10%
Entertainment	10%
Information, media and telecommunications	10%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart 2.3: Tasmanian Technology businesses, by annual revenue, 2021

Revenue range	Count
Zero to less than $50k	275
$50k to less than $200k	228
$200k to less than $2m	167
$2m to less than $5m	24
$5m to less than $10m	6
$10m or more	4
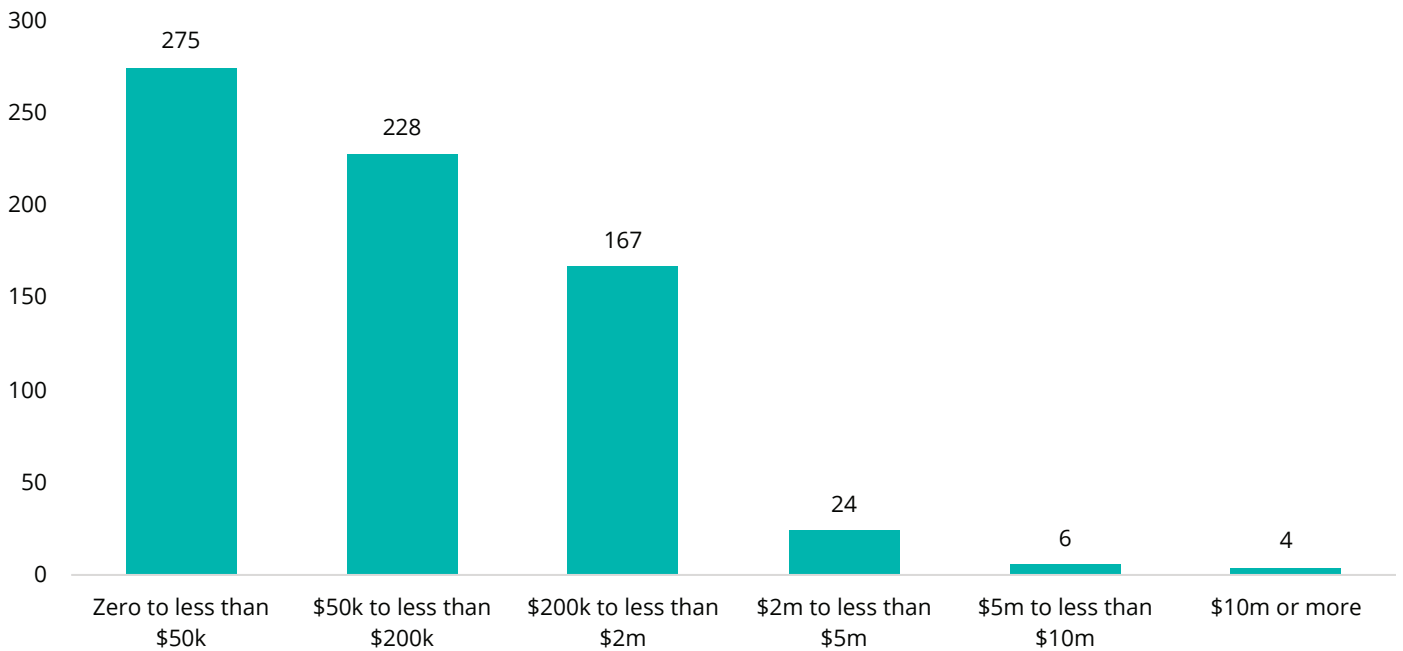
Source: ABS (2021)
Note: Totals do not sum to the total number of businesses due to statistical discrepancies in the data.

2.2 Sector revenue

The total revenue associated with the technology sector in Tasmania is estimated to be $1.7 billion in 2020-21.[xvi] The revenue is comprised of:

- $952 million in the telecommunications services

- $420 million in internet service providers, web search portals and data processing services

- $286 million in computer system and design.

These estimates include both the revenue generated by technology businesses headquartered in Tasmania and those businesses that have operations within Tasmania with headquarters outside the State.

For those technology businesses with headquarters in Tasmania, the majority are Small to Medium sized Enterprises (SMEs), with 95% of businesses generating less than $2 million in revenue per year (see Chart 2.3), which is aligned closely with the Australian technology industry, where 94% earn less than $2 million in

revenue per year.[xvii] A large share (61%) are sole traders and 38% employ between 1-19 employees.[xviii] This is closely aligned with the general composition of businesses in Tasmania with 62% of all Tasmanian businesses being sole traders and 36% employing between 1-19 employees.[xix]

2.3 Location of customers

The Tasmanian technology sector is connected beyond the State's borders, with a third (34%) of Tasmanian businesses exporting their products or services internationally and two thirds (69%) having interstate customers. Despite a number of businesses accessing these markets, customers located within Tasmania are the main source of revenue for the sector, accounting over two thirds (66%) of the revenue (see Chart 2.4). International customers account for 5%, or an estimated $83 million in revenue for the sector in the 2020-21 financial year. This share of revenue generated through international trade is smaller than the share of Tasmanian Gross State Product (GSP) attributable to international trade (14%).[xx] Nevertheless, as a share of the total economy, technology exports are a third as large for Tasmania than Australia more broadly.[xxi]

Chart 2.4: Share of revenue for 2019-20 by customer base for the Tasmanian technology sector
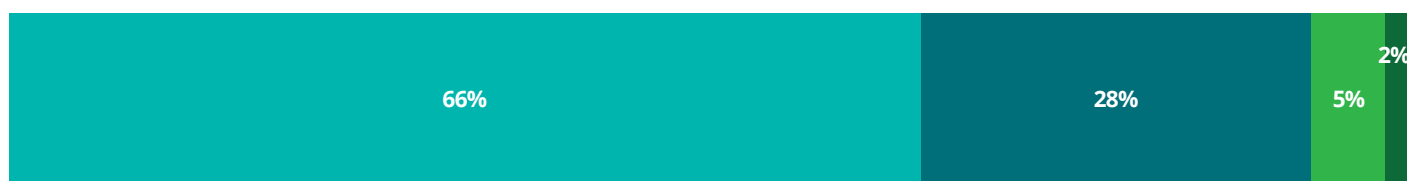
66%	28%	5%	2%

■ Tasmanian customers ■ Australian customers (other than Tasmanian) ■ International customers ■ Don't know/Not sure

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022), ABS (2021)
Note: the shares presented in this chart have been weighted based on employee size with the Tasmanian technology sector.

Exporting technology businesses in Tasmania access a wide range of international markets. Of the 7 global regions defined in our survey, 69% of businesses surveyed that currently export have customers in multiple regions. Tasmanian technology customers are relatively evenly spread across North America, Asia, Oceania and Europe with 52%-59% of exporting businesses having customers located in these regions (see Figure 2.2).

Figure 2.2: Location of international customers for Tasmanian technology sector
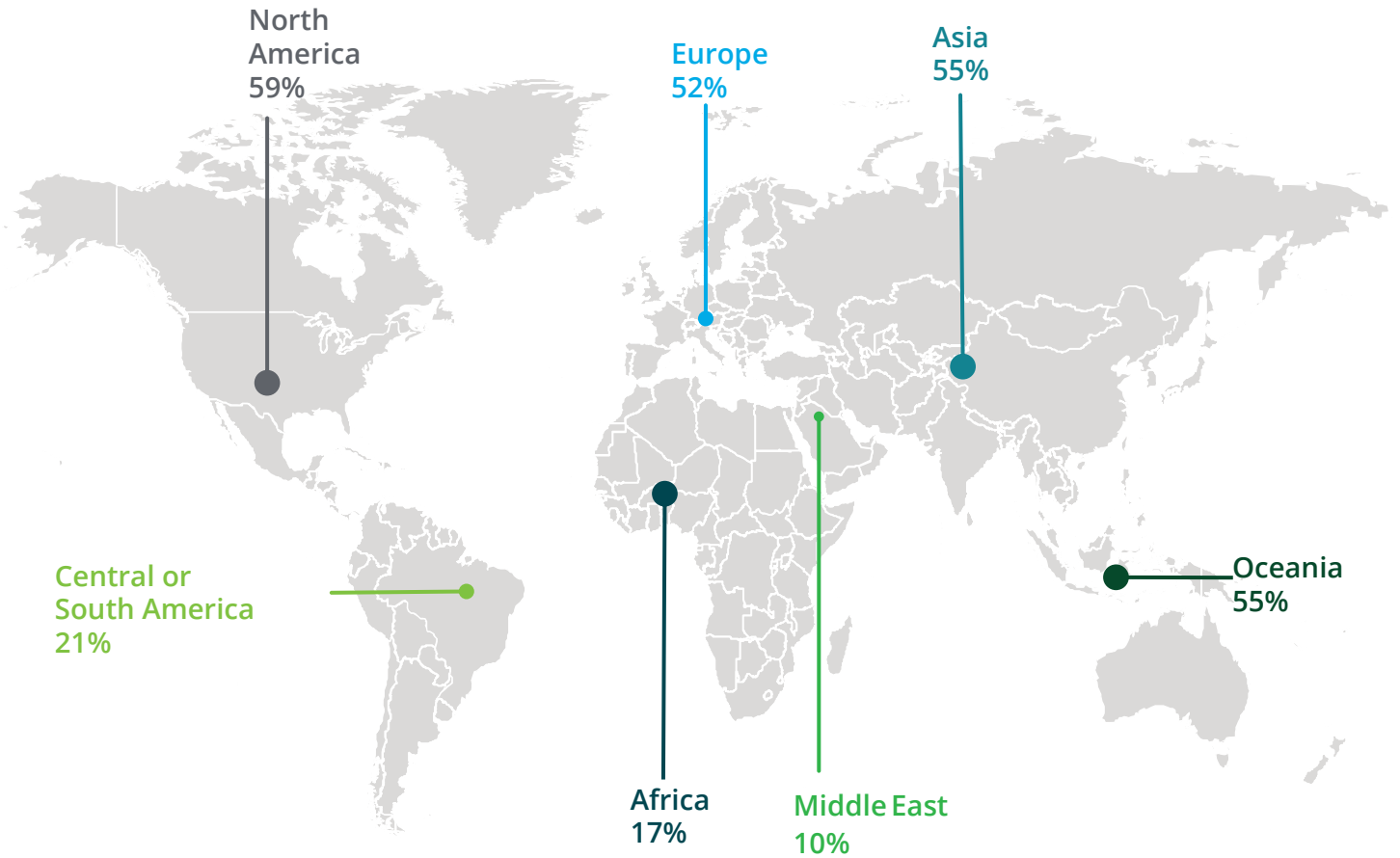
Source: Deloitte Access Economics (2022)
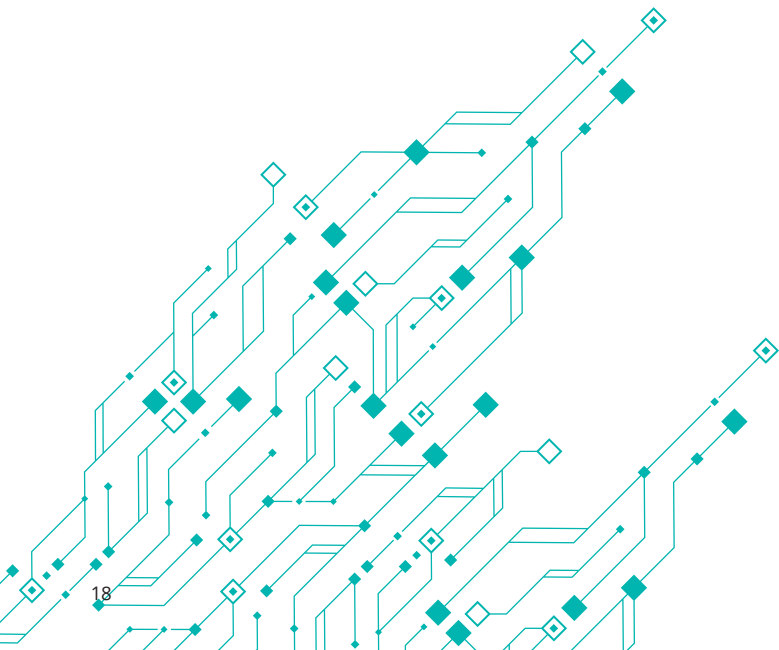
2.4 Location of operations

Tasmanian technology businesses are distributed across both the State's capital and regional areas. Of the businesses surveyed, 35% operate at more than one location; in total the survey identified 180 technology businesses sites in Tasmania. A majority of business sites (56%) are located in Hobart, 26% are located in Launceston and the North East and 18% are located in the West and North West of Tasmania (see Figure 2.3).

Figure 2.3: Distribution of Tasmanian technology business's physical locations across Tasmania

Launceston and
North East 26%

West and North West
18%

South East and
Hobart 56%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)
Note: Regional classification is based upon the ABS Australian Statistical Geography Standard Statistical Area Level 4, Hobart and the South East have been aggregated. The figure includes businesses with more than one location in Tasmania
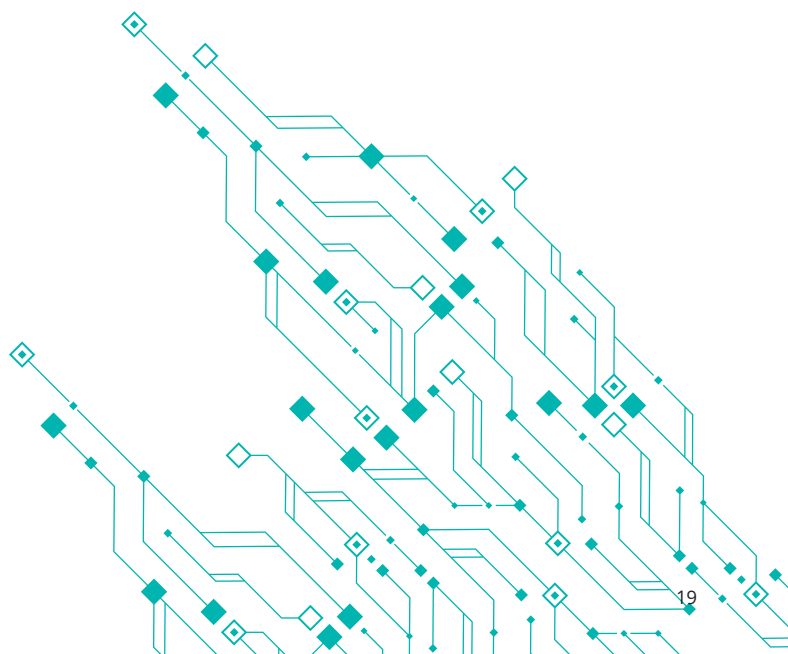
Tasmania's technology businesses operate both nationally and internationally. Half of the technology businesses surveyed for this report (that have a Tasmanian presence) have business operations located in mainland Australia and/or overseas – representing Tasmania on both the interstate and international stage. Just over 40% of businesses only have operations in Tasmania, while 9% of businesses are based outside of Tasmania (see Figure 2.4).

Figure 2.4: Location of headquarters and operations of businesses

41%   Tasmanian business with operations only in Tasmania

50%   A business with headquarters in Tasmania with operations in mainland Australia and/or internationally

9%   A business with headquarters outside of Tasmania
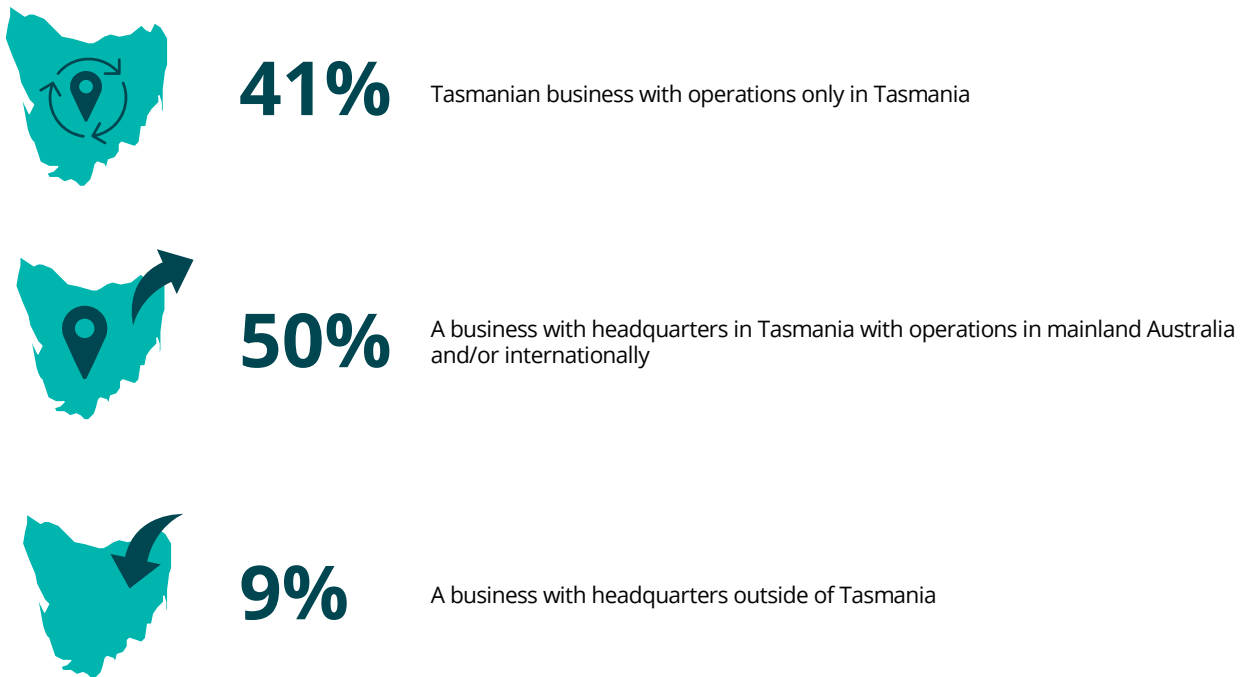
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Bitwise Agronomy

Bitwise Agronomy merges modern leading technologies with viticulture to enable vineyard owners and other farmers including berry producers to make better management and investment decisions, while reducing operation costs, increasing productivity, and fostering good quality crops.

The National Farmers Federation has recognised that digital innovation is the key for future growth in Australian agriculture. Fiona Turner, the co-Founder & CEO of Tasmanian based Bitwise Agronomy explains how the business is doing just that by using technology and big data to enable vineyard owners and other farmers including berry producers to make better management and investment decisions.

Bitwise Agronomy established its first product, *Greenview*, two years ago. *Greenview* combines computer vision, machine learning and artificial intelligence to count and measure components of horticultural crops using off-the-shelf cameras (such as GoPros).

GreenView is now used by over 70 businesses in eight different countries – having processed almost 119 million images from 11,000 videos equating to more than 23 terabytes of data. All up it can take less than 12 hours to process and produce results for their customers, Fiona noted:

"The up-take of *GreenView* has been rapid from farmers outside of Australia who are more open to adopting digital technologies. From the start Bitwise Agronomy has had a global approach with our first paid customer based in New Zealand. Currently, two-thirds of our customers are located overseas."

Now Bitwise Agronomy's innovative and easy-to-use technology has been recognised on the national stage. Fiona was the runner up for the Women in AI Innovator of the Year and the category award for AI in Agribusiness at the Australia and New Zealand Women in AI Awards.

Fiona recognises that part of Bitwise Agronomy's success is thanks to its diverse workforce. Bitwise Agronomy employs 20 people (including part-timers and casuals) across the globe with the idea that location of staff doesn't matter – the right skill set and cultural fit is much more important. Some of the business's most senior roles (including Head of Data Science, Artificial Intelligence, and Agronomy) are also held by women. Fiona stated:

"Promoting a culturally diverse workplace has helped bring in different views and grow our business."

Fiona believes a major factor contributing to this gender diversity is a result of Bitwise Agronomy being female led. This has led to more applicants who are female and a work culture that embraces flexibility for working parents.

3 Diverse capabilities of the technology sector

Capabilities are more than just what the sector produces or provides to its customers. Capabilities focus on the big picture by identifying what an organisation is able to do and its areas of expertise.

As an example, while a business may sell smart devices to other businesses, a core offering for the business could be the data analytics that sit behind the device and the cyber security that protects potentially commercially sensitive information for the client.

Using this broader perspective to assess the Tasmanian technology sector, this chapter explores the breadth of technical expertise within these businesses. For those businesses that provided consent, a capability matrix is also presented to summarise key areas of capabilities within the sector.

3.1 Capability framework

This report uses the following capability framework based on six overarching areas with forty-three underlying specific capabilities (see Figure 3.1). The capability framework is informed by the SFIA framework, with minor amendments to capture some emerging technology areas. The SFIA framework was first established in 2000 and is the globally accepted common language for the skills and competencies for the digital world which is now into its eighth iteration (SFIA 8).[xxii]

The SFIA framework is used by businesses to better understand internal digital and technical skills and competencies and provides a guide for assessing where capability gaps may exist. By using the SFIA framework as a basis for this capability framework, this analysis promotes a common language to define the Tasmanian sector's capabilities in a consistent way.
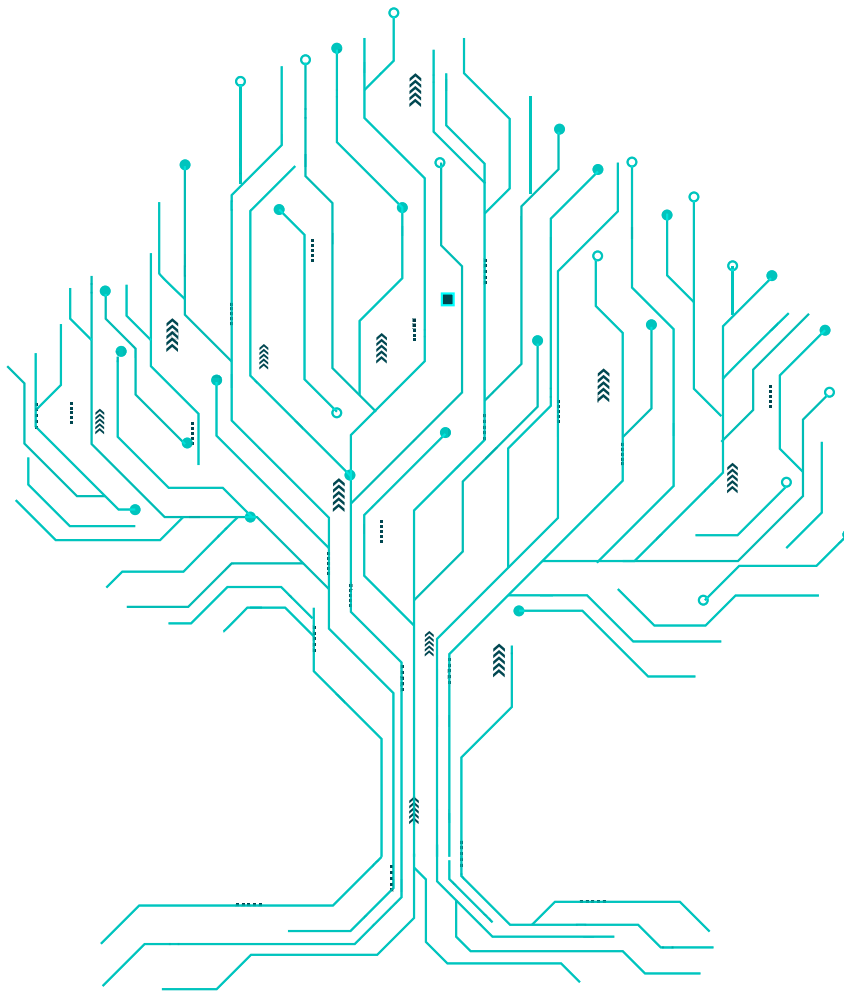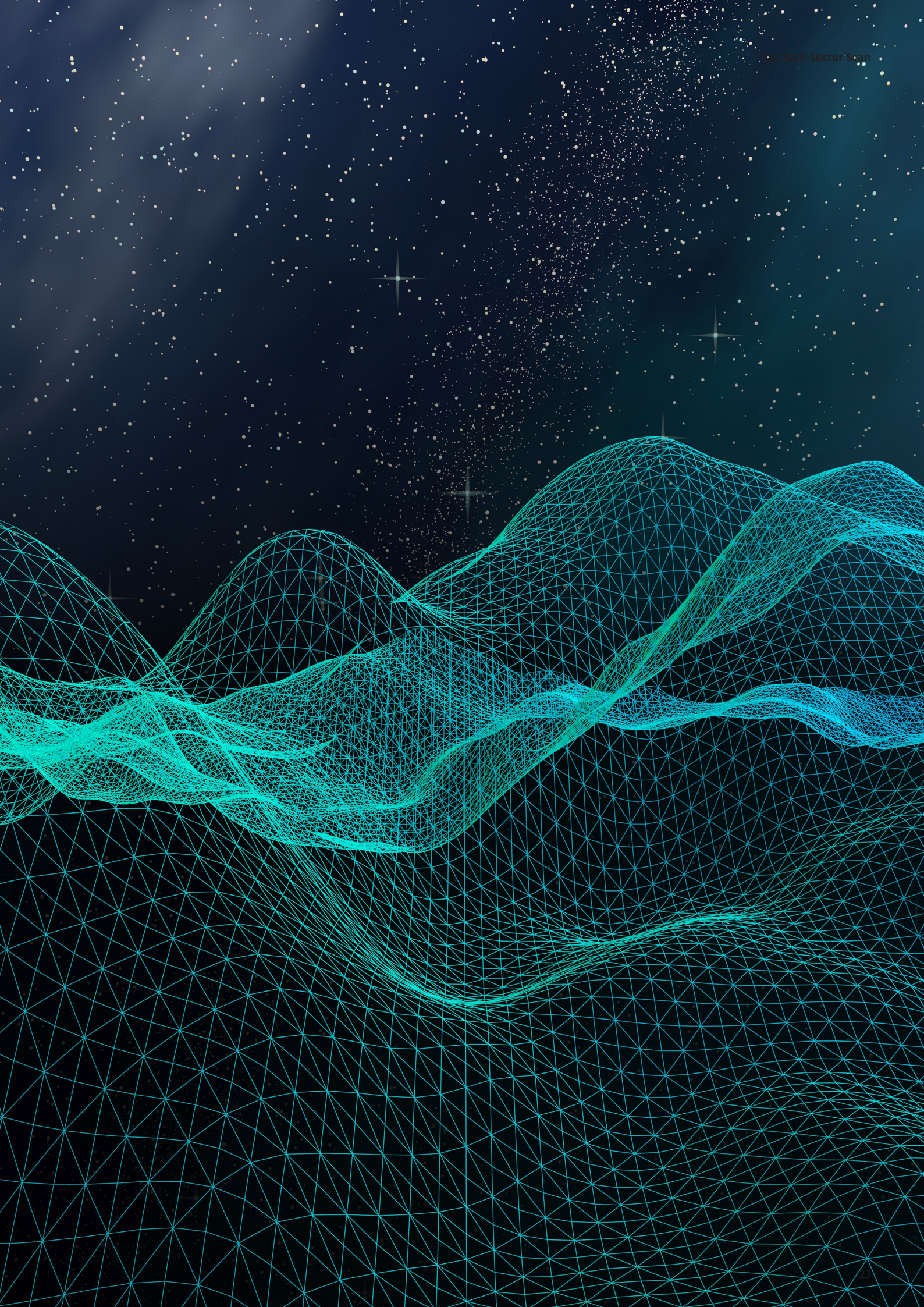
Figure 3.1: Technology capability framework

Systems development	Data and analytics	User experience	Content management	Computational science	Emerging technology
Product management	Data management	User research	Content authoring	Scientific modelling	Cyber security
Systems development management	Data modelling and design	User experience analysis	Content publishing	Numerical analysis	Machine learning and Artificial intelligence
Systems and software lifecycle engineering	Database design	User experience design	Knowledge management	High-performance computing	Internet of Things
Systems design	Data engineering	User experience evaluation			Automation
Software design	Database administration				Advanced robotics
Network design	Data science				Blockchain
Hardware design	Business intelligence				Cloud computing
Programming/software development	Data visualisation				Extended reality (Virtual and Augmented reality)
Systems integration and build					
Testing					
Software configuration					
Real-time embedded systems development					
Safety engineering					
Safety assessment					
Radio frequency engineering					
Animation development					

Source: Deloitte Access Economics (2022) based on SFIA (2022) [xxii]
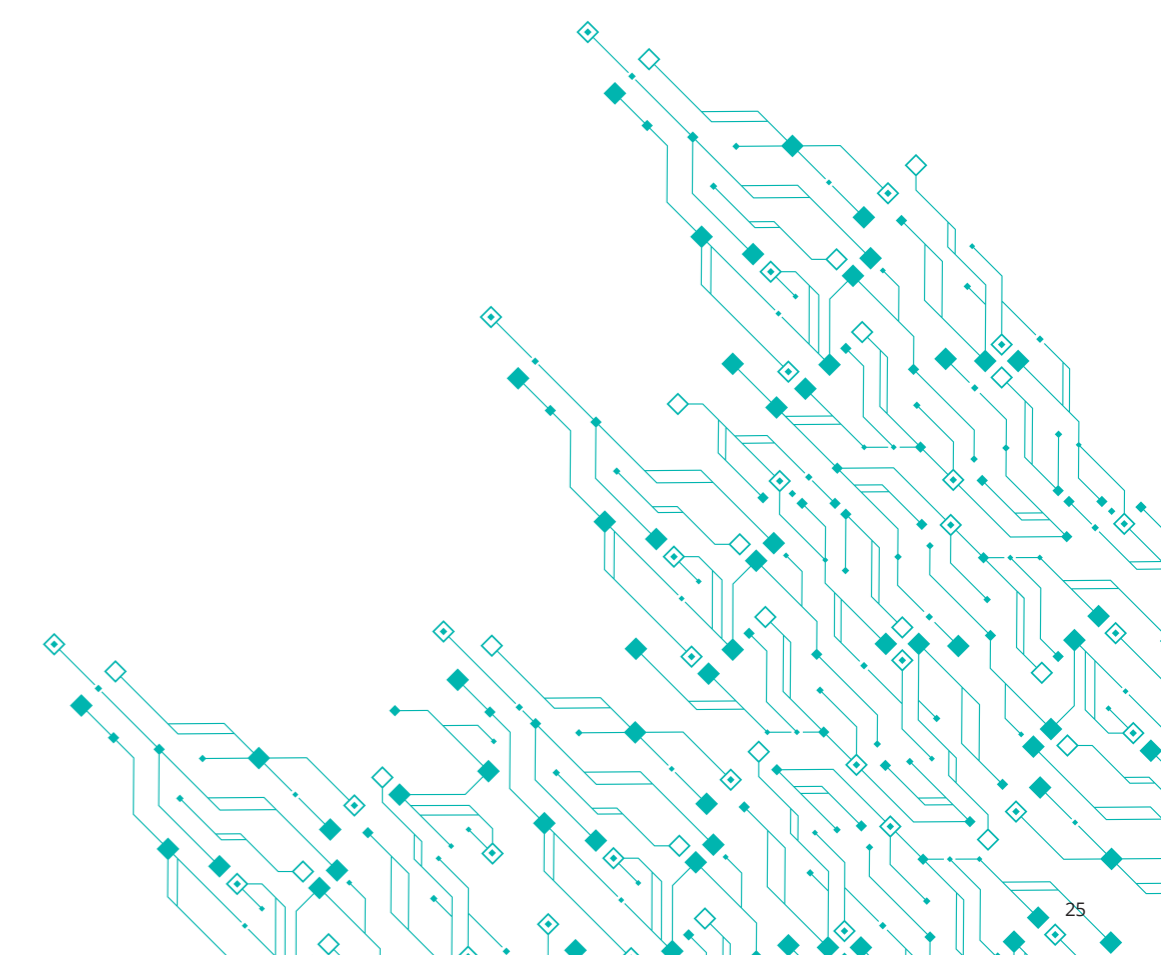
3.2 Overarching capability areas

Based on the survey results, Chart 3.1 highlights that the most commonly selected overarching capabilities among the Tasmanian technology sector are systems development (reported by 73% of businesses) followed by emerging technology (50%) and data and analytics (43%). This aligns to a 2021 report by the Australian Computer Society (ACS) which found that 4 out of 15 most used technology and digital skills are within the systems development capability area.[xxiv] The other commonly used skills reported by ACS tended to be more general in nature such as specialist advice, relationship management and business analysis.

Chart 3.1: Share of businesses with broad capability areas
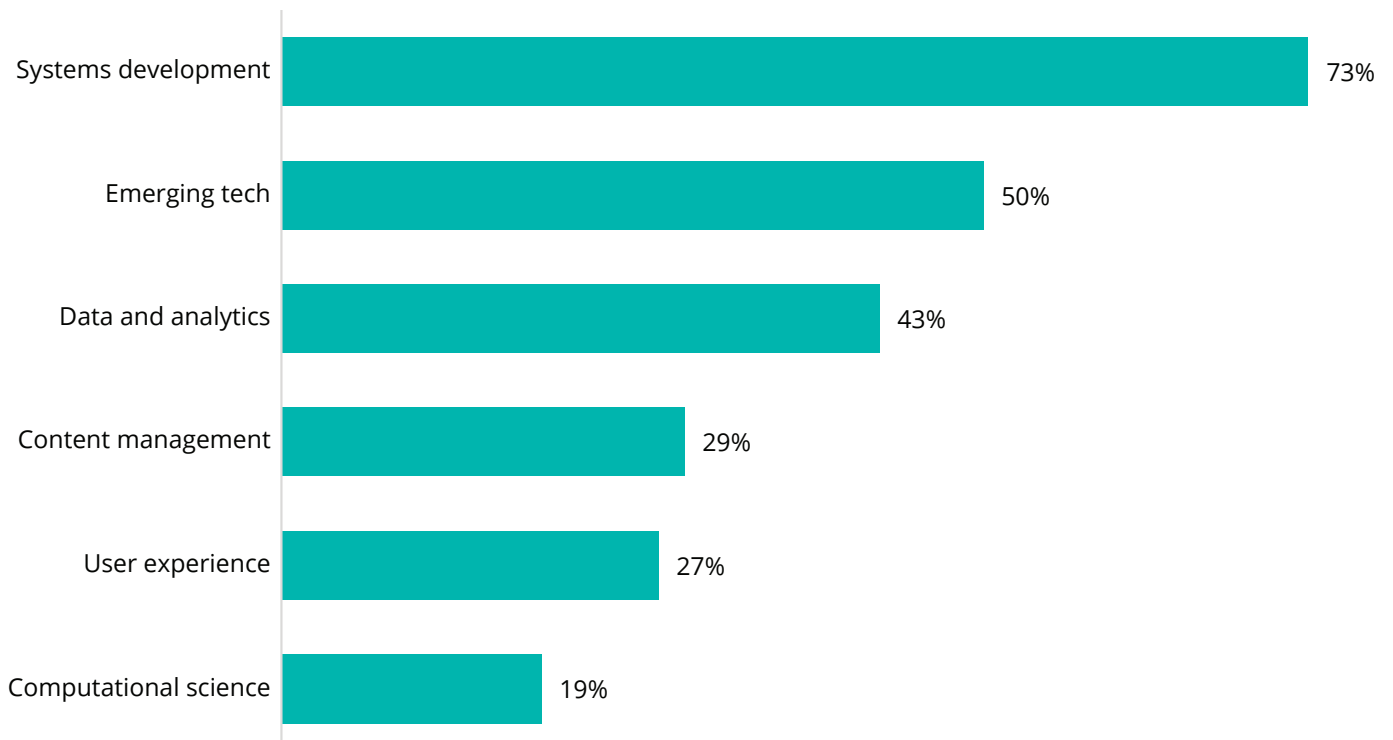
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

The business survey revealed that the Tasmanian technology sector has significant diversity in its capabilities. Nearly three quarters (72%) of businesses have capabilities in two or more broad capability areas, with 55% having two or three capabilities. Those businesses providing goods and services across multiple overarching capability areas are more likely to be generating revenue from international customers. For instance, only 6% of technology businesses with one capability area received revenue from international customers, compared to 27% of businesses who had capabilities in two or more broad areas.

3.3 Specific capabilities

Underlying the six overarching capability areas are forty-three specific capabilities that provide a more granular perspective of what the Tasmanian technology sector does and offers customers. Chart 3.2 shows the most commonly selected specific capabilities in the sector. Almost half of surveyed businesses (47%) have capabilities in programming/software development and over one third (38%) specialise in systems integration and build. Out of the top 10 capabilities in the sector, seven sit within systems development, two sit within emerging technology and one sits within data and analytics. A full list of the share of Tasmanian technology businesses with specific capabilities can be found in Appendix A: Industry Survey.

These capabilities are consistent with the skills that technology employers are seeking across Australia. Technology job postings on LinkedIn indicate that some of the most sought-after skills in the industry include programming/software development, networking and data integration skills and product management.[xxv]
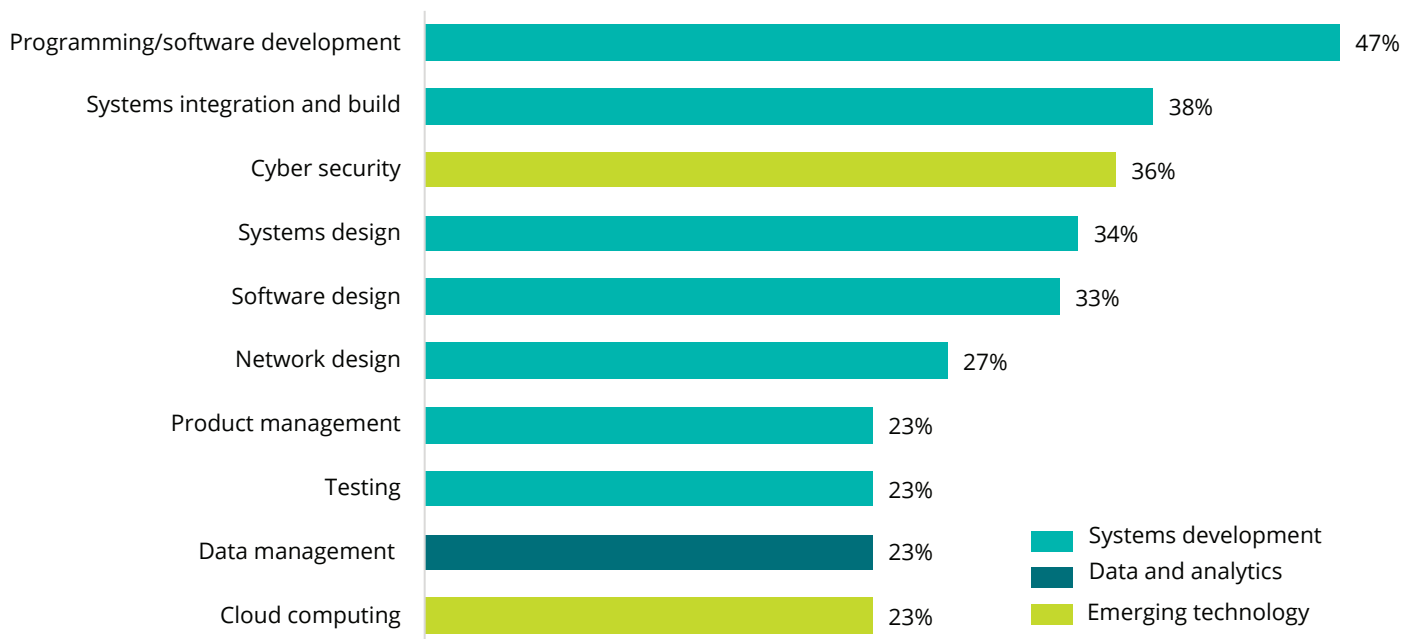
The capabilities selected by organisations indicate where there appears to be relatively lower levels of some specific skills and expertise within Tasmania's technology sector. Where demand for such capability exceeds the local supply, then capabilities are sourced from businesses in other jurisdictions. Tasmanian technology businesses may consider these areas as opportunities to expand their current range of services and expertise. It should be noted that some of these gaps may reflect capabilities from businesses that did not participate in the survey.

The results also indicate the significant growth potential across the broader economy as digital disruption increasingly takes hold in other sectors. In Tasmania, many businesses in traditional sectors are realising the urgent need to transform their operations to keep pace with competitors, retain their existing markets and expand to service new trading partners. This is true for emerging technology such as 5G where traditional industries such as mining, manufacturing and utilities have been found to have higher levels of adoption and readiness for 5G relative to other service-based industries such as retail trade.[xxvi]

Chart 3.2: Top 10 specialised capabilities of Tasmanian Technology Sector

Capability	Percentage
Programming/software development	47%
Systems integration and build	38%
Cyber security	36%
Systems design	34%
Software design	33%
Network design	27%
Product management	23%
Testing	23%
Data management	23%
Cloud computing	23%

Legend:
- Systems development
- Data and analytics
- Emerging technology

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

The survey identified a number of leading Tasmanian technology companies are already operating in the finance, agriculture, health care, environment, marine and manufacturing sectors. Opportunities include facilitating dialogue between the technology sector and traditional sectors to identify transformational opportunities in the form of possible applications, realistic uptake pathways and potential investors or funding sources. Table 3.1 identifies several opportunities for innovation across several sectors.

Table 3.1: Digital opportunities by sector

Medtech
- Big data analytics to predict patient outcomes
- Wearables and sensors
- High quality real-time video for remote healthcare
- Social media analytics to identify disease outbreaks/hotspots and misinformation.

Space, defence and security
- Smart devices and applications for automated security
- Big data, data integration in real time to detect potential security threats
- More efficient emergency management systems

Fintech
- Quantum encryption to improve security of financial information and assets
- Blockchain and similar ledgers
- Machine learning and artificial intelligence for fraud detection
- Artificial intelligence and big data to improve customer service and provide new products and services.

Entertainment, social media and gaming
- Artificial intelligence to personalised entertainment offerings
- Immersive experiences through Virtual Reality (VR) and Augmented Reality (AR)
- High quality real-time video on smart devices
- Advanced mobile cloud gaming

Mining Equipment and Technology Sector (METs)
- Automated Vehicles and machines
- Artificial intelligence to identify resources
- In-field sensors and remote sensing of machine and goods
- Artificial intelligence to improve adverse event predictability
- Automation of exploration via UAVs (programmed and autonomous).

Envirotech (including climate)
- Internet of things (IoT) to improve resource efficiency
- Automation of real-time environmental monitoring
- Machine vision and object/event identification.

Tourism and Hospitality
- Automated reception and service
- Personalised services
- Location-sensitive information availability
- Virtual experiences through VR and AR.

Transport and logistics
- Autonomous vehicles and unmanned aerial vehicles (UAV)
- Real-time traffic management/route optimisation
- Compliance management via informatics, sensors and remote observation

Source: Deloitte Access Economics (2022) and Australian Academy of Science (2021).[xxvii, xxviii]

Similarly, expectations of digital delivery of government services and integration across different areas of government are now becoming the norm.[xxix] The Independent Review of the Tasmanian State Service stated that 'Digitalisation of services provides the opportunity to redefine the way that government relates to individuals and families, presenting services that are easier to access, more effective and more efficient in terms of costs to government and cost/time for the customer'.[xxx] The opportunities for improving delivery of government services include increasing the digitisation of customer transactions and development and implementation of authentication processes that improve security and are user friendly to realise productivity and efficiency benefits of a more digital government.

In order to realise the benefits from the diverse capabilities and opportunity areas for the Tasmanian technology sector requires greater awareness of these capabilities. A coordinated campaign to promote the capabilities and expertise held by the Tasmanian technology sector would raise general community awareness and prompt other businesses to identify and pursue opportunities for digital transformation.

3.4 Capability matrix

The Tasmanian technology sector capability matrix (shown in Figure 3.2) displays a detailed picture of the technology capabilities that currently exist within Tasmania. The capability matrix shows the top five capabilities of the 47 Tasmanian technology businesses who provided their consent to have their responses shared publicly.

Figure 3.2: Capability matrix of the Tasmanian technology sector

Organisation	Product management	Systems development management	Systems and software life cycle engineering	Systems design	Software design	Network design	Hardware design	Programming/software development	Systems integration and build	Testing	Software configuration	Real-time/embedded systems development	Safety engineering	Safety assessment	Radio frequency engineering	Animation development	Data management	Data modelling and design	Database design	Data engineering	Database administration	Data science	Business intelligence	Data visualisation	User experience analysis	User experience design	Content authoring	Content publishing	Knowledge management	Scientific modelling	Numerical analysis	High-performance computing	Cyber security	Machine learning and Artificial intelligence	Internet of Things	Automation	Advanced robotics	Blockchain	Cloud computing	Extended reality	Other
					Systems development												Data and analytics								User experience		Content management			Computational science			Emerging technology								
AANDCP IT Solutions						●																						●					●						●		
Another Computer Store																													●												
Arrowhead Assets Trading As Eaglecrest Technologies		●		●		●	●		●																								●								
Blackheart Cyber																																	●					●			
Business Software Tasmania				●	●				●												●									●											
Cyberevolution Pty Ltd																																	●	●			●				
Data#3	●			●					●																								●						●		
Digital Dandy																									●	●	●	●	●												
Edalex								●				●					●	●											●												
Electrical & Automation Engineers		●		●			●		●			●																													
Esk Mapping & GIS									●								●	●	●																		●				
Forsius Technology Consulting (Australia)																													●												●
Fulcrum Robotics							●						●																								●				
Futago Pty Ltd									●	●															●	●	●														
Geoneon																						●		●						●	●						●				
Handbuilt Creative Pty Ltd									●							●									●	●														●	
Healthcare Software Pty Ltd	●					●			●																														●		
HENSOLDT ANZ	●		●	●	●										●																										
Honestally					●																				●	●							●								●
Indicium Dynamics									●	●														●										●	●						●
InScope IT																																									●
Insight GIS					●				●	●	●																		●												
Ionata Digital									●	●											●								●										●		
Irrisys Pty Ltd					●	●	●	●	●																														●		
ISW					●				●																												●		●		
Jay-Nik Pty Ltd																	●		●											●	●	●									
Kingthing																																									●
LiveTiles	●	●							●																●																
Marketing Data Fitness Pty Ltd						●			●								●		●					●																	
Mighty Kingdom				●	●				●	●						●																									
Mint Telecom																																									●
MyTyreSite Pty Ltd									●	●															●																
Neon Jungle	●								●																				●				●						●		
Ossa Information Technology Pty Ltd		●		●					●	●			●																												
Patterson Brown Pty Ltd				●					●	●																					●		●								
PopUp WiFi PTY LTD																																									●
Pritech PTY LTD	●					●	●		●																																●
RACT									●													●							●				●								
Red Apple IT Pty Ltd																																									●
Remember Press	●					●			●															●				●													
Safe Shore									●				●	●																			●						●		
Secret Lab	●								●														●														●				
St Lukes Health						●					●						●									●			●												
Temtrol Technologies Pty Ltd								●	●	●																										●					●
Timberlands Pacific																		●				●	●							●							●				●
2PM Services			●						●																				●										●		●
42-24						●	●		●																								●				●				

Note: Government organisations have been excluded from the Capability Matrix. 'User research' and 'user experience' from the SFIA framework are not included in the capability matrix as they were not among the top five capabilities for the 47 Tasmanian technology businesses included in the matrix. These capabilities and others are likely to be within the capabilities of the sector but are not among the top five capabilities of the organisation.

Chart 3.3: Aggregated capability matrix of the Tasmanian technology sector

Systems Development
- Programming/software development — 10.6%
- Systems integration and build — 7.7%
- Systems design — 4.9%
- Software design — 3.5%
- Hardware design — 2.8%
- Network design — 2.8%
- Software configuration — 2.1%
- Systems and software life cycle engineering — 1.4%
- Systems development management — 1.4%
- Product management — 1.4%
- Radio frequency engineering — 0.7%
- Safety engineering — 0.7%
- Real-time/embedded systems development — 0.7%
- Testing — 0.7%

Data and analytics
- Data management — 4.2%
- Business intelligence — 3.5%
- Data visualisation — 2.8%
- Data modelling and design — 2.8%
- Database design — 2.1%
- Machine learning — 1.4%
- Database administration — 1.4%
- Artificial intelligence — 0.7%
- Data engineering — 0.7%

User experience
- User experience design — 2.8%
- User experience analysis — 1.4%

Content management
- Knowledge management — 3.5%
- Content authoring — 2.8%
- Content publishing — 1.4%

Computational science
- Scientific modelling — 2.1%
- Numerical analysis — 0.7%

Emerging technologies
- Cyber security — 7.0%
- Cloud computing — 2.1%
- Extended reality (Virtual and Augmented reality) — 1.4%
- Advanced robotics — 1.4%
- Internet of Things — 1.4%
- Machine learning and Artificial intelligence — 1.4%
- Blockchain — 0.7%
- Automation — 0.7%

- Other — 7.7%

Note: The percentage shares indicate the split of technology sector capabilities in Tasmania for Tasmanian technology businesses who provided their consent to have their responses shared publicly.

Fortifyedge
Identity - Status - Safety

FortifyEdge

Tasmanian-based start-up, Fortifyedge uses its advanced biometrics software built on tiny machine learning to provide decentralised identity & authentication particularly when connectivity is limited or not available. Fortifyedge's software has broad applications for highly mobile and remote users that need enhanced cyberphysical security including Defense & emergency services, the emerging space economy (low earth orbit to moon to mars) and critical infrastructure.

FortifyEdge was founded in 2019 and is a pioneer in global cyber-physical security. With a need for greater data security in an increasingly distributed and connected world, FortifyEdge develops provides security authentication based on personal physiology of individuals such as their gait, physical features and cadence.

Co-founder Peter Padd believes that what sets FortifyEdge's solution apart is TinyML – a machine learning algorithm that enables untethered and unsupervised learning for devices. This allows software to be embedded on a device such as smart watch to analyse and learn how a user walks and use that information to continuously authenticate users.

TinyML improves data security while reducing friction for users by eliminating the need for passwords to be manually entered. Removing the need for manual entering of passwords can be lifechanging for those working in defence or emergency services. In fact, Peter explains that:

"Passwordless security is predicted to be one of the next big things in tech. With our technology, you are the password"

FortifyEdge's technology has been recognised an important innovation in defence technology, receiving funding through the prestigious United States Airforce TechStars Accelerator, being named as a finalist in the Australian Defence Industry Awards for Start-UP of the Year in 2021 and were one of only three business to be invited to present their product as a winner of the Northrop Grumman Inaugural Australian Tech and Innovation Showcase.

In the defence space, the company has partnered with Microsoft and leading defence contractor Thales to produce Nexium Defence Cloud Edge for the Australian Defence Force. This product saw FortifyEdge awarded Best Cyber Security Initiative at the 2021 TasICT Excellence Awards.

The solution provided by FortifyEdge has a range of applications across other industries including health care, space, human performance, logistics, finance and agriculture. Another emerging use is in the workplace health and safety space by pre-emptively identifying incidents before they occur by recording other health indicators that may signal fatigue or illness.

FortifyEdge now employs nine people dispersed across Australia and the United States. Being located in a range of locations hasn't proved a barrier to working at the cutting edge of cyber security and affords staff a better work-life balance than requiring physical relocation to a single destination. Peter recognises that recent events have made Tasmania an even more feasible and attractive destination for technology businesses, noting that:

"Trends towards a distributed workforce is a great opportunity for Tasmanian tech talent"

PopUp WiFi

Founded in Tasmania, PopUp WiFi is now a global company that offers self-serve, remotely managed branded internet solutions for businesses and events. PopUp WiFi has supported over 3,000 events and brokered partnerships with some of the world's most recognised companies.

PopUp WiFi has supported major Tasmanian events such as Dark Mofo, the Falls Music and Arts Festival and the Taste of Tasmania by providing reliable WiFi connectivity at events. Founded in 2013 by three local Tasmanians, PopUp WiFi combines world-leading advanced networking and 3D printing techniques, filled with enterprise-grade hardware.

PopUp WiFi experienced success early and received the Best Start Up ICT Solution at the 2013 TasICT Industry Awards. More recently, Nina McMahon co-founder and CEO of PopUp WiFi received the 2021 Tasmanian Pearcey Entrepreneur of the Year Award (an award which recognises a Tasmanian who has taken a risk, made a difference and inspired others).

The start-up journey for PopUp WiFi was helped by Austrade and the Tasmanian Government's start up sector and grants. This assistance provided resources and skills that enabled PopUp WiFi to target international markets and finesse their product, Nina noted:

"During our early stages, Austrade visited our co-working space at the collaborative workspace, Enterprize, and helped us understand the next steps forward as we looked to expand our operations."

PopUp WiFi is now servicing customers from all over the world, including Europe, the United States, New Zealand, and Singapore. By ensuring the technology and business model was scalable from the outset, PopUp WiFi has been able to grow quickly without incurring large overhead costs.

"Thanks to Artificial Intelligence, we have been working on automated management systems meaning that our business can continue to grow quickly without an associated increase in our costs."

Even with the disruption in the global events sector from COVID-19, PopUp WiFi managed to see an opportunity and pivot towards supporting event live streaming, such as graduations and ceremonies.

PopUp WiFi continues to have a strong community focus, having contributed over half a million dollars in cash and in-kind donations to community and charitable events since the business first started.[xxxi] The business also has developed carbon neutral event WiFi, powered by solar and re-chargeable batteries to create an environmentally sustainable product.

4 Technology workforce

Tasmanian technology businesses and organisations with technology at their core operations require a qualified and skilled workforce. Fostering growth in the Tasmanian technology sector will depend on the workforce continuing to develop skills in a fast-changing field.

This chapter analyses the characteristics of the workforce in terms of size, pipeline, qualifications, and diversity. The insights in this chapter are based on data from the ABS, the Department of Education, Skills and Employment (DESE), the National Centre for Vocational Education Research (NCVER), the Department of Home Affairs (DHA) and insights gained from the business survey (including State and local government).

4.1 Size and outlook for the technology workforce

The number of technology workers in Tasmania grew by 3% between 2020 and 2021 to reach over 9,600 workers.[xxxii,1] In the previous year (2019 to 2020), Tasmania's technology workforce grew by 20%, which was the largest growth rate of any state or territory in Australia during this time period and double the rate growth in New South Wales during this period.

The *Australian Digital Pulse* definition of technology workers

captures both those working in the technology sector and the technology workers throughout the broader economy. Those technology workers employed within the technology sector reflect those employed by businesses identified at the beginning of chapter 2. In Tasmania, technology workers employed in technology businesses comprise 38% of the total technology workforce, where the rest of the technology workforce are employed across other sectors such as agriculture, finance and professional services.

Tasmanian's technology workforce represents a smaller share of its total workforce (3.7%) than other Australian states (see Chart 4.1), suggesting the potential for growth. Indeed, Tasmania's workforce is expected to grow strongly at 4.2% on average for the next 5 years. This will mean the number of technology workers in Tasmania will reach 12,348 by 2027.[xxxiii]

Chart 4.1: Technology workers as a share of state employment, 2021
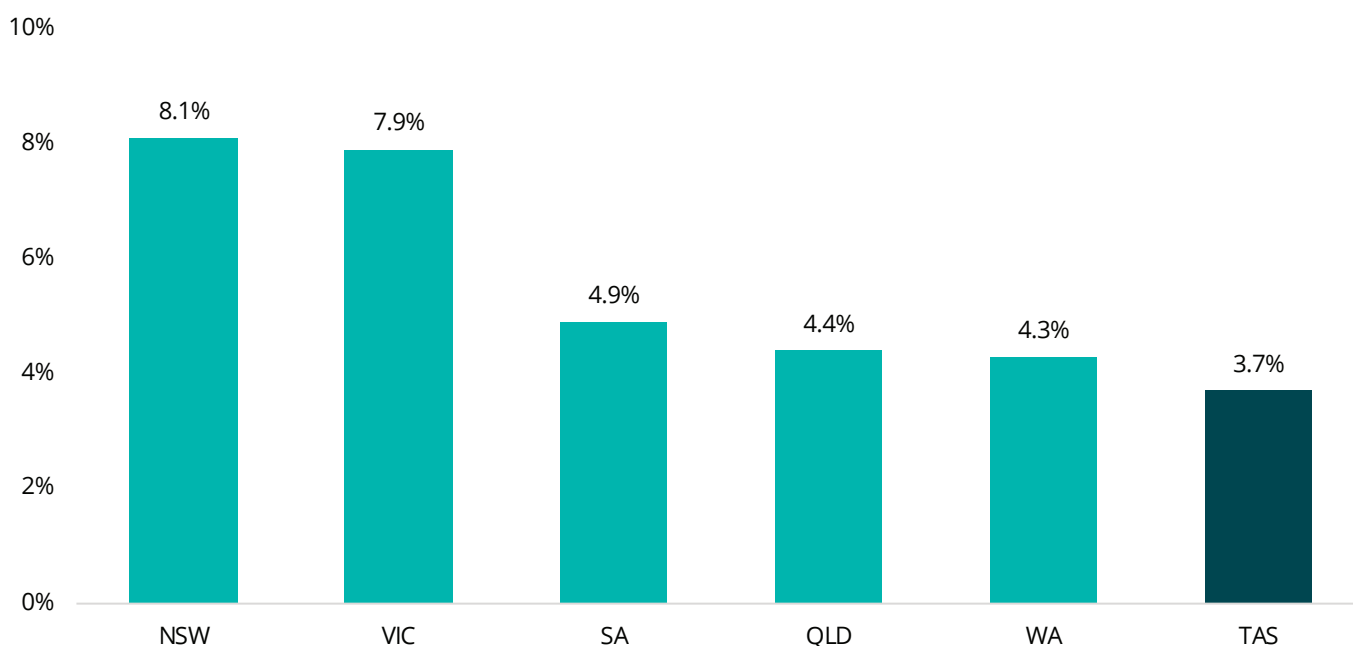
Source: ABS (2022)

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[1] This measure draws on definitions and nomenclature developed by Ian Dennis from Centre of Innovation Industries Economic Research (CIIER).

Tasmanian technology workers are primarily in ICT management and operations roles and ICT technical and professional roles. Over two-thirds (70%) of Tasmania's technology workforce are in these two occupational categories (see Chart 4.2). Specifically, nearly one-in-five (18%) technology workers in Tasmania were working in software and applications, as developers, programmers or engineers, which is an ICT technical and professional occupation. This aligns with the findings in *Australia's Digital Pulse 2021* where

analysis on Burning Glass data identified software programming to be the second highest skill required in job advertisements, coming second only to baseline digital skills (computer literacy, Microsoft office). [xxxiv]

In the Tasmanian companies surveyed, the majority (79%) of technology workers are employed full time. The remaining workers are employed on a part-time (11%), casual (3%) or contract/temp agency/labour hire (6%) basis.[2]

Chart 4.2: Share of employees in technology occupational roles (top 10 occupations)

Occupation	Share
Software and applications developers, programmers or engineers	18%
ICT/IT consultant	6%
ICT Managers	6%
ICT support professionals	5%
ICT support and test engineers	5%
ICT sales professionals	5%
Database and systems administrators	4%
Cyber or ICT security specialists	4%
Graphic and web designers and illustrators	4%
Agile project managers	3%
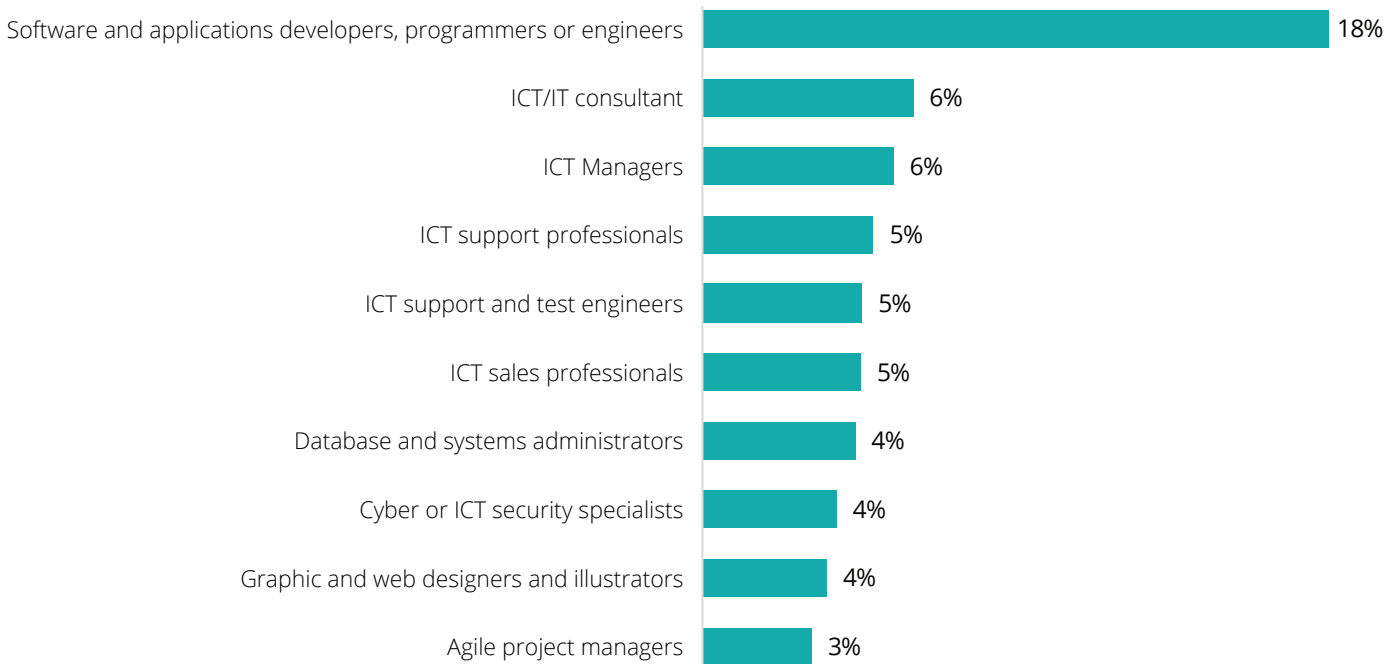
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

[2] Shares do not sum to 100% due to rounding.

4.2 Technology workforce pipeline

Facilitating the growth in demand for the technology workforce will be essential for growth in the Tasmanian technology sector and the use of technology in the broader economy.

The key sources for the technology workforce pipeline are university graduates with relevant qualifications, migrants to Tasmanian and those reskilling from similar professions.

The University of Tasmania is the chief source of ICT degree graduates for the State. Over the decade to 2019, the number of students completing undergraduate or postgraduate ICT related degrees from the University of Tasmania has increased by over 9% per year on average to reach 533 students (see Chart 4.3). Data from the Department of Education, Skills and Employment (DESE) indicates 83% of students enrolled in 2019 were from overseas.xxxv With significant interruptions to international

education in Australia due to the COVID-19, the number of enrolments and completions are likely to continue downward for the next few years. Thus encouraging more Tasmanian students to study ICT will be an important contributor to facilitating growth in the technology sector.

The increase in student completions has been largely driven by an increase in the number of international students, which has almost tripled over the last decade. The increase in international student completions has more than offset a corresponding decrease in domestic student competitions over the same period. Over the past decade, the share of international student completions grew from 67% in 2010 to 90% in 2019. The growth in student numbers has been strongest for postgraduate studies, with the share of postgraduate completions growing from 29% of total completions in 2010 to 51% in 2019.

Chart 4.3: University of Tasmania ICT completions
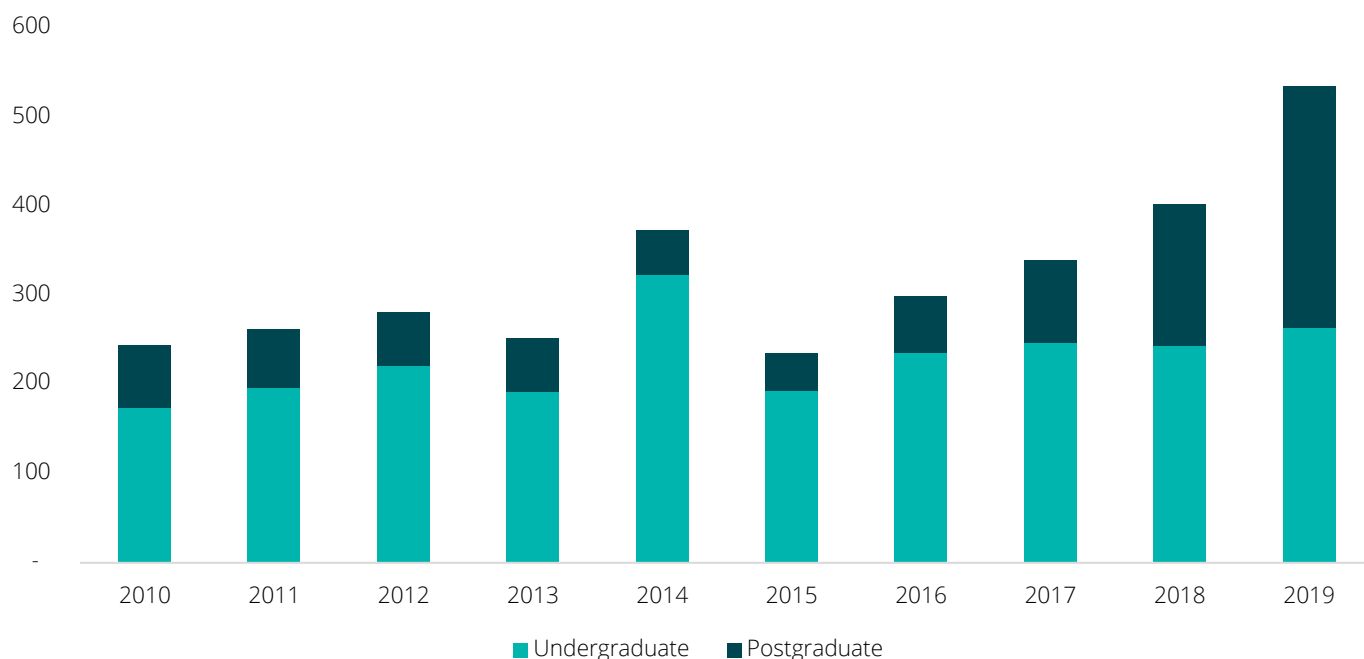
Source: Department of Education, Skill and Employments (DESE) xxxvi

The number of completions of vocational qualifications in technology related courses in Tasmania decreased by approximately 30% from 2015 to 2019 (see Chart 4.4). While completions of all qualification levels have fallen, the largest decrease was in certificates I/II in 2019, which may reflect issues in the Certificate I intake and transition of the 2018 Certificate I cohort to enrol in Certificate II. Alternatively, this may be a result of funding changes for the vocational education system or reflect the skills pipeline leakage via the nationally identified decline in students studying STEM subjects in high school and at college level.

Chart 4.4: Vocational ICT qualification completions, Tasmania
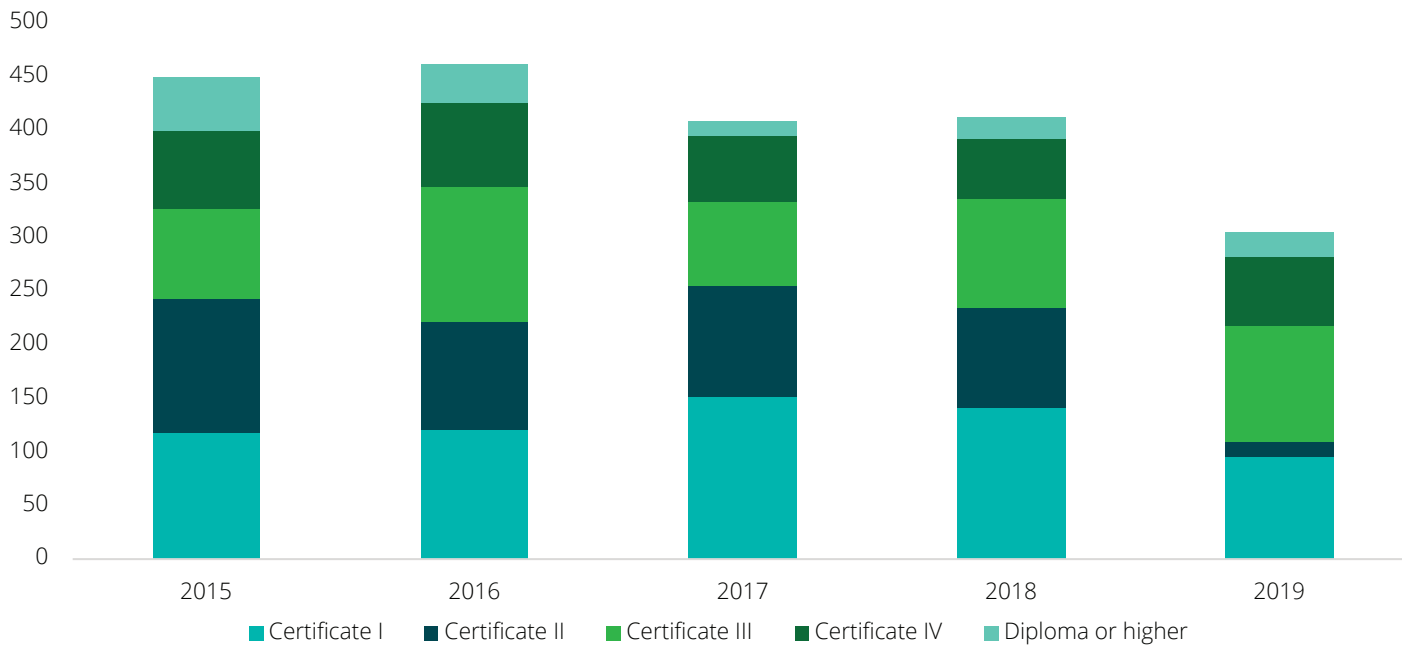
Source: NCVER[xxxvii]

In addition to ICT graduates, migrants to Tasmania with technology skills are a longstanding source of potential talent and capabilities. The Australian Federal Government's Priority Migration Skilled Occupation List (PMSOL) includes particular ICT specialist roles.[xxxviii] The Tasmanian Government identifies a subset of the priority list of eligible occupations (the Tasmanian Skilled Occupations List) based on skills that are in demand in Tasmania for the Skilled Nominated visa (subclass 190) and Skilled Work Regional (Provisional) visa (subclass 491). The only ICT related occupation included in the TSOL for 2021-22 was Web Designer.[xxxix]

Data from the DHA shows that there is only a small number of skilled migrants within technology related occupations sponsored in Tasmania each year.[xl] Prior to the pandemic, migration to Tasmania had been increasing by 28% per year on average (See Chart 4.5). In 2019, net overseas migration accounted for roughly 73% of Tasmania's total net migration adding 3,967 residents to Tasmania's population and net interstate migration contributing an additional 1,418 residents.[xli] The impact of closed borders from COVID-19 saw net migration to Tasmania to decline by 73% in 2020. The impact was felt across both overseas and interstate migration. While these migration figures do not directly reflect the number of migrants coming with technology skills or employed in the sector, the magnitude of the decline suggests that the impact of COVID-19 could disrupt this small but important flow of technology talent into the Tasmanian workforce.

Chart 4.5: Tasmanian net migration, 2015-2020
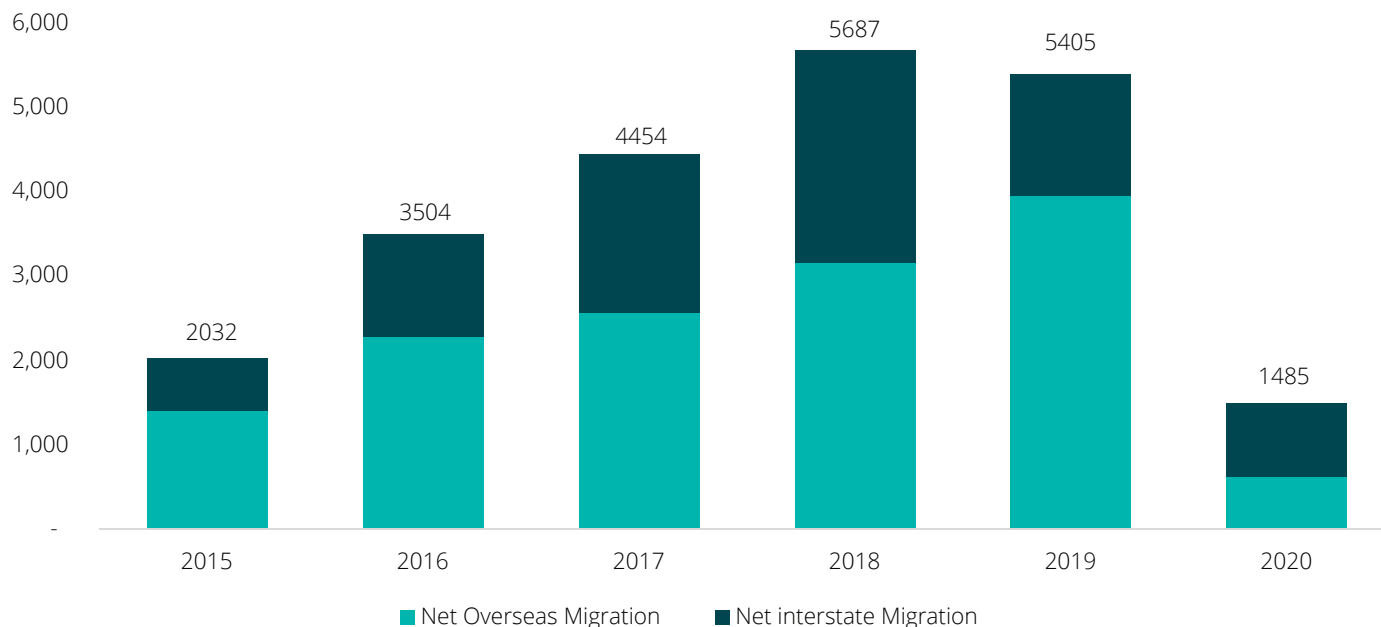
Source: ABS (2021)

4.3 Qualifications of the workforce

For technology business surveyed for this report, almost 60% of employees had a bachelor's degree or higher qualification. These results are significantly higher when compared to the Tasmanian general population, where 26% hold a bachelor's or higher degree.[xlii]

Chart 4.6: Share of employees by highest qualification (average)
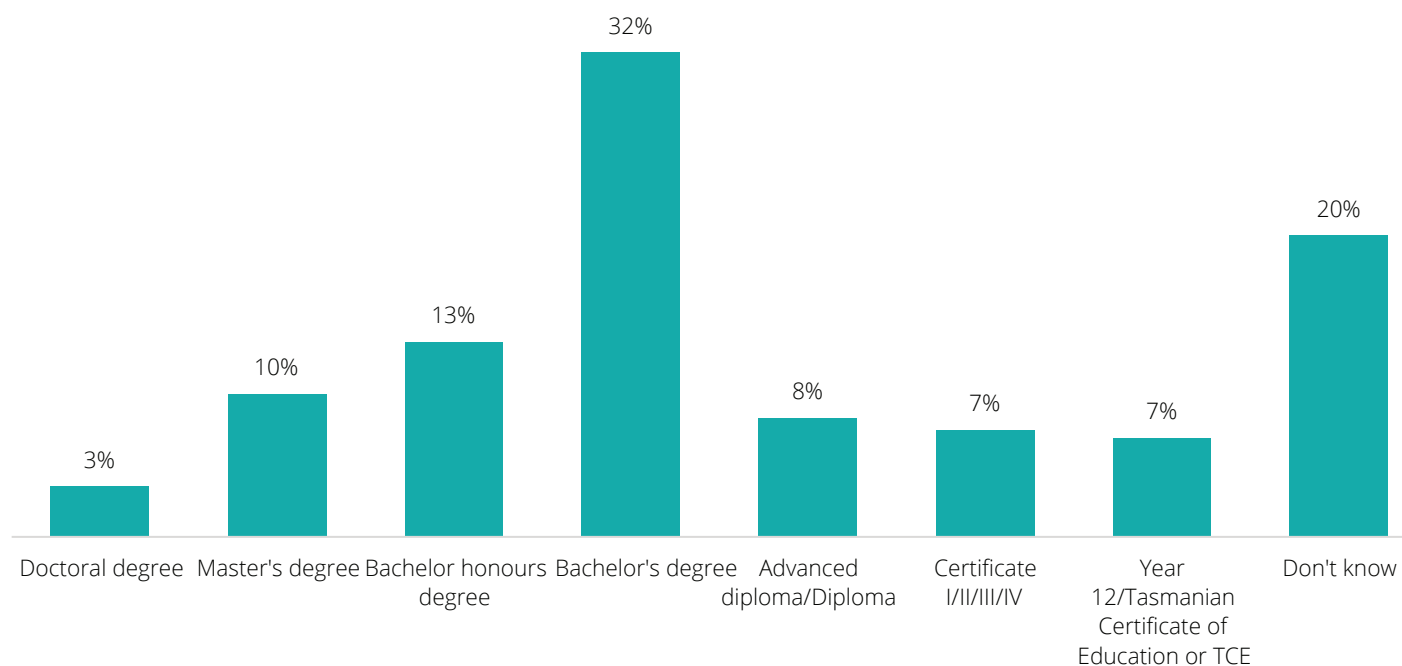
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Alongside traditional qualifications, such as undergraduate degrees and TAFE diplomas, businesses reported a number of microcredentials held by their employees to develop and recognise their skills throughout their careers. The business survey revealed that 63% had at least one of their employees with a microcredential. This suggests that for every five employees, there are two with microcredentials.[3] Chart 4.4 shows that microcredentials are held in a range of areas including Cloud (including AWS, Azure and Google Cloud) (8%), networking (6%), backend development tools (6%) and project management (6%).

Microcredentials represent ongoing learning and professional development in the technology workforce. While professional development is important in any industry, it is arguably more critical in technology occupations given the high rate of innovation and technological change. The World Economic Forum (WEF) estimates the 'half-life' or ongoing relevance of professional skills is approximately five years.[xliii]

Beyond the technology sector, digital skills will be increasingly required for the broader workforce in those businesses that require technology for their core operations. Recent research has found that 87% of jobs in Australia require digital literacy skills and that upgrading technology skills may result in $7,700 in additional income for an individual employee.[xliv]

Chart 4.7: Share of employees with microcredentials (average)
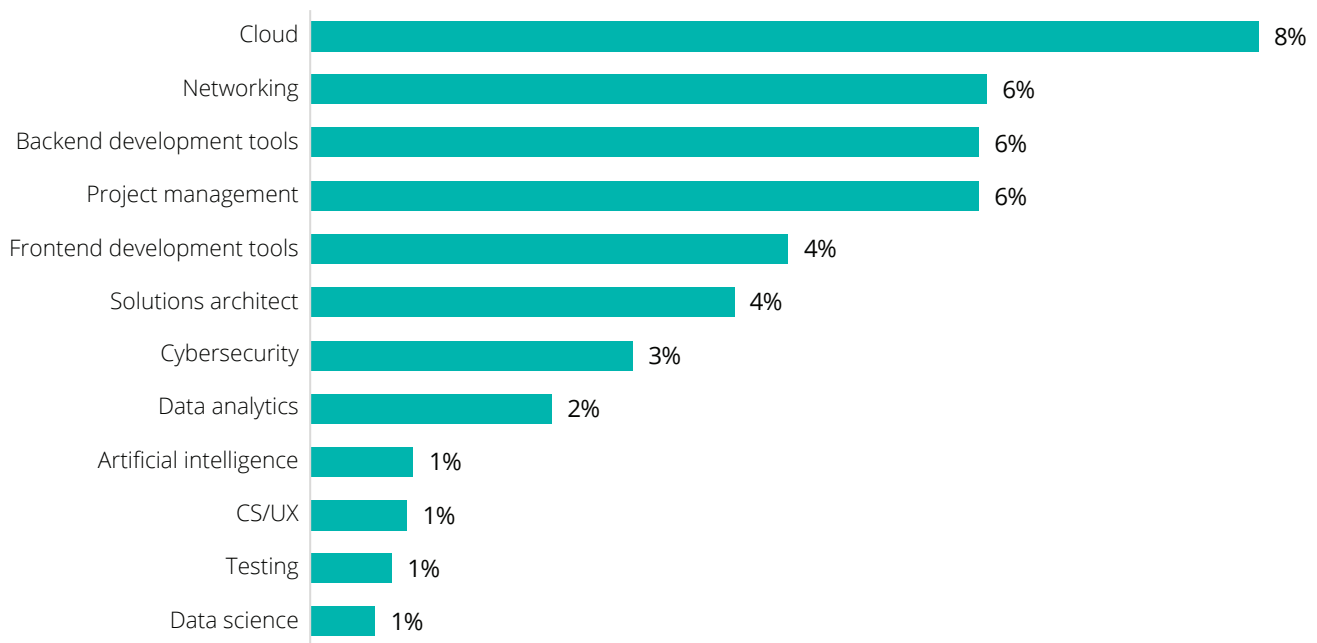
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

[3] This number is indicative as employees may have more than 1 microcredential.

4.4 Diversity in the technology workforce

The technology industry is still male dominated. Despite the growth of female participation in recent years, it remains below the average for professional industries overall.[xlv] Our survey of technology businesses found that, on average, only 30% of employees were women and less than 1% of employees identified as non-binary. The share of women employed in technology roles is consistent with the national average of 31% in the 2022 edition of *Australia's Digital Pulse*.[xlvi]

The benefits of increasing the number of women in technology has been estimated at $11 billion in Australian Gross Domestic Product (GDP) over 20 years.[xlvii] This is mainly attributed to the productivity benefits associated with women reskilling into higher paid technology roles compared to professional services. There are a number of other benefits from increasing other forms of diversity in the technology workforce such as age, cultural, sexual orientation, physical ability and neurodiversity. For example, one study found that increasing the number of workers with different abilities increases productivity.[xlviii] Other studies have also noted

that increasing ethnic diversity increases financial returns,[xlix] and firm productivity.[l] Given there are significant benefits associated with a diverse workforce, almost half of the businesses surveyed have a diversity policy in place. Chart 4.9 shows that policies cover a range diversity types, but most commonly were gender (81%), cultural (73%) and age (67%). A quarter of Tasmanian technology businesses surveyed are yet to develop a diversity policy. This presents an opportunity for the Tasmanian technology sector industry associations to further promote diversity within the workforce.

In addition to promoting diversity through workforce policies and practices, increasing the pipeline of women coming into the technology sector will be important. At both a vocational and university level, ICT qualifications are mainly being undertaken by men. For vocational qualificaitons enrolments in 2019, only 37% were women.[li] At the university level, only 17% of domestic students and 40% of international students enrolled in ICT courses were women.[lii] This is lower than the proporion of enrolments for all courses, where 69% of domestic and 49% of international students are women.

Chart 4.8: Share of businesses and status of diversity policy
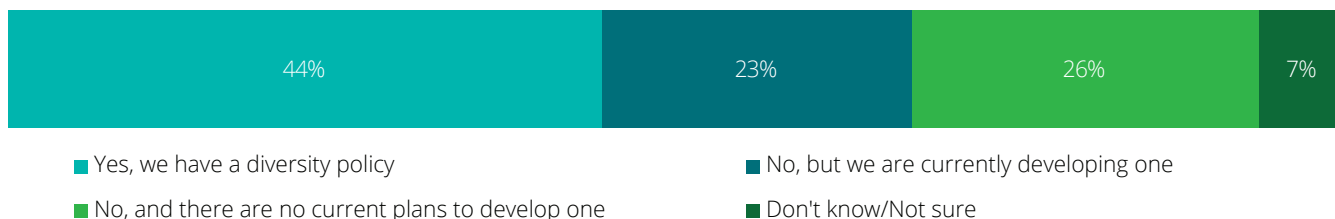
- Yes, we have a diversity policy
- No, and there are no current plans to develop one
- No, but we are currently developing one
- Don't know/Not sure

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart 4.9: Types of diversity covered in diversity policy
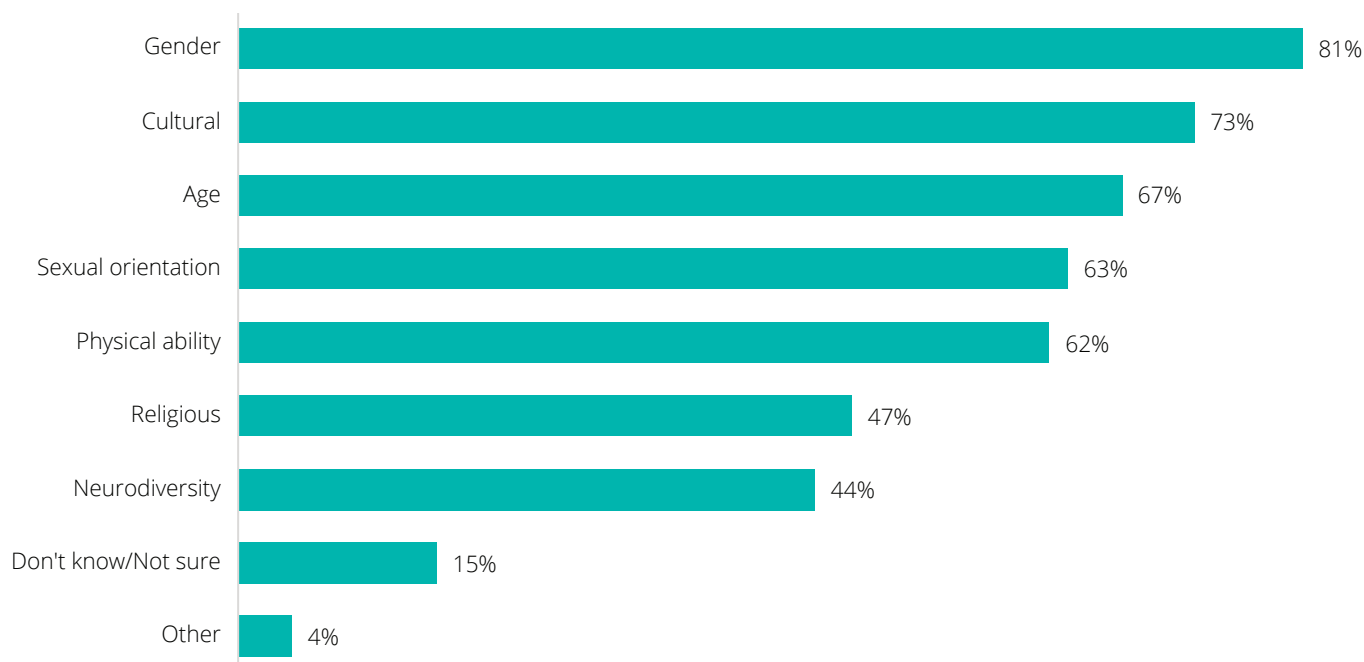
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

![MyState Bank logo]

MyState Bank

MyState Bank is A Tasmanian based bank with a strong focus on using technology to drive growth. MyState utilises analytics to improve their customer's experiences and help them better understand their spending and achieve their financial goals.

MyState Bank is a Tasmanian based bank that has used technology to improve its service offerings for its 162,000 customers. The bank's internal technology team of 30 people is responsible for the service delivery and improvement of the bank's core banking infrastructure, lending system and online banking. The team works with the broader business to deliver on the bank's objectives by testing and deploying of new online products and supporting 24/7 operations.

David Mills, Head of Technology at MyState, believes that the team's real value add is ensuring that the technology supports the business and its customers by having a strong understanding of the bank's commercial and operational requirements, noting that:

"Technology is an essential part of our growth strategy with 93 per cent of our 17,000 new customers in 2020-21 originating through digital channels."

Another way technology has helped support the bank is through the introduction of artificial intelligence and robotics processes in its back office to predict the behaviour of home loan customers. This has improved customer wait times and accuracy, with most conditional loan approvals being made in two days and unconditional approval made within a week while maintaining relevant checks on applicants.

For its core banking functions, MyState has acquired a licence for a customised solution that allows it to tailor the technology to the objectives and requirements of the bank. Speaking on the benefits of this platform, David recognises that:

"This ability to customise has given us a competitive edge in the market. It lets us be agile and go straight to market with new features such as the New Payments Platform, as well as GooglePay and ApplePay."

The bank's technology also supports and empowers its customers, contributing to the bank having one of the highest net promoter scores in the industry. For example, MyState recently rolled out online applications such as their Insights and Auto-Savings which provide customers smarter insights into their spending and analytics to embed better auto-saving practices. This feature saw the bank place in the top 10 in the *AFR BOSS Innovation Awards in the banking, superannuation and financial services* category in 2021.

As the importance of technology has grown in the business, MyState has needed to focus more on finding skilled staff. One channel is through student internship programs, which has proved to be a 'win-win' situation that provides students with an opportunity to gain professional experience and the bank to identify potential future staff members. A number of current employees have been recruited through this channel.

The technology team at MyState is culturally diverse, which has helped collaborating with MyState's technology providers, many of whom are based overseas. David believes that having a c`ulturally diverse team has added significant value and collaborative problem solving when working with these providers, noting that:

"Out of our 30 team members, we have nine nationalities represented. The impact this has had on our culture is fantastic, it has really helped break down barriers."

5 A growing sector

With a diverse set of capabilities alongside a strong outlook for the State economy, businesses in the Tasmanian technology sector have strong expectations of growth. These expectations have been supported by the high growth experienced during the COVID-19 pandemic.

However, there are barriers that could affect the ability of the sector to realise growth such as finding the right skills, obtaining access to markets, and accessing support for start-up businesses. This chapter explores the outlook for the industry before discussing some of the key factors that are required to facilitate growth in the sector.

5.1 Outlook for the industry

Relatively smaller exposure to early COVID-19 outbreaks alongside effective government support saw Tasmania's economy recover relatively quicker from the pandemic than other Australian states and territories. Deloitte Access Economics estimates Tasmania's economy (measured by Gross State Product) was almost 9% larger in December 2021 than pre-pandemic.[liii]

As the COVID-19 recovery continues, Tasmanian and Australian employment levels are now back to record highs and Tasmania's underemployment rate (portion of workers who would like to work more hours) sits roughly at a decade low.[liv]

Despite strong recent performance, the December 2021 edition of Deloitte Access Economics' *Business Outlook* highlights that Tasmania is approaching a crucial turning point as traditional barriers to faster economic growth return.[lv] After the initial Omicron rebound, Deloitte Access Economics expects output per person and jobs growth to trail the national average for the medium term as other states and territories continue their own post lockdown recoveries.

Of the Tasmanian technology businesses that responded to the survey, the reported average growth in revenue between 2019-20 and 2020-21 was 17%, demonstrating the significant resilience of the sector and pandemic-induced digitisation across the economy.

The industry is also confident about the future outlook, with 81% of businesses expecting to experience revenue growth over the next three financial years (2022-23 to 2024-25). More than 60% of businesses expected increases in revenue of up to 30% over this period and 8% of businesses expecting revenue to double (see Chart 5.1). However, revenue expectations vary among businesses with one in five expecting a decline or no change in revenue.

Chart 5.1: Expectations of revenue growth, 2022-23 to 2024-25
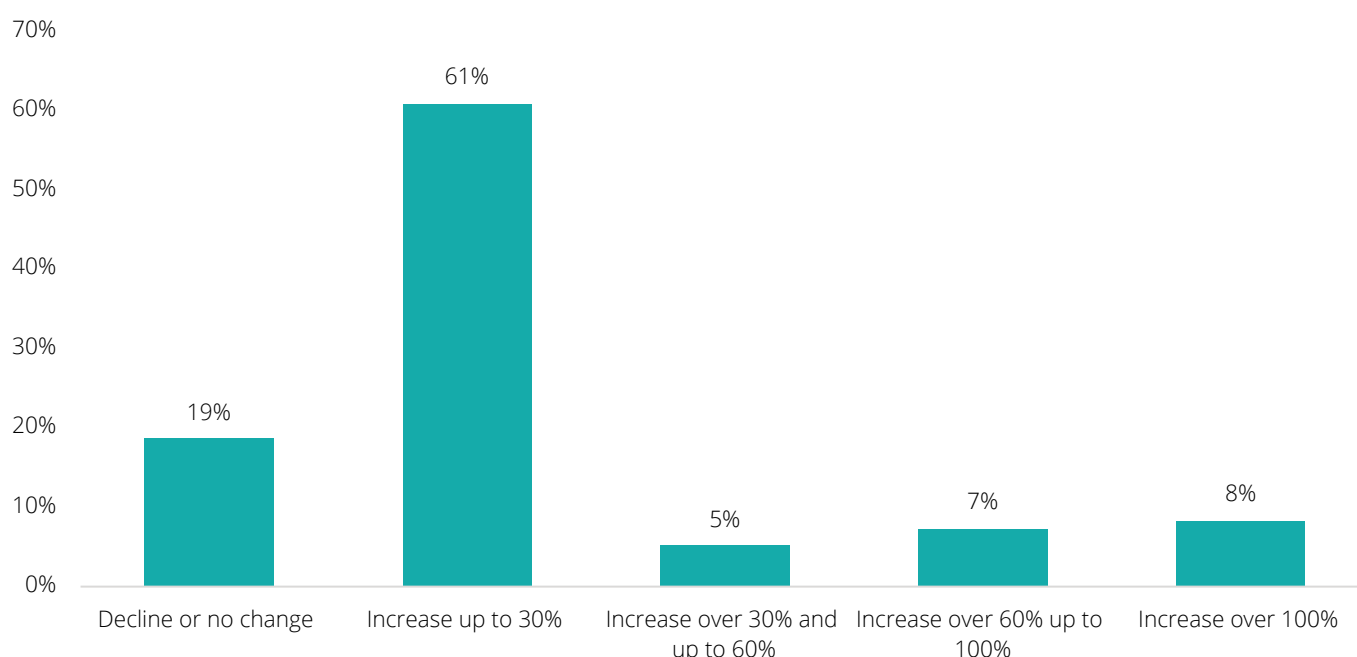
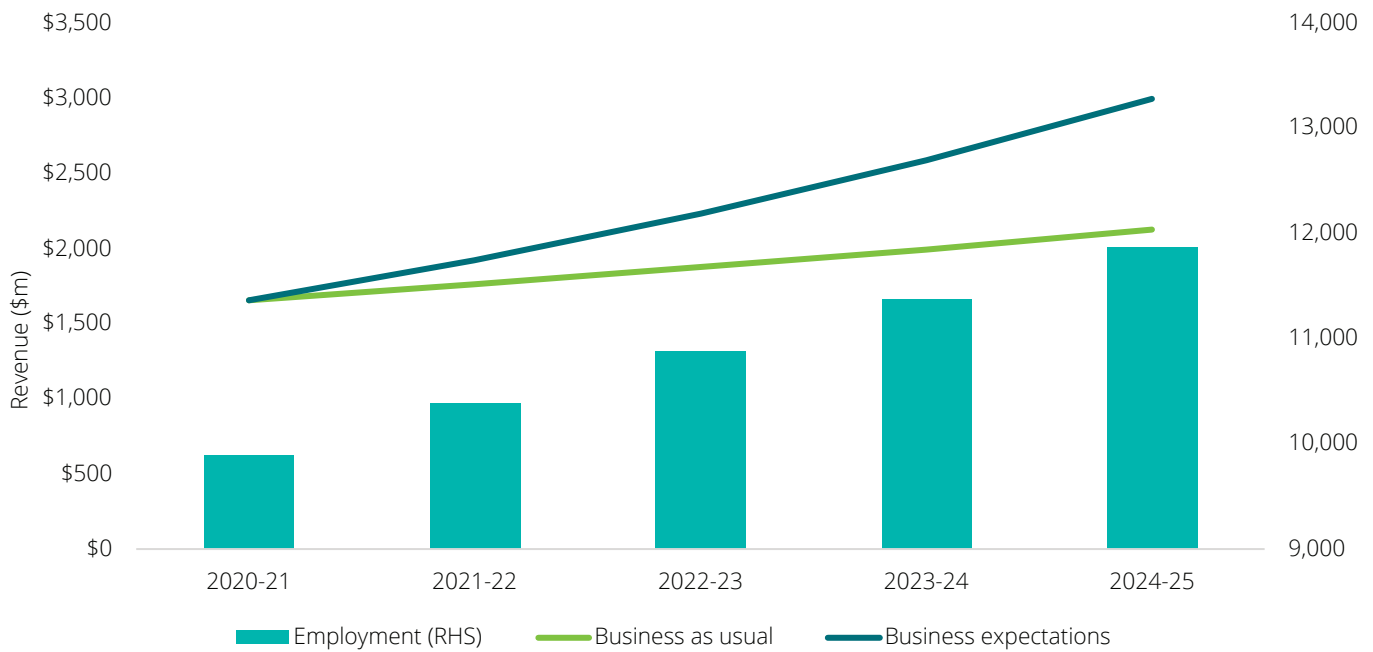Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Based on the current trajectory of the Tasmanian sector, revenue would increase by $467 million to reach $2.1 billion by 2024-25 (See Chart 5.2). This would be consistent with the historical five-year average annual growth rate of 6.4%. The outlook based on business expectations of revenue growth shows a faster expansion of the sector. After accounting for business size, the survey suggests that Tasmanian technology businesses expect average revenue growth of approximately 16% per year through to 2024-25. If this growth rate is realised, the revenue of technology sector would increase by $1.3 billion to reach $3.0 billion by 2024-25.

Revenue growth will also translate into employment growth for technology workers in Tasmania. *Australia's Digital Pulse* (ADP) estimates that the technology workforce in Tasmania will grow by 4.7% or to a total of 12,600 workers out to 2026.

Chart 5.3 shows that the most commonly selected source of growth reported by businesses was increasing demand for products/services. This is likely a result of a long-term trend towards a more digital economy accelerated by investments in technology during COVID-19. Australian business investment in technology increased by 13% between March 2020 and June 2021.[lvi]

Other expected sources of revenue growth include increasing market share for existing products as well as new products and services, indicating the willingness of this sector to expand and experiment with innovative products or business models.

Chart 5.2: Revenue and technology employment forecasts

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022) and Deloitte Access Economics (2021)

Chart 5.3: Sources of revenue growth

Increasing demand for products/services	75%
Increase in market share for existing products	69%
New products/services	55%
Access to new domestic markets in the rest of Australia	39%
Access to new international markets	35%
Access to new domestic markets in Tasmania	20%
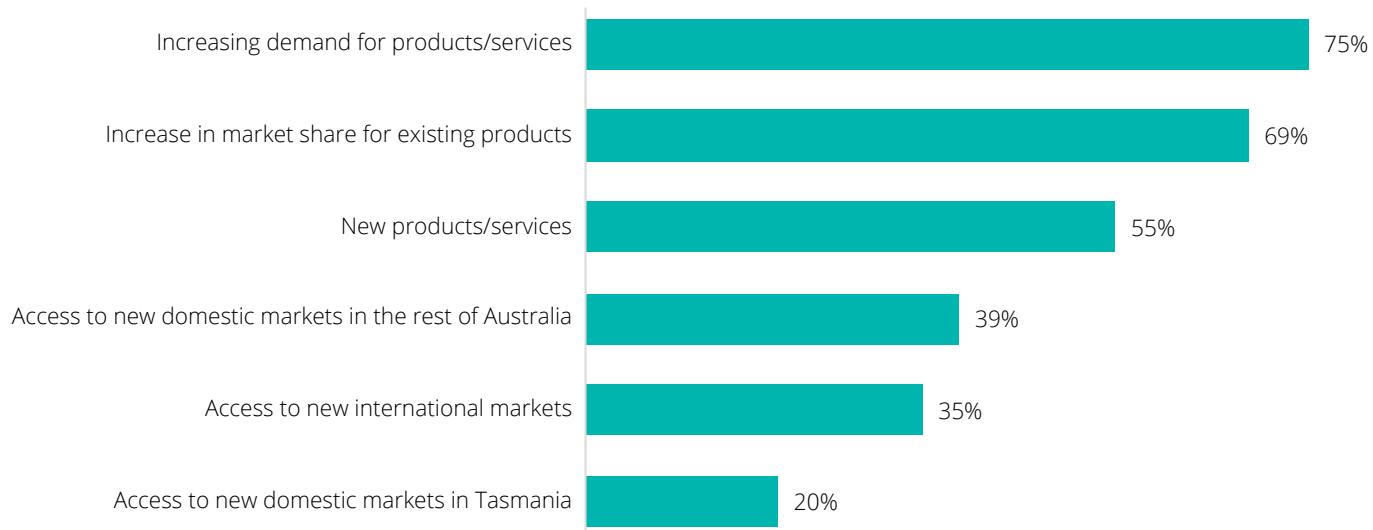
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)
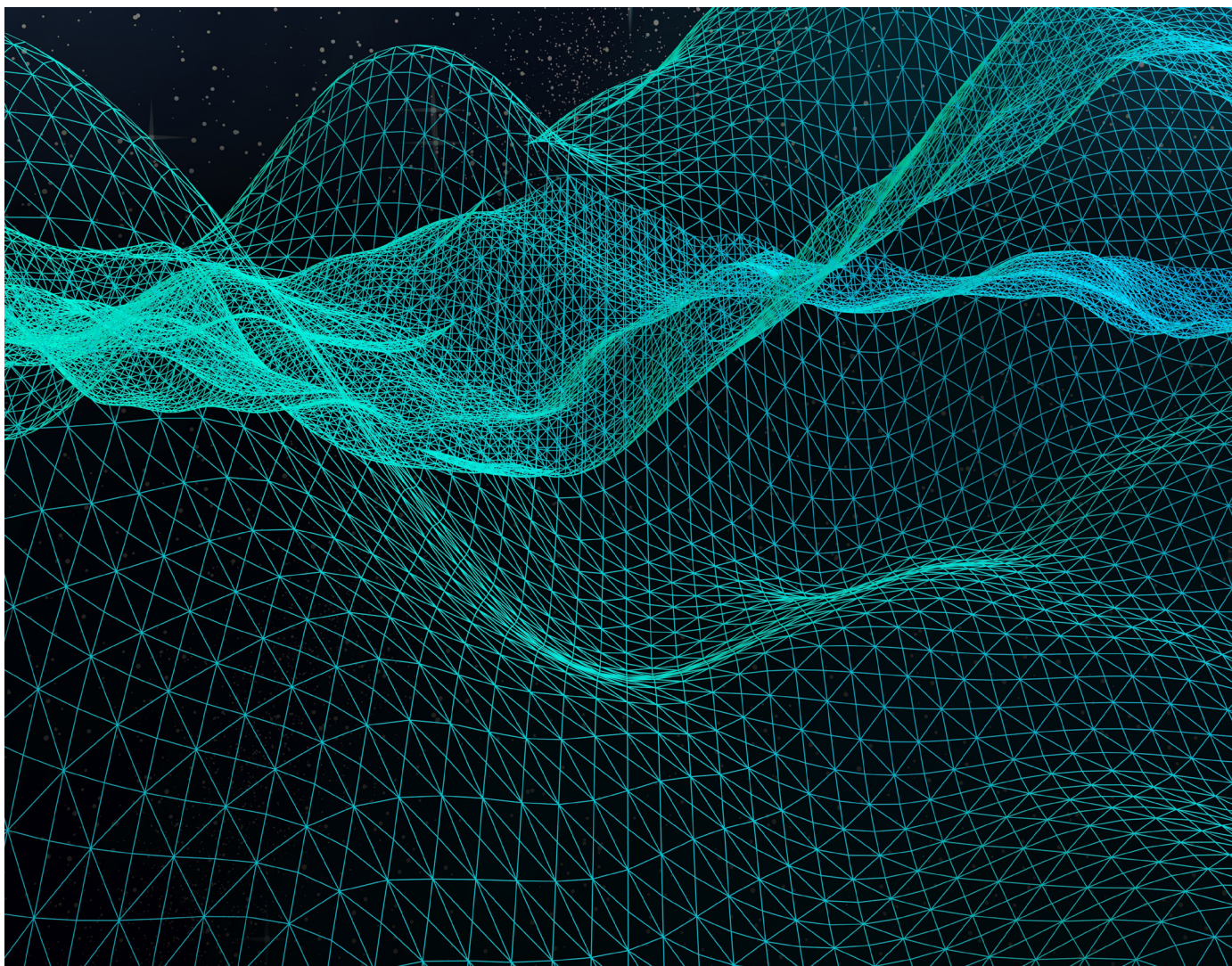
5.2 Supporting growth in the sector

Realising the strong outlook in the Tasmanian Technology sector will require businesses to overcome barriers to growth. Nearly 9 out of 10 (87%) businesses reported facing a barrier to growth in their business.

Chart 5.4 shows that inability to attract suitable staff is the most common barrier (selected by 51% of businesses), with more than double the share of businesses citing this impediment compared to any other barrier.

Beyond difficulties attracting suitable staff, there are a range of other barriers facing the sector. While some are more difficult for the industry and government to influence – such as economic uncertainty – others can be addressed or mitigated through government and industry action, including access to start-up capital, access to markets and developing soft skills. The remainder of this chapter explores these issues.

5.2.1 Developing skills for the workforce

Organisations reported a number of technical and 'soft' or generic skill gaps within the sector inhibiting growth. In fact, a third of businesses don't believe their current employees have the technology-related skills they require for their current business skills. This demonstrates the challenges in finding suitable staff needed to grow that is experienced by businesses across Tasmania.

Businesses which currently have technology capabilities and skills are also more optimistic about the future of their business. Businesses that agreed that their current employees have the skills and capabilities required for their current needs reported an expected revenue growth of 35% in 2021-22, compared to expected revenue growth of 15% in 2021-22 for remaining businesses.

Cyber security was the most common technical skills gap, as businesses are increasingly looking to enhance their cyber security capabilities. Cyber security was also listed as a top skill by organisations. In fact, six out of the top ten skills gaps are also in the top ten capabilities reported by organisations, including cloud computing, programming/software development, systems integration and build, testing and product management. This demonstrates that many of the reported skills gaps in the sector are within skill categories that many businesses have already and are looking to further develop. Other skills including user experience design and machine learning and artificial intelligence are still emerging with fewer businesses having capabilities in these areas.

Generic or enterprise skills are another skills gap for the Tasmanian technology sector. The business survey for this report indicated that the most common soft skill gap is project management, reported by a fifth of organisations (21%), highlighting that businesses are looking for workers who can help them manage the delivery of work, especially as businesses are expecting to see significant growth in the next few years. Other soft skills gaps reported include communication skills (14%), writing (13%) and research (12%).

Chart 5.4: Top 10 most commonly cited barriers to business growth
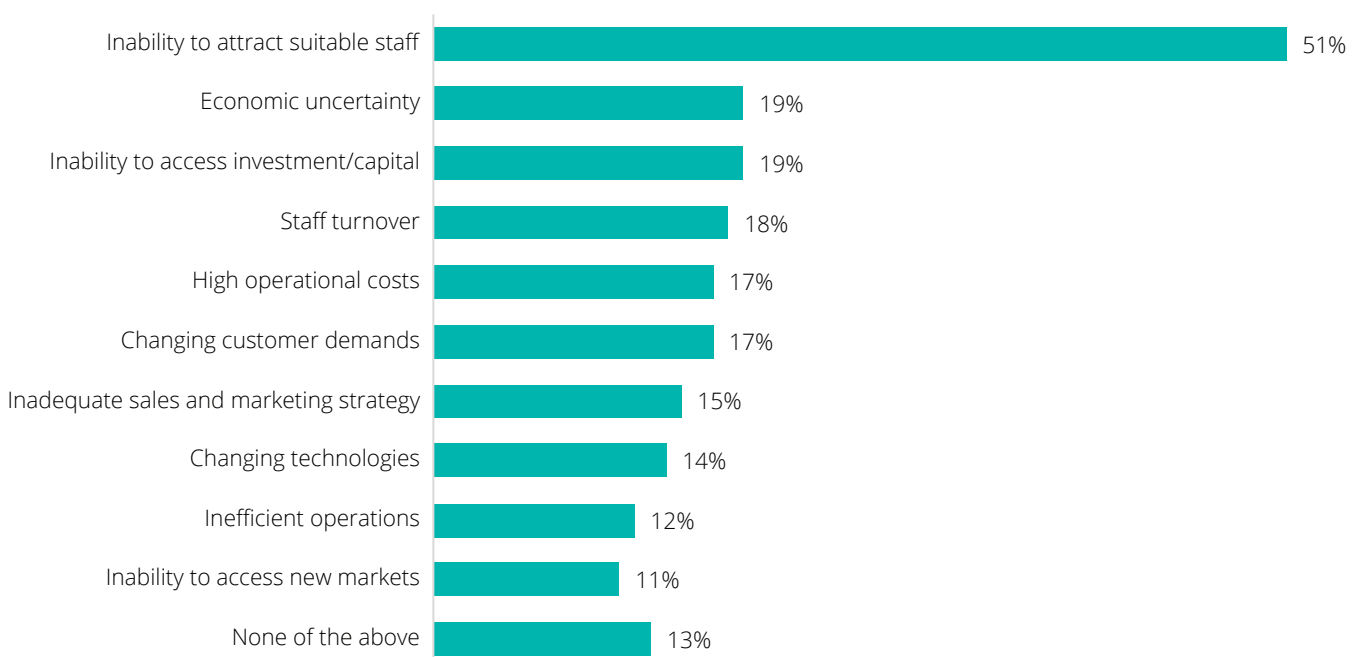
Barrier	Percentage
Inability to attract suitable staff	51%
Economic uncertainty	19%
Inability to access investment/capital	19%
Staff turnover	18%
High operational costs	17%
Changing customer demands	17%
Inadequate sales and marketing strategy	15%
Changing technologies	14%
Inefficient operations	12%
Inability to access new markets	11%
None of the above	13%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart 5.5: Top technical skills gaps for the technology sector

Note: Established capabilities is defined as those that were identified as a top skills gap and a top capability across the sector. Emerging capabilities is defined as those that are not a top capability but a skills gap for businesses.
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart 5.6: Soft skills gap (rank 1)
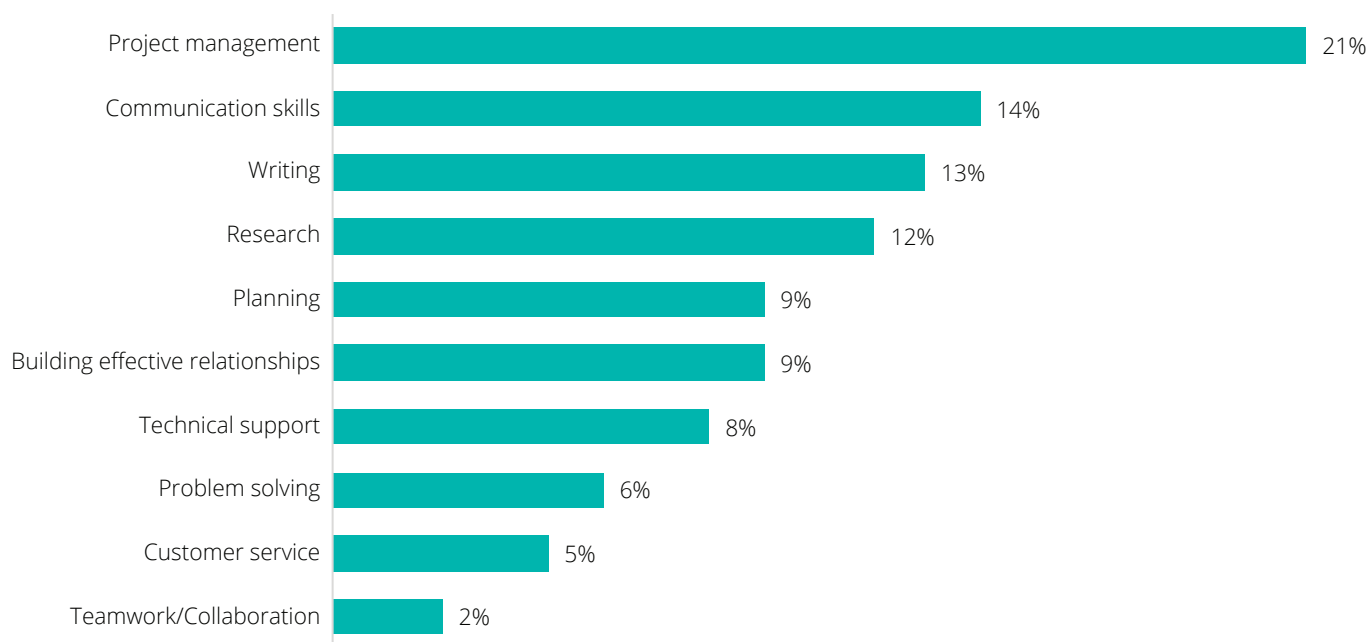
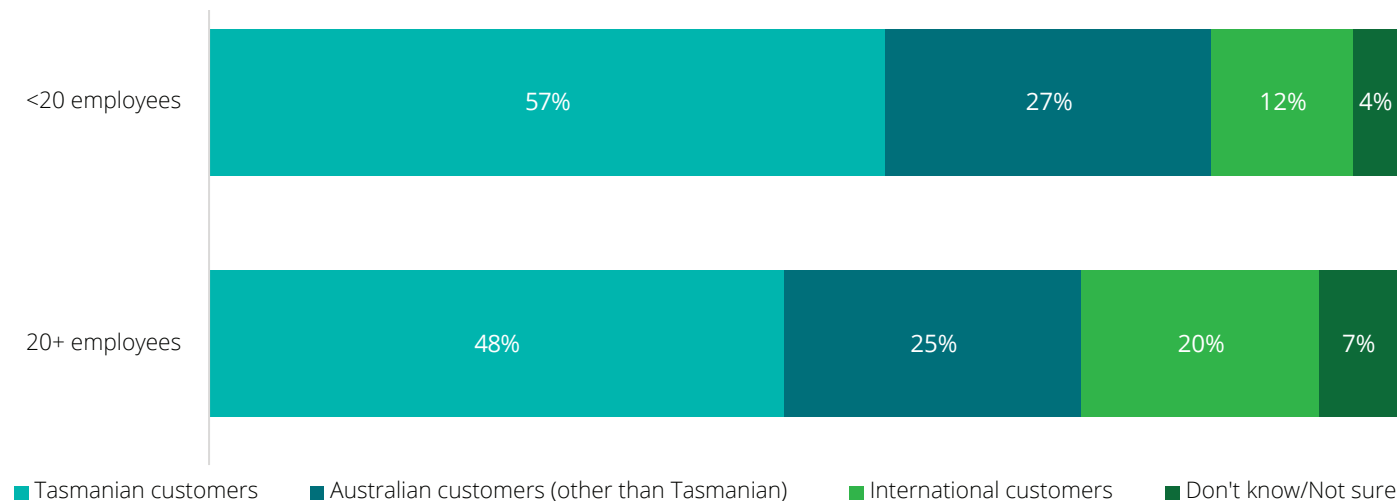Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

When businesses were asked about where they are most likely to develop their skills and capabilities to grow their business, almost half of organisations are most likely to hire new staff (44%). For those looking to hire skilled staff, over two thirds (68%) of businesses prefer to hire from within the Tasmanian workforce, rather than hiring from mainland Australia or internationally. However, only a fifth of businesses are confident that the Tasmanian job market can provide the technology-related skills and capabilities they require. This represents a mismatch where businesses are looking to hire from within Tasmania, however there is a shortage of appropriately skilled job applicants to fill the roles. The already existing skills gap within the sector may be further exacerbated unless businesses find other sources of skilled workers.

One alternative solution is to upskill existing staff. Only a third (33%) of businesses are most likely to upskill current staff to source skills and capabilities to grow their business. Yet there could be benefits if businesses were to reconsider this approach. One study suggests those businesses with higher levels of upskilling current staff have nearly half the attrition rate compared to businesses that have low levels of upskilling (14% compared to 25%).[lvii] The skills gaps identified by industry in the Tasmanian technology sector survey provide the opportunity to more closely align university courses and vocational offerings with sector demand. This could be encouraged by industry developing strong links with educational facilities over time and could also increase the likelihood that Tasmanian students enter the local ICT sector.

Chart 5.7: Source of skills and capabilities (rank 1)
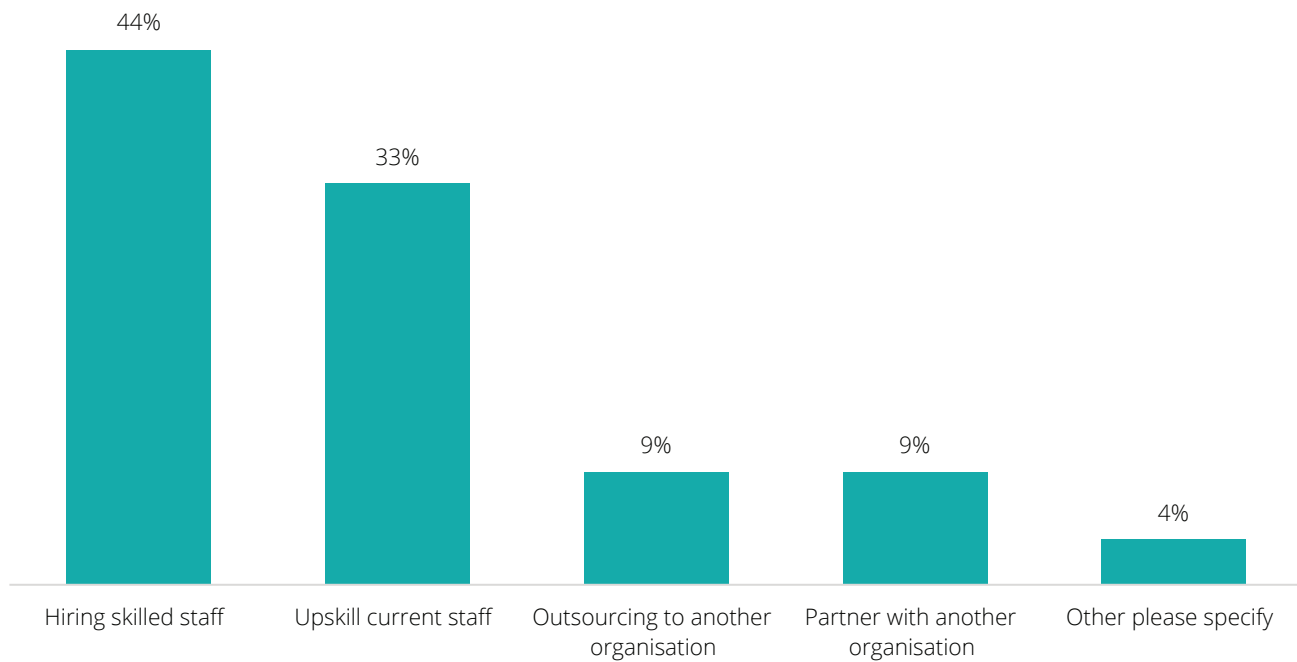
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

5.2.2 Access to external markets

Access to external markets can lead to significant economic opportunities and access to a greater number and wider range of customers.

On average, 28% of revenue generated by technology businesses in the survey were from interstate customers, and 5% from international customers. Businesses exporting had more than double the revenue growth and saw an increase of 28% in revenue between 2019-20 to 2020-21, compared to businesses with Tasmanian customers only with a revenue growth of 13% in the same period.

Businesses with more employees are more likely to export internationally than smaller businesses. This means that smaller businesses have an opportunity to access the international markets: where 12% of revenue generated by businesses with less than 20 employees were from international customers compared to 20% of businesses with 20 or more employees. The results suggest that there may be a knowledge gap around how to access international markets, rather than only a capability and resources gap as technology goods and services are generally easier to export compared to more traditional goods. Even with greater awareness of opportunities in international markets, smaller businesses may still lack resources, time and money to access external markets.

Chart 5.8: Average share of customer revenue by business size

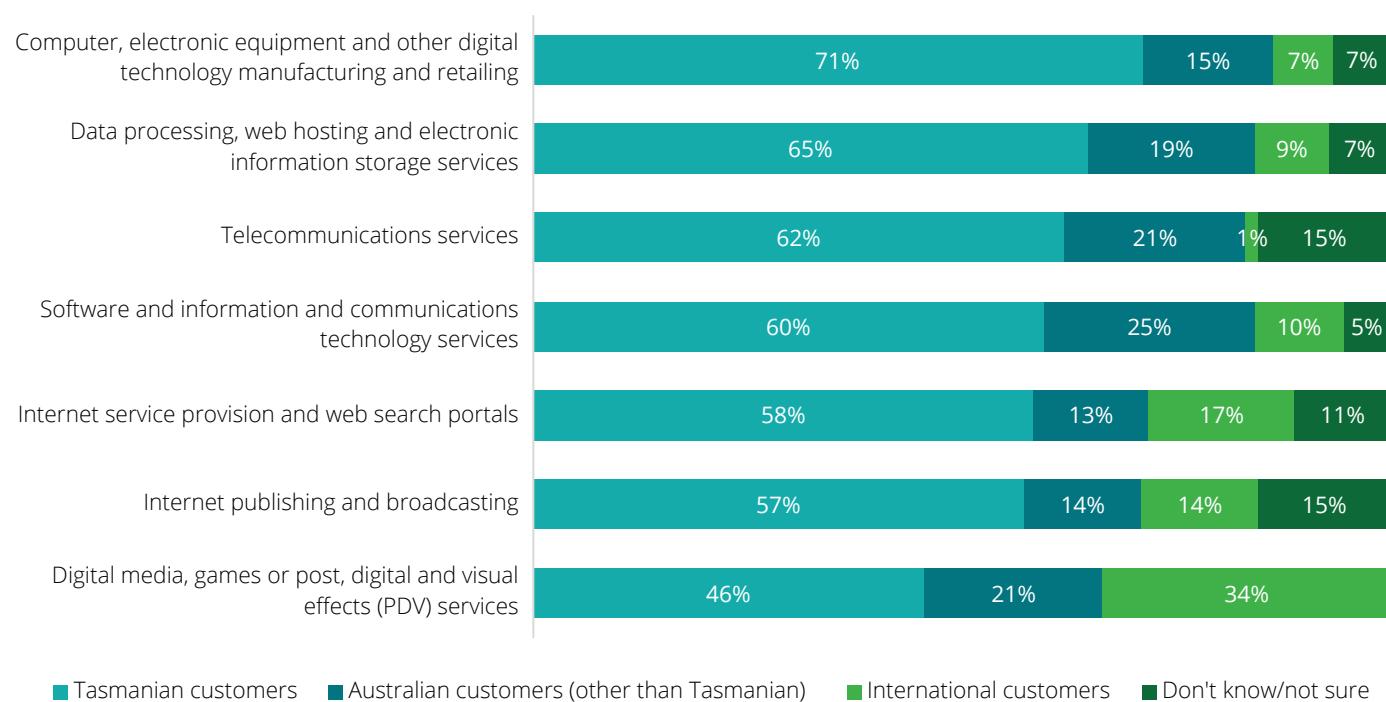|	Tasmanian customers	Australian customers (other than Tasmanian)	International customers	Don't know/Not sure
<20 employees	57%	27%	12%	4%
20+ employees	48%	25%	20%	7%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Businesses from all market segments are exporting a wide range of technology services and products. For digital media, games or post, digital and visual effects services businesses, an average of a third of revenue (34%) was generated from international customers, and less than half (46%) were from Tasmanian customers. For businesses providing telecommunication services, only 1% of revenue on average was generated by international customers, which likely reflects the fact that telecommunication services are usually provided through national infrastructure networks. Considering the significant share of capabilities that the Tasmanian sector has in software programming and development, a significant opportunity for businesses providing software and ICT services to increase.

Chart 5.9: Average share of revenue by customer location, by market segment

	Tasmanian customers	Australian customers (other than Tasmanian)	International customers	Don't know/not sure
Computer, electronic equipment and other digital technology manufacturing and retailing	71%	15%	7%	7%
Data processing, web hosting and electronic information storage services	65%	19%	9%	7%
Telecommunications services	62%	21%	1%	15%
Software and information and communications technology services	60%	25%	10%	5%
Internet service provision and web search portals	58%	13%	17%	11%
Internet publishing and broadcasting	57%	14%	14%	15%
Digital media, games or post, digital and visual effects (PDV) services	46%	21%	34%	

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

The benefits of accessing external markets are recognised in the Tasmanian Government's *Our Digital Future strategy.*[lviii] This strategy has a clear focus on building export capabilities for SMEs and raising awareness of the Tasmanian technology sector to the global market. The Tasmanian Department of State Growth's Trade Strategy 2019-2025 sets a coordinated whole-of-government approach to work with business and partners to grow trade, both domestically and internationally.[lix] The Strategy nominates Science and Technology as a key sector and identifies priority markets to showcase the sector's capabilities to drive partnership opportunities and investment. Assistance and specific grants are available to assist companies maximise opportunities for increased trade in markets outside of Tasmania.

Austrade also provides resources for businesses looking to export.[lx] This includes advice on exporting overseas, identification of relevant international contacts, *Export Market Development Grants*, and other export finance support such as credit and loans.

To encourage greater access to external markets, the Tasmanian technology sector could more closely align to national technology sector. Australian ICT exports were worth $8.8 billion In 2018-19, representing 7% of technology revenue in that year. This is broadly aligned to the Tasmanian technology share of revenue coming from international customers.[lxi] Based on analysis of key export markets, there are market opportunities for the Tasmanian sector in the United States, New Zealand, Singapore, India and China. These are the largest markets in terms of current Australian ICT exports with four out of five of these countries experiencing double digit trend growth and Australia and four have Free Trade Agreements in force with India being signed in early 2022.

Table 5.1: Top 5 countries with highest growth in Australian ICT exports

	Country	Value of ICT exports in 2018-19 ($million)	Growth rate (5 year trend, 2013-14 to 2018-19)	Free Trade Agreement
1	United States	1,796	11%	Australia-United States (AUSFTA) – 1 January 2005
2	New Zealand	1,197	6%	Australia-New Zealand (ANZCERTA or CER) – 1 January 1983
3	Singapore	686	17%	Singapore-Australia (SAFTA) – 28 July 2003
4	India	118	18%	Australia-India FTA signed but not enforced
5	China	441	22%	China-Australia (ChAFTA) – 20 December 2015
6	Germany	263	28%	No FTA in force
7	Japan	152	15%	Japan-Australia (JAEPA) – 15 January 2015
8	India	118	18%	Signed by not yet in force
9	South Korea	58	20%	Korea-Australia (KAFTA) – 12 December 2014
10	Malaysia	75	-1%	Malaysia-Australia (MAFTA) – 1 January 2013

Source: Department of Foreign Affairs and Trade (DFAT) (2019)[lxii]

Geoneon

Geoneon develops scalable solutions to anticipate the impact of climatic disasters – heatwave, wildfire, flood, and landslides – by combining earth observation, data fusion, deep-learning, and advanced analytics. Geoneon supports government and infrastructure companies to make informed decisions about climate change adaptation to reduce the number of affected people, direct economic loss, damage to critical infrastructure, and disruption of critical services.

Geoneon was established almost four years ago, with the aim of offering a data driven approach to assessing infrastructure exposure to climatic disasters (such as bushfire and flood). Using analytics to identify exposure and vulnerability hot spots, Geoneon assists governments and private organisations to make informed decisions about both current and future asset use and resilience planning.

Geoscientists and co-founders Roxane and Alex Bandini-Maeder saw Tasmania as an opportunity to test their ideas. It didn't take long for the start-up to sign their first local client and now Geoneon represents Tasmania on both the national and global stage.

A key component to the business's success has been networking opportunities, which are invaluable to start-ups. Tasmania is a unique market where business and government leaders are more accessible than elsewhere, Roxane noted:

"Being able to network and engage with organisations and business leaders is great for collaboration and finding your place in the local market."

The start-up has been included on the Tasmanian Trade Directory, held discussions with Swiss Ambassadors (on innovation, clean and climate technology), and most recently signed a Memorandum of Understanding with the University of Tasmania to collaborate on climate change adaption and disaster risk reduction.

Geoneon relies upon satellite data (which provides complete global coverage) to optimise its solutions for clients. Partnering with Maxar (a leading space technology and intelligence company), Geoneon was recently granted the opportunity to trial new satellite technology, selected as only one of three companies in the Asia Pacific region to test the innovation.

In another landmark project, it is currently assisting a global government organisation to analyse the exposure of infrastructure in Bhutan to landslides and floods.

Geoneon now employs five team members and recently welcomed three interns during 2021 – all of whom have (or are currently) completing qualifications locally at the University of Tasmania. Alex stated:

"Despite the challenges of recruiting locally, Tasmania has very clever and motivated candidates who are committed to the industry."

In 2022, Geoneon was accepted into an accelerator program in the United States to assist preparation for future fundraising and accelerate the businesses growth. The evolution of Geoneon is one of several examples of successful Tasmanian start-ups that now showcase their products and Tasmania's capabilities to the world.

5.2.3 Accessing greater support for scaling up businesses

To run and grow a business, funding and resources are needed for human capital and physical assets. Without these, start-ups and entrepreneurs will struggle to participate in a competitive market. Australia has seen significant growth in the number of start-ups. Between 2019-20 and 2020-21, 365,480 companies entered the market, or 14% of total active businesses.[lxiii] However, many businesses fail, with 37% of non-employing and 25% of all Tasmanian businesses with 1-19 employees operating in 2017 no longer operating by 2021.[lxiv] There are a number of reasons why start-ups fail, including lack of market need for their product, running out of funding and not having the right team to deliver.[lxv]

Support for small businesses and start-ups is clearly important for future growth of the economy. Of businesses surveyed, 6% had been in operation for less than a year and 12% for less than three years. In addition, a fifth of businesses (19%) reported that inability to access investment/capital as a barrier to business growth.

While consultations with the sector indicated a view that Tasmania has relatively less support for start-ups compared to other states, the Government has a number of relevant support programs that may need to be more broadly promoted.

Enterprize is a hub to support Tasmanian entrepreneurs to start and run innovative and high growth businesses. There are currently hubs in both Hobart and Launceston and a satellite hub will be established on the North West coast by late 2022. In the 2021-22 budget, the Tasmanian Government committed $1.34 million to fund these hubs.[lxvi] Their Born Global Incubator program is offered twice a year to help Tasmanian technology start-ups develop the skills, knowledge and business models to successfully sell their products and services into international markets.[lxvii]

In addition, Enterprise Centres Tasmania provides free advice from independent business advisors, for Tasmanian businesses to help them make key decisions in their business.[lxviii]

The Tasmanian Government has committed $2 million over three years for grants for start-ups and small businesses via Business Tasmania, through the Business Incubator and Accelerator Pilot Program. Almost $1 million will be provided to four organisations that have been funded under round one of the Program, including:

- Braddon Business Centre Inc for a Small Business Accelerator Program (targeting the retail, manufacturing, primary production, food processing, and construction sectors)

- Illuminate Education Australia for a Shift Lab Incubator Program (targeting businesses from all sectors)

- Seedlab Tasmania for their Germinate Incubator Program and Bootcamp Accelerator Program (targeting the agri-business and health and wellness sectors

- Secret Lab for Narrative Game Development Incubator (targeting the gaming and game development sector)

The successful recipients will provide specialist advice and support to the wider business community, aiding the creation of new businesses and the success of existing early-stage businesses in key economic sectors.[lxix, lxx]

There are other opportunities provided by government and industry that can help support the growth of start-ups and small businesses. For example, consultations with industry suggests that more professional networking opportunities to facilitate sharing of ideas, experiences and resources can be valuable where business can learn from each other and improve their own operations.

5.2.4 Attracting more technology businesses to Tasmania

Tasmania currently has the lowest national share of technology businesses at 1.72% of total businesses compared to other Australian states. The Government's Office of the Coordinator General provides a range of incentives to attract investment in Tasmania, either through business relocation or establishment of operations within the State. To achieve a greater national presence of technology businesses within Tasmania will require the skills pipeline issues identified above to be addressed.

Tasmania offers many liveability advantages and the State Government is pursuing an active campaign to attract new residents. The recent trend towards more remote working – both for workers being remote from the office and businesses being more remote from their clients – following COVID-19 will make Tasmania an attractive location for business operations.

Chart 5.10: Technology businesses as a share of total businesses, by state
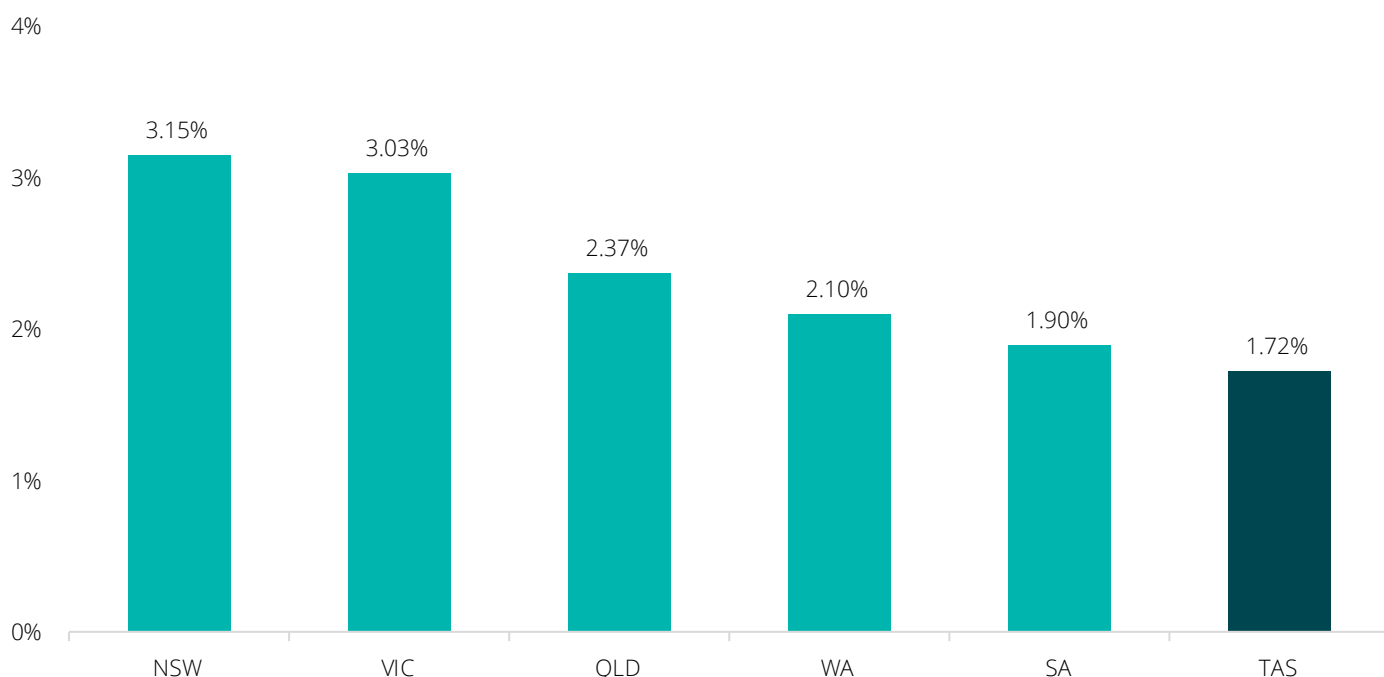
Source: ABS (2021)

Appendix A: Industry Survey

The analysis contained in this report has been informed by a fresh survey of businesses either headquartered in Tasmania or with operations in Tasmania. The survey was fielded between February and March 2022, with 108 businesses completing the survey.

The businesses identified to participate in the survey were conducted through a number of channels. The Department of State Growth provided Deloitte with a list of identified businesses which were approached directly. Deloitte also collaborated with industry associations such as the Launceston Chamber of Commerce, TasICT, ACS and Tasmanian Gamemakers which reached out to their members directly encouraging them to participate.

The questions were designed to develop a detailed understanding of the size, capabilities and workforce skills of the Tasmanian technology sector as well as barriers and enabler to growing the sector.

Demographic characteristics of the surveyed businesses are shown in the charts below.

Figure A.1: Tasmanian businesses by employee size
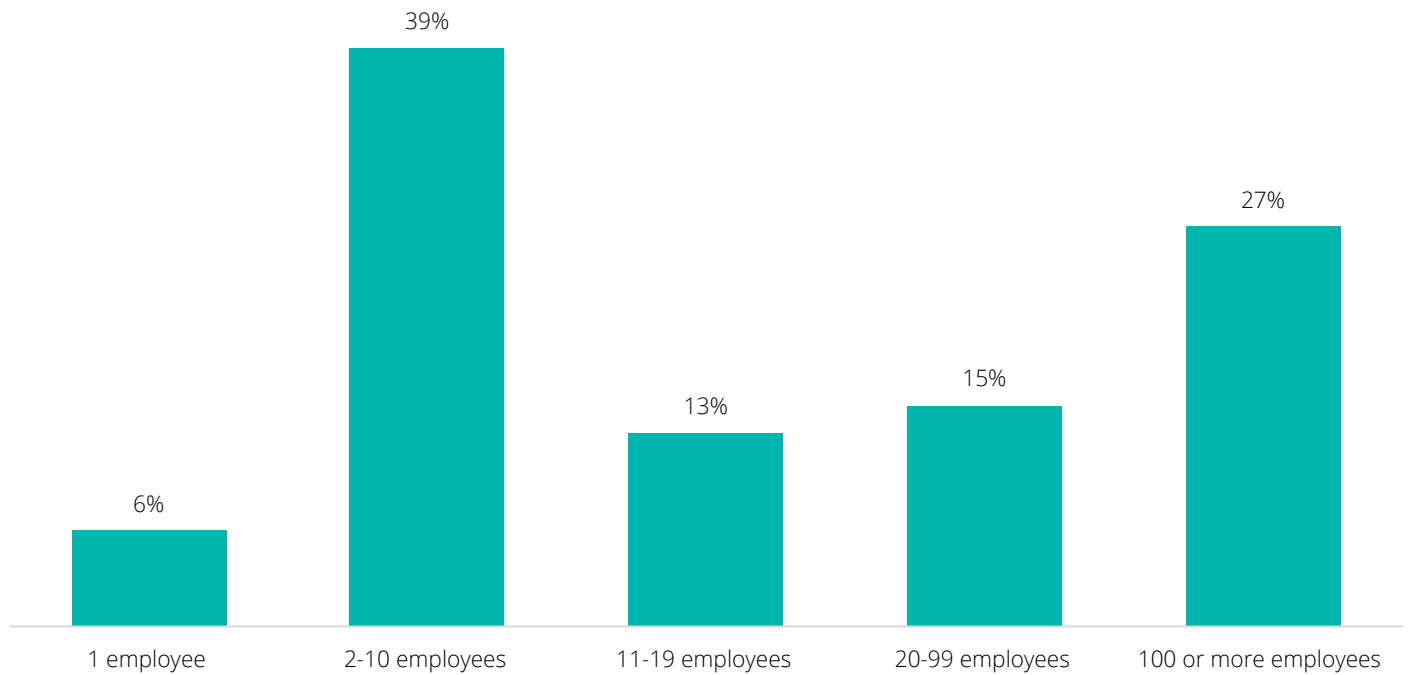
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart A.2: Employment type (total operations)
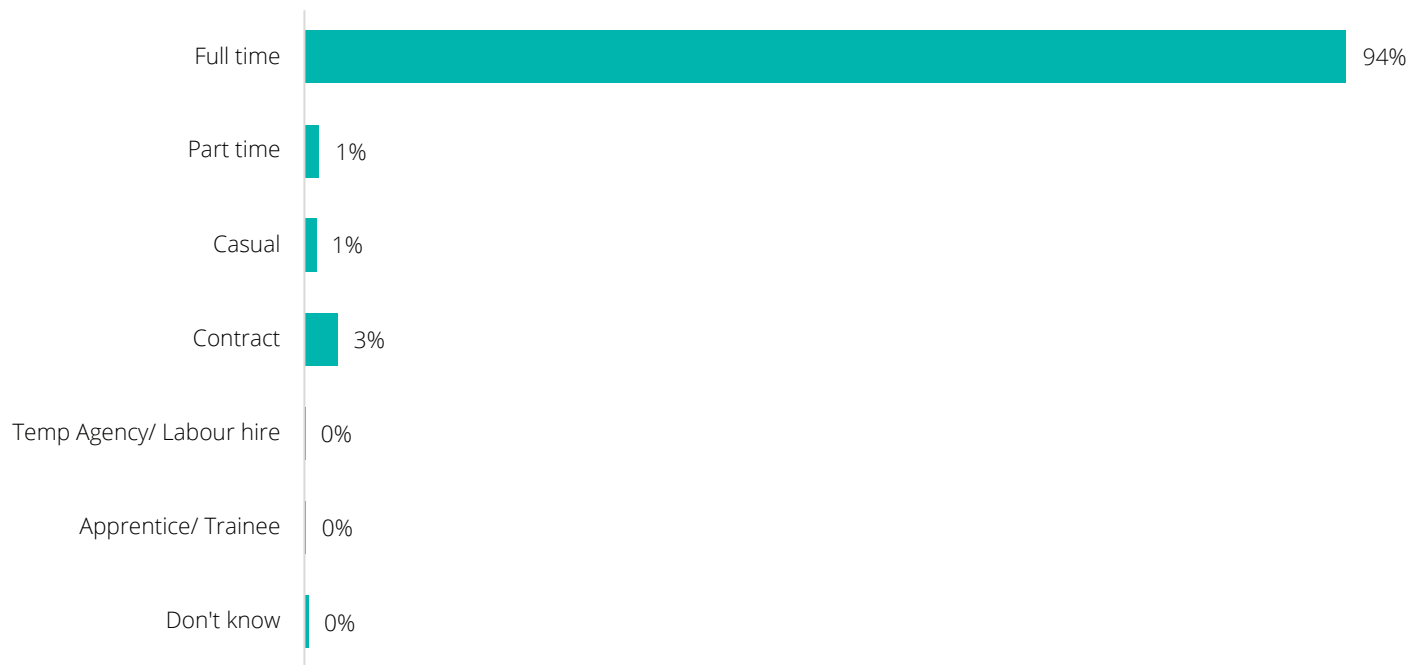
Full time	94%
Part time	1%
Casual	1%
Contract	3%
Temp Agency/ Labour hire	0%
Apprentice/ Trainee	0%
Don't know	0%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart A.3: Business revenue 2019-20 (total operations)
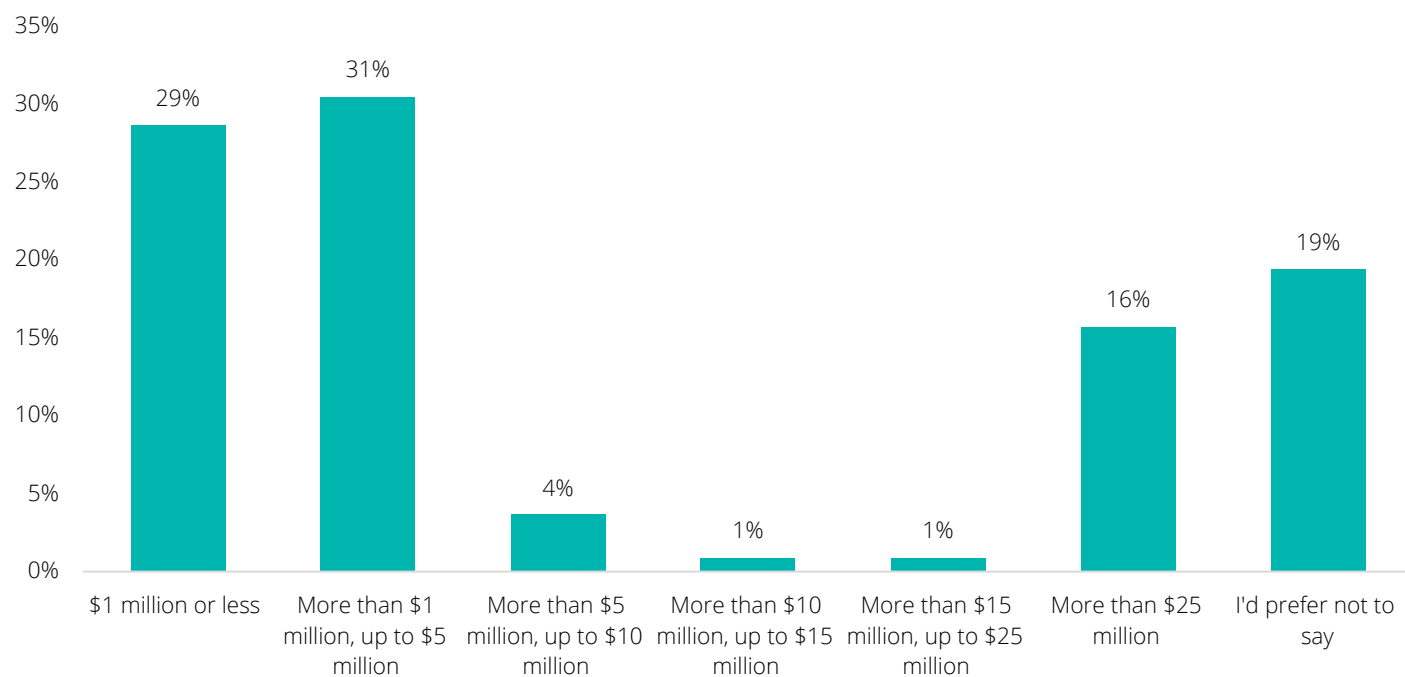
$1 million or less	29%
More than $1 million, up to $5 million	31%
More than $5 million, up to $10 million	4%
More than $10 million, up to $15 million	1%
More than $15 million, up to $25 million	1%
More than $25 million	16%
I'd prefer not to say	19%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart A.4: Years of operation
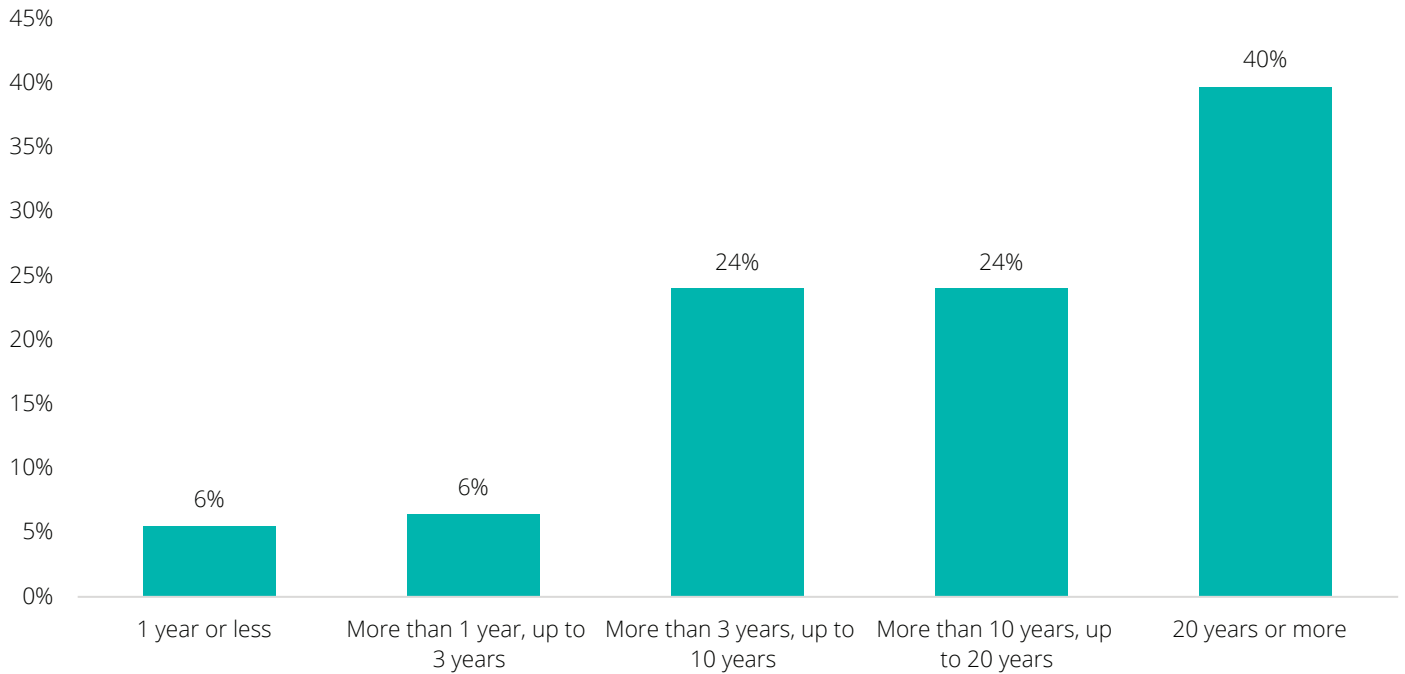
Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Table A.1: Tasmanian technology business's physical locations across Tasmania

Region	Count of business sites	%
Hobart and South East	101	56%
Launceston and North East	46	26%
West and North West	33	18%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Table A.2: Distribution of Tasmanian technology business's physical locations across Tasmania

Region	%
Tasmanian business with operations only in Tasmania	41%
A business with headquarters in Tasmania with operations in mainland Australia and/or internationally	50%
A business with headquarters outside of Tasmania	9%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Chart A.5: Industries supported

Industry	Percentage
State government	38%
Professional, scientific and technical services	23%
Education and training	18%
Health care and social assistance	18%
Electricity, gas, water supply, energy and renewables	17%
Local government	16%
Finance and insurance	12%
Agriculture and forestry	10%
Entertainment	10%
Information, media and telecommunications	10%
Police, defence and safety	10%
Retail trade	8%
Administrative and support services	8%
Arts and recreation services	8%
Environmental/climate management	7%
Aquaculture	6%
Accommodation, cafes and restaurants	6%
Federal government	6%
Logistics, transport, postal and warehousing	6%
Mining	5%
Manufacturing	5%
Construction	3%
Wholesale trade	3%
Other	11%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Table A.3: Market segments of the Tasmanian technology sector

Products and services provided	% (n=89)
Internet publishing and broadcasting	**19%**
Internet service provision and web search portals	**16%**
Data processing, web hosting and electronic information storage services	**40%**
Telecommunications services	**18%**
Fixed network services	11%
Mobile, wireless or satellite network services	9%
Retail telecommunication services	11%
Other	7%
Software and information and communications technology services	**73%**
Software development or programming services	46%
Software as a service (SAAS)	42%
Cyber software	19%
App development	33%
Data analytics and data science tools	37%
Blockchain and cryptocurrency	0%
Systems integration and/or analysis	53%
Information and communications technology consulting	44%
Cyber security services	28%
Internet and web design consulting service	19%
Managed service provider (MSP)/Managed security service provider (MSSP)	24%
Enterprise support i.e. cloud infrastructure, backup services, asset management and hosting solutions	27%
Robotics or automation services	15%
Digital marketing and/or communications services	10%
Cloud services	19%
Other	11%
Computer, electronic equipment and other digital technology manufacturing and retailing	**22%**
Computer and related technology hardware manufacturing	4%
Computer and related technology hardware retailing	18%
Computer and related technology hardware maintenance	17%
Other digital technology manufacturing (e.g. internet of things, smart devices, robotics)	9%
Other digital technology retailing (e.g. internet of things, smart devices, robotics)	10%
Other digital technology maintenance (e.g. internet of things, smart devices, robotics)	13%
Other	1%
Digital media, games or post, digital and visual effects (PDV) services	**16%**
Digital media content production (e.g. video, sound, text, advertising)	7%
Games development	7%
Post-production, visual or and visual effects (PDV) services	8%
Other	3%
Total technology businesses	**100%**

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Table A.4: Business capabilities

Business capabilities (selected)	% (n=89)
Programming/software development	47%
Systems integration and build	38%
Cyber security	36%
Systems design	34%
Software design	33%
Network design	27%
Product management	23%
Testing	23%
Data management	23%
Cloud computing	23%
Systems development management	22%
User experience design	21%
Software configuration	20%
Hardware design	18%
Data visualisation	18%
Content authoring	18%
User experience analysis	17%
Machine learning and Artificial intelligence	17%
Content publishing	16%
Systems and software life cycle engineering	15%
Database design	15%
User experience evaluation	15%
Internet of Things	15%
Data modelling and design	14%
Machine learning	14%
Business intelligence	14%
User research	14%
Knowledge management	14%
Automation	14%
Data engineering	13%
Database administration	13%
Scientific modelling	13%
Numerical analysis	13%
Real-time/embedded systems development	12%
Artificial intelligence	12%
Data science	11%
High-performance computing	11%
Extended reality (Virtual and Augmented reality)	9%
Safety engineering	7%
Safety assessment	7%
Radio frequency engineering	7%
Animation development	7%
Advanced robotics	7%
Blockchain	7%
Don't know/Not sure	10%
None of the above	10%

Source: Deloitte Access Economics based on Tasmanian technology business survey (2022)

Endnotes

i.   Deloitte Access Economics (2021) *Demystifying Data* 2021 <https://www2.deloitte.com/au/en/pages/economics/articles/demystifying-data.html>.

ii.   Australian Bureau of Statistics (2022) *Household impacts of COVID-19 survey* <https://www.abs.gov.au/statistics/people/people-and-communities/household-impacts-covid-19-survey/mar-2022>.

iii.   Economy.id, *State Growth Tasmania Economic Profile* (2021).

iv.   DFAT (2019) Trade in services Australia, <https://www.dfat.gov.au/about-us/publications/Pages/trade-in-services-australia>.

v.   Australian Bureau of Statistics (2021) *Counts of Australian Businesses, including entries and exits*, 2017-2021.

vi.   Deloitte Access Economics (2021) ACS Australia's Digital Pulse <https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html>.

vii.   Deloitte Access Economics, *Premium Skills* (report commissioned by DeakinCo., 2019) <https://www2.deloitte.com/au/en/pages/economics/articles/premium-skills.html>.

viii.   'Tiny ML' FortifyEdge (2022) <https://www.fortifyedge.com/tinyml>.

ix.   'Echoview Software Pty Ltd', TasICT (2022) <https://www.tasict.com.au/provider/82/>.

x.   'Biteable raises $7 million Series A for its template-based online video builder', TechCrunch (2020) <https://techcrunch.com/2020/12/30/biteable-raises-7-million-series-a-for-its-template-based-online-video-builder/>.

xi.   Tasmanian Government (2020) *Our Digital Future: Tasmanian Government strategy for digital transformation* <https://www.digital.tas.gov.au/data/assets/pdf_file/0007/603529/Our-Digital-Future.PDF>.

xii.   Tasmanian Government (2019) *Tasmanian ICT Workforce Action Plan 2020-2023* <https://www.stategrowth.tas.gov.au/__data/assets/pdf_file/0017/216611/Tasmanian_ICT_Workforce_Action_Plan_2020-2023.pdf>.

xiii.   Digital Skills Organisation (2021) *Towards a new model for the development of digital skills* <https://digitalskillsorg.com.au/>.

xiv.   Australian Bureau of Statistics (2021) *Counts of Australian Businesses, including entries and exits*, 2017-2021.

xv.   Australian Bureau of Statistics (2021) Australian National Accounts: *State Accounts* 2020-21.

xvi.   Economy.id, *State Growth Tasmania Economic Profile* (2021).

xvii.   Australian Bureau of Statistics (2021) *Counts of Australian Businesses, including entries and exits*, 2017-2021.

xviii. Australian Bureau of Statistics (2021) *Counts of Australian Businesses, including entries and exits*, 2017-2021.

xix.   Australian Bureau of Statistics (2021) *Counts of Australian Businesses, including entries and exits*, 2017-2021.

xx.   Australian Bureau of Statistics (2021) *Australian National Accounts: State Accounts* 2020-21.

xxi.   Export Council of Australia (2018) *From resource boom to digital boom: capturing Australia's digital trade opportunity at home and abroad* <https://export.org.au/eca-institute/from-resource-boom-to-digital-boom-capturing-australias-digital-trade-opportunity-at-home-and-abroad/>.

xxii.   SFIA (2022) SFIA: *the global skills and competency framework for the digital world* <https://sfia-online.org/en/about-sfia>.

xxiii. SFIA (2022) SFIA: *the global skills and competency framework for the digital world* <https://sfia-online.org/en/about-sfia>.

xxiv.   Australian Computer Society (2021) *Demand & Impacts on Tech & Digital Skills* <https://www.acs.org.au/content/dam/acs/acspublications/Demand&ImpactsonTech&DigitalSkills.pdf>.

xxv. LinkedIn (2022) *Workforce data* <https://economicgraph.linkedin.com/the-future-of-work>.

xxvi. Deloitte Access Economics (2022) Unleashing 5G <https://www2.deloitte.com/au/en/pages/economics/articles/mobile-nation. html>.

xxvii. Deloitte Access Economics (2022) Unleashing 5G <https://www2.deloitte.com/au/en/pages/economics/articles/mobile-nation. html>.

xxviii. Australian Academy of Science (2021) Policy Primer: Australia's Digital Future – a nation of users or leaders, <https://www.science. org.au/support/analysis/decadal-plans/ics/preparing-australias-digital-future>.

xxix. Australian Academy of Science (2021) Policy Primer: Australia's Digital Future – a nation of users or leaders, <https://www.science. org.au/support/analysis/decadal-plans/ics/preparing-australias-digital-future>.

xxx. Department of Premier and Cabinet (2021) *Independent Review of the Tasmanian State Service, Final Report*, < https://www.dpac.tas. gov.au/__data/assets/pdf_file/0026/136934/TSSR_Final_Report.pdf>

xxxi. Pearcey Foundation (2021) *PopUp WiFi CEO and Co-founder Nina McMahon Awarded 2021 Tasmanian Pearcey Entrepreneur of the Year* <https://prwire.com.au/pr/100220/popup-wifi-ceo-and-co-founder-nina-mcmahon-awarded-2021-tasmanian-pearcey-entrepreneur-of-the-year>.

xxxii. Deloitte Access Economics (2021) *Australia's Digital Pulse*, <https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html>.

xxxiii. Deloitte Access Economics (2021) *Australia's Digital Pulse*, <https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html>.

xxxiv. Deloitte Access Economics (2021) *Australia's Digital Pulse*, <https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html>.

xxxv. Parliament of Australia (2021) *Overseas students in Australian higher education: a quick guide* <https://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp2021/Quick_Guides/OverseasStudents>.

xxxvi. Department of Education, Skill and Employments (2020), uCube <http://highereducationstatistics.education.gov.au/>.

xxxvii. Digital Transformation Agency (2018) Digital Transformation Strategy, 2018-2025, <https://www.dta.gov.au/>.

xxxviii. Department of Home Affairs (2022) Priority migration skilled occupation list, <https://immi.homeaffairs.gov.au/visas/employing-and-sponsoring-someone/sponsoring-workers/pmsol>.

xxxix. Migration Tasmania (2022) Skilled migrants, <https://www.migration.tas.gov.au/skilled_migrants>.

xl. Department of Home Affairs (2022) *Visa Statistics* <https://www.homeaffairs.gov.au/research-and-statistics/statistics/visa-statistics/work>.

xli. Australian Bureau of Statistics (2021) *National, state and territory population* September 2021.

xlii. Australian Bureau of Statistics (2021) *Education and Work, Australia* <https://www.abs.gov.au/statistics/people/education/education-and-work-australia/latest-release#data-download>.

xliii. World Economic Forum (2017) *Skill, re-skill, and re-skill again. How to keep up with the future of work* <https://www.weforum.org/agenda/2017/07/skill-reskill-prepare-for-future-of-work/>.

xliv. RMITOnline (2021) *Ready, set, upskill: effective training for the jobs of tomorrow* <https://www2.deloitte.com/au/en/pages/economics/articles/business-return-learning-development.html?elq_mid=5832&elq_cid=20547>.

xlv.   Department of Industry, Science, Energy and Resources (2019) *Advancing Women in STEM strategy* <https://www.industry.gov.au/data-and-publications/advancing-women-in-stem-strategy/snapshot-of-disparity-in-stem>.

xlvi.   Deloitte Access Economics (2022) *Australia's Digital Pulse* <https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html>.

xlvii.   Deloitte Access Economics (2021) *Australia's Digital Pulse* <https://www2.deloitte.com/au/en/pages/economics/articles/australias-digital-pulse.html>.

xlviii.   Narayanan, Sriram, and Ed Terris. *Inclusive Manufacturing: The Impact of Disability Diversity on Productivity in a Work Integration Social Enterprise*. Manufacturing & service operations management 22, no. 6 (2020): 1112–1130.

xlix.   McKinsey & Company (2015) *Diversity Matters* < https://www.mckinsey.com/business-functions/organization/our-insights/~/media/2497d4ae4b534ee89d929cc6e3aea485.ashx>.

l.   Richard, Orlando C., María del Carmen Triana, and Mingxiang Li. "The Effects of Racial Diversity Congruence Between Upper Management and Lower Management on Firm Productivity." Academy of Management Journal 64, no. 5 (2021): 1355–1382.

li.   National Centre for Vocational Education Research (2021) VOCSTATS <https://www.ncver.edu.au/research-and-statistics/vocstats>.

lii.   Department of Education, Skill and Employments (2020), uCube <http://highereducationstatistics.education.gov.au/>.

liii.   Deloitte Access Economics (2021) *Business Outlook, December 2021*< https://www2.deloitte.com/au/en/pages/media-releases/articles/business-outlook.html>.

liv.   Australian Bureau of Statistics (2021) *Labour Force, Australia, February 2021* <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia/feb-2022>.

lv.   Deloitte Access Economics (2021) *Business Outlook, December 2021*< https://www2.deloitte.com/au/en/pages/media-releases/articles/business-outlook.html>.

lvi.   Xero (2021), *Small business technology spend linked to greater sales, fewer job losses during pandemic* <https://www.xero.com/au/media-releases/small-business-technology-spend-linked-to-greater-sales/>.

lvii.   Deloitte Access Economics, The Business Return on Learning and Development (report commissioned by DeakinCo., 2022) <https://deakinco.com/contact/download-business-return-on-ld/>.

lviii.   Tasmanian Government (2021) *Our Digital Future* <https://www.digital.tas.gov.au/>.

lix.   Department of State Growth (2019), Tasmanian Trade Strategy, <https://www.stategrowth.tas.gov.au/business/trade/tasmanian_trade_strategy>.

lx.   Austrade (2021) *Assistance exporting from Australia* <https://www.austrade.gov.au/international/invest/guide-to-investing/australian-government-support-programs/assistance-exporting-from-australia>.

lxi.   Australian Bureau of Statistics (2021) *Australian industry*, 2019-20.

lxii.   DFAT (2019) *Trade in services Australia*, <https://www.dfat.gov.au/about-us/publications/Pages/trade-in-services-australia>.

lxiii.   Australian Bureau of Statistics (2021) *Counts of Australian Businesses, including entries and exits*, 2017-2021.

lxiv.   Australian Bureau of Statistics (2021) *Counts of Australian Businesses, including entries and exits*, 2017-2021.

lxv.   CBinsights (2021) *The Top 12 Reasons Startups Fail* <https://www.cbinsights.com/research/startup-failure-reasons-top/>.

lxvi.   Tasmanian Government (2021) *Powering entrepreneurial development* <https://www.premier.tas.gov.au/site_resources_2015/additional_releases/powering_entrepreneurial_development>.

lxvii.   Enterprize (2022) Tasmanian startups, prepared for global success, <https://enterprize.space/>.

lxviii.   Tasmanian Government (2021) *Enterprise Centres Tasmania* <https://www.enterprisecentres.tas.gov.au/>.

lxix.   Tasmanian Government (2022), small business incubator and accelerator pilot program round one grant recipients announced, <https://www.premier.tas.gov.au/site_resources_2015/additional_releases/small_business_incubator_and_accelerator_pilot_program_round_one_grant_recipients_announced>

lxx.   Tasmanian Government (2022) Small business incubator and accelerator pilot program - round one grant recipients announced, https://www.premier.tas.gov.au/site_resources_2015/additional_releases/small_business_incubator_and_accelerator_pilot_program_round_one_grant_recipients_announced.

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