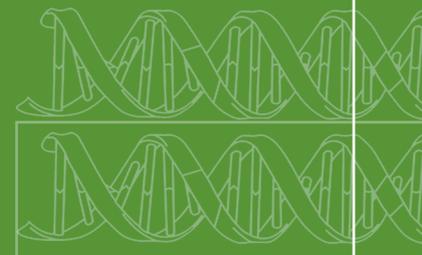


AusBiotech

AUSTRALIA'S BIOTECHNOLOGY ORGANISATION

AUSTRALIAN BIOTECHNOLOGY SECTOR SNAPSHOT 2022



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About AusBiotech

AusBiotech is Australia's biotechnology industry organisation representing over 3,000 members, covering human health, medical devices and diagnostics, and agricultural biotechnology sectors.

Dedicated to the development, growth and prosperity of the Australian biotechnology industry for more than 35 years, AusBiotech provides initiatives to drive sustainability and growth, outreach and access to markets, and representation and support for members nationally and around the world.

AusBiotech is a not-for-profit organisation, with representation in each Australian state and in various special interest sectors. Active state-based committees and national advisory groups provide a network to support members and promote the commercialisation of Australian bioscience in the global marketplace. The membership base includes biotechnology companies, ranging from start-ups to mature multinationals, research institutes and universities, specialist service professionals, corporate, institutional and individual members from Australia and overseas.

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Executive Summary

The life sciences sector in Australia works from bench to bedside, and includes industry companies (medical technologies (devices and diagnostics) and digital health, biotherapeutics, food and agriculture), research institutes, government and regulatory organisations, funding bodies and support services. The Sector Snapshot 2022 (the Snapshot) was commissioned by AusBiotech to provide both an overview of the sector in Australia, in terms of organisation and employment numbers, and to determine how the sector has changed since this data was collected in 2017 and 2019. The report also offers critical metrics that align to AusBiotech's *Biotechnology Blueprint* (Blueprint), a strategic decadal framework developed by industry, for industry. The Blueprint metrics seek to track the maturity and vibrancy growth in our ecosystem, to measure the Australian biotechnology industry's global and local

standing, and the industry's positive contribution to Australian prosperity.

This report reveals significant sector growth of 43 per cent in the past two years, with 2,654 organisations collaborating across the country. The research also shows that 1,427 of the 2,654 organisations (54 per cent) are industry-based; the number of companies undertaking biotech research and development has grown by 40% since 2019.

The high-value talent backing our Australian biotechnology sector has increased and there are now approximately 263,693 people employed. The number of employees behind our biotech companies has also expanded, increasing 21 per cent compared to 2019 from approximately 87,397 people in 2019 to 105,569 in 2022.

The Australian life sciences industry is dominated by the medical technologies (devices and diagnostics) and digital health companies (577), followed closely by biotherapeutics companies (548) and then food and agriculture biotechnology companies (302).

In terms of the economic impact of the sector, there are currently 192 life sciences companies listed on the Australian Securities Exchange (ASX), increasing by 19 per cent from 2019's 161 listed companies. 26 of these companies have listed in the last 24 months. Collectively ASX-listed biotech companies now represent a market capitalisation of approximately \$233 Billion (compared to around \$170B in 2019), demonstrating a substantive 37 per cent increase in value.

Gender equity figures remain stable with female representation very close to or over 50 per cent in funding bodies, government and regulatory organisations, and research institutions. Women in industry are still under-represented (35 per cent), however, this has increased since 2019's Sector Snapshot survey (32 per cent). As seniority increases, female representation decreases and, overall, female representation in management level positions across the sector remains below 50 per cent.

There are **2,654** organisations in the Australian life sciences ecosystem



Victoria and **New South Wales** are critical hubs of the life sciences sector with **73%** of the sector calling them home



The life sciences sector has grown by **43%** since 2019 and **60%** since 2017

There are **1,427** companies in the life sciences industry, increasing **40%** (from 1,017) since 2019

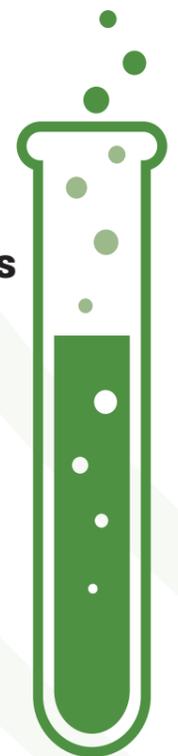


More than **192** life sciences companies are listed on the ASX and represent a market capitalisation of approximately \$233 Billion (~\$170B in 2019)

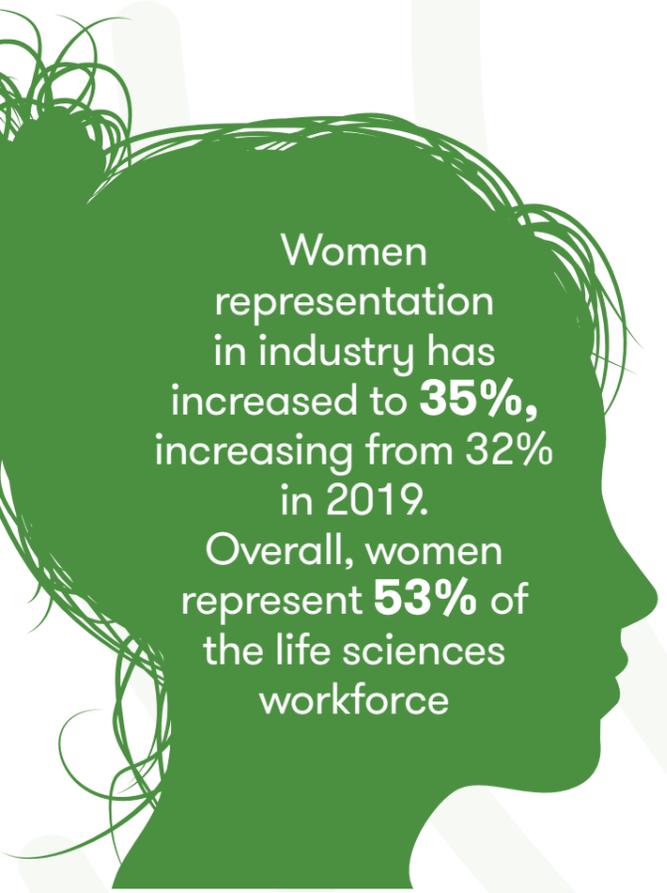
263,693 employees support the Australian life sciences ecosystem



799 support service companies represents 30% of the sector (increasing 65% since 2019), it has increased 65 per cent since 2019



Industry represents **54%** of the life sciences sector, and employs **40%** of the biotech workforce

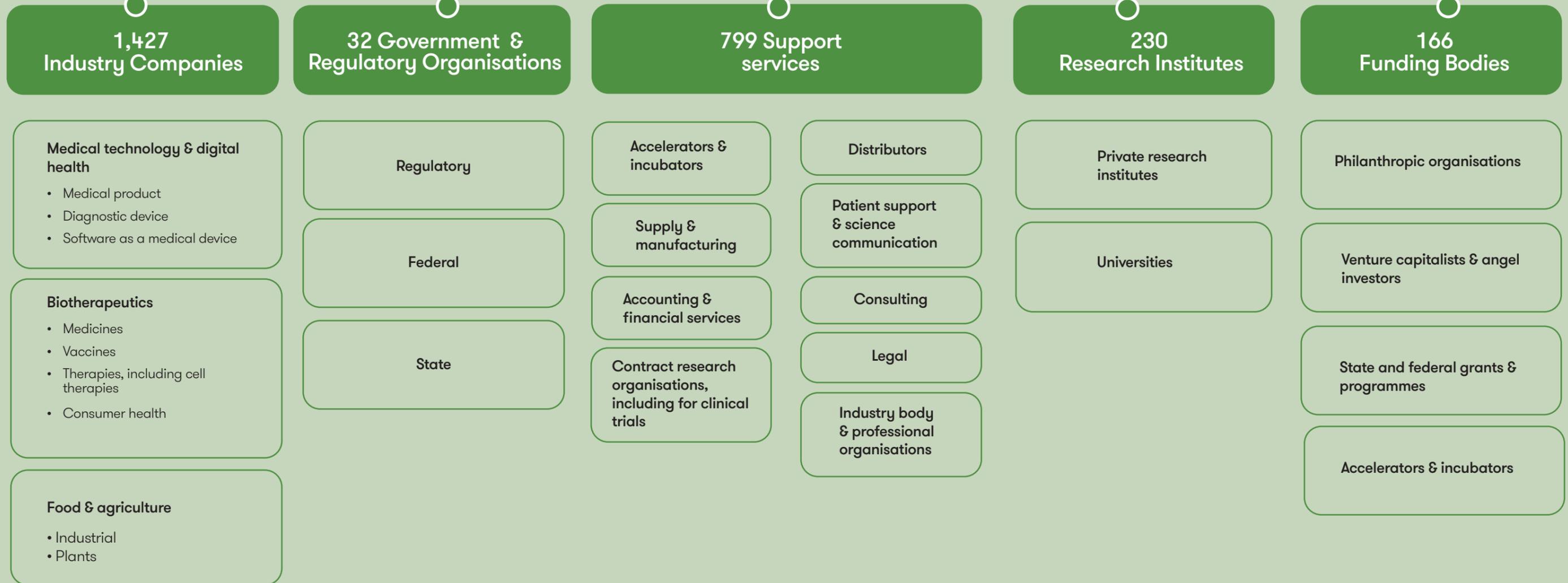


Women representation in industry has increased to **35%**, increasing from 32% in 2019. Overall, women represent **53%** of the life sciences workforce

The Australian Life Sciences Sector: 2,654 organisations



Australia's Life Sciences Sector



Key findings

The Australian biotechnology sector has grown by 43 per cent since 2019 and 60 per cent since 2017

There are 2,654 organisations identified as being part of the biotechnology sector, as defined by this report. This includes companies and organisations within industry, funding bodies, government and regulation, research institutes, and support services sub-sectors (Sector map, pages 7-8). The sector has seen a 43 per cent increase since this report was last published in 2019.

This has grown year-on-year since AusBiotech's Sector Snapshot research was first commissioned: growing from 1,654 organisations in 2017, to 1,852 organisations in 2019. Over the four years, the sector has seen overall growth of 60 per cent.

The scale of the Australian life sciences industry is a key factor for the industry's sustainability and its ability to attract and retain talent.

Of the total number of organisations, industry comprises of 1,427 companies, making up 54 per cent of the life sciences sector in Australia (Figure 1.1). This year industry saw a 40 per cent growth since 2019; while categorising is complex given technology convergence, it includes 577 medical technology and digital health companies, 548 biotherapeutics companies, and 302 food and agriculture companies.

Support services make up the second largest portion of the sector (30 per cent) with 799 organisations; this category encompasses organisations ranging from legal firms, to consultancies, to manufacturers and distributors. This sub-sector has seen significant growth of 65 per cent since last reported. While funding bodies make up just six per cent of the sector, it has seen high growth of 29 per cent in the past two years.

The life sciences workforce has increased by 8 per cent since 2019

There are approximately 263,693¹ people employed in the life sciences sector across the 2,654 organisations. When compared to the employee numbers reported in 2019, there has been an 8 per cent overall increase in the number of people employed by the sector (from 243,406 in 2019).

Industry capabilities have increased by 21 per cent compared to 2019, increasing from approximately 87,397 in 2019 to 105,569 in 2022.

The depth and liquidity of the life sciences job market across Australia is necessary to attract and retain people into its high-value roles, as it delivers economic and social benefits for Australia and Australians.

¹ This data set includes a broad confidence interval due to large companies having a range of employee numbers (100 to ~4,000).

Industry has **grown 40%** since 2019, and comprises of 54% of the life sciences sector

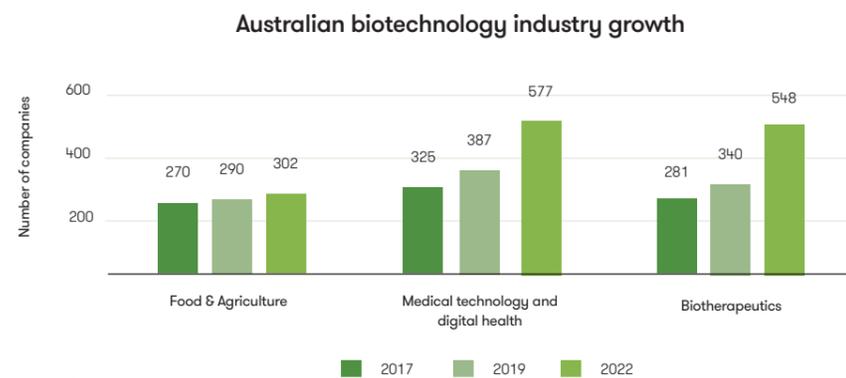


Figure 1.1

Critical Australian life science sector hubs

Almost three-quarters (73 per cent) of the entire life sciences sector (Figure 1.2) calls New South Wales (986 organisations; 37 per cent) and Victoria (948 organisations; 36 per cent) home, with each state growing 51 per cent and 34 per cent respectively. Queensland has seen 60 per cent growth, retaining the third largest number of life sciences organisations (324; 12 per cent). Western Australia continues to steadily grow, increasing 9 per cent from 179 in 2019 to 244 in 2022. South Australia represents 5 per cent of the sector, growing 39 per cent to 135 organisations. Tasmania has shown no marked change in the size of its life sciences sector since 2017.

The highest proportion of all people employed in the life sciences sector (Figure 1.3) are based in Victoria (100,642 people) and New South Wales (89,537 people), together making up 72 per cent of the workforce. Queensland has the third-largest proportion of the life sciences workforce in Australia (32,678), demonstrating 18 per cent growth since 2019.

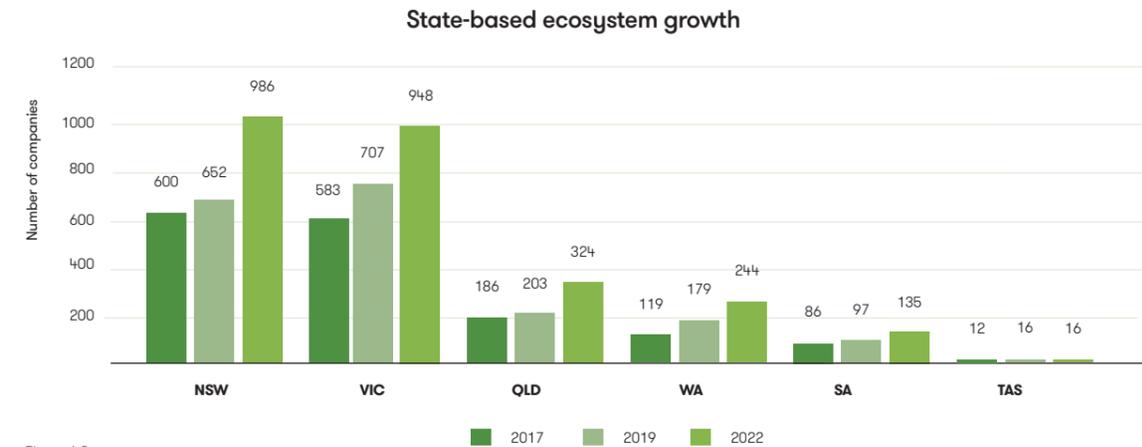


Figure 1.2

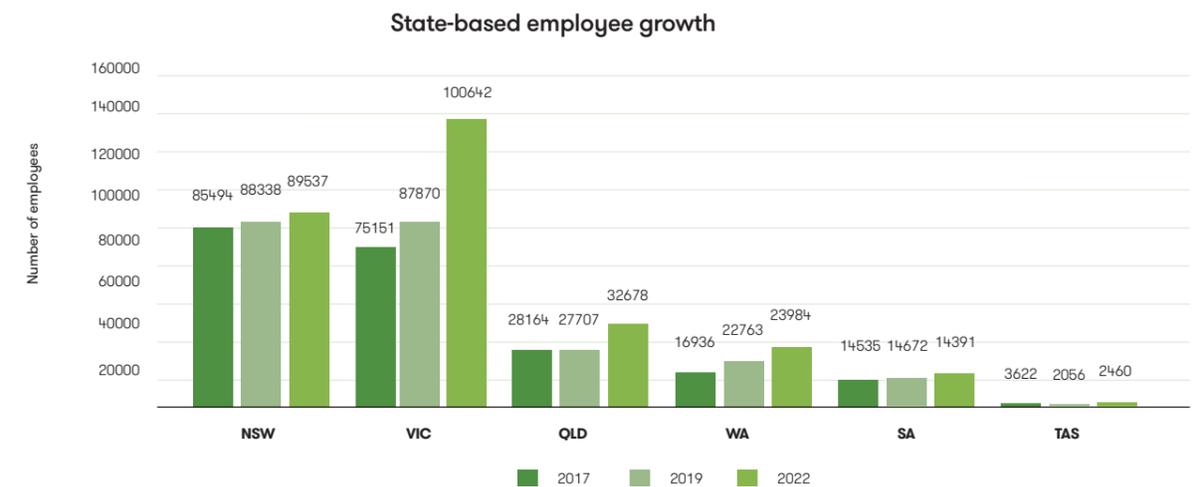


Figure 1.3

Key findings

State-based growth by sector

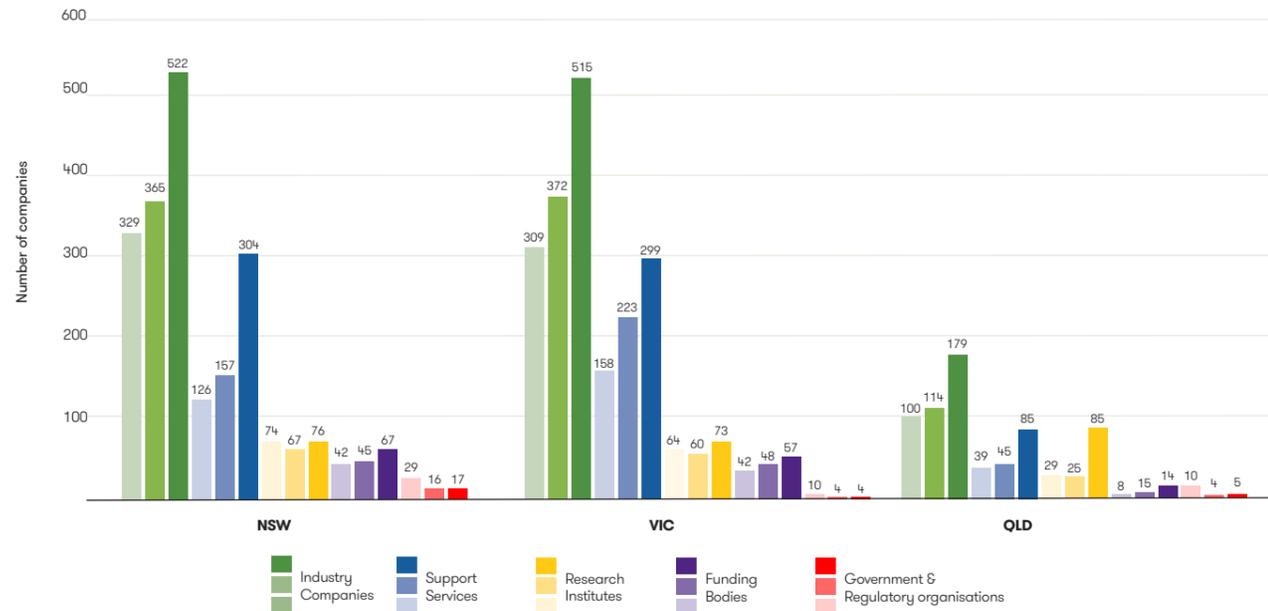


Figure 1.4

State-based growth by sector

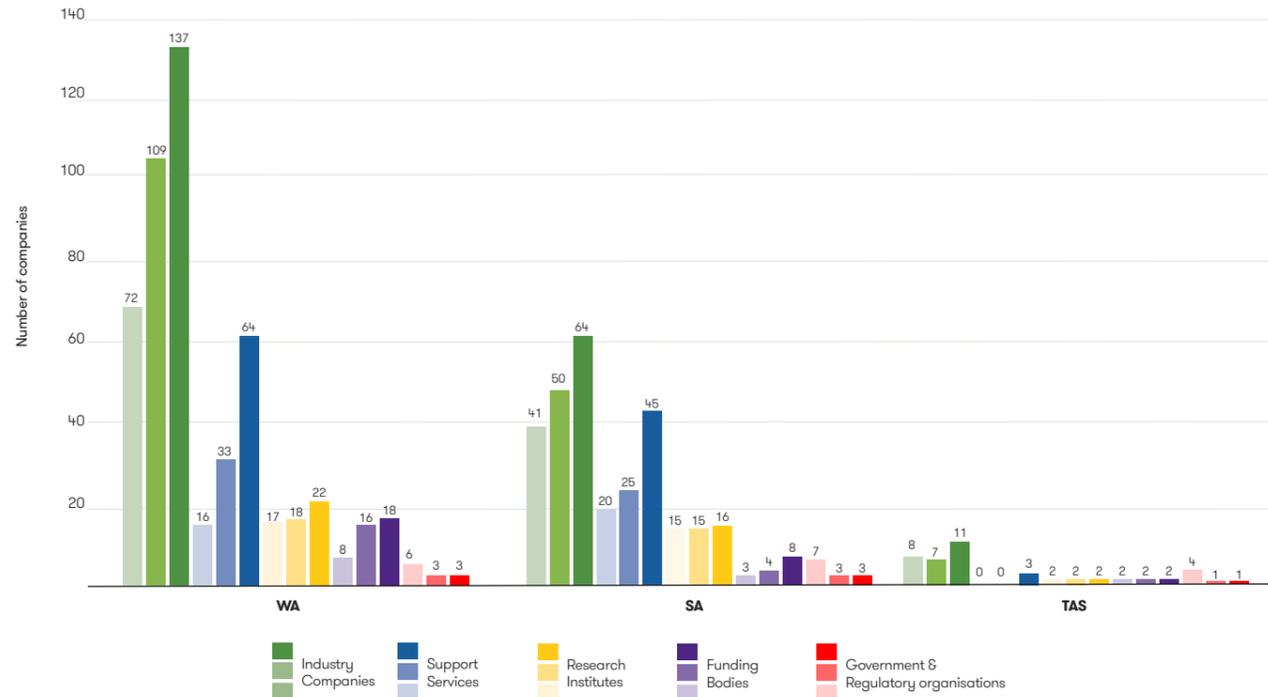


Figure 1.5

State-based employee growth by sector

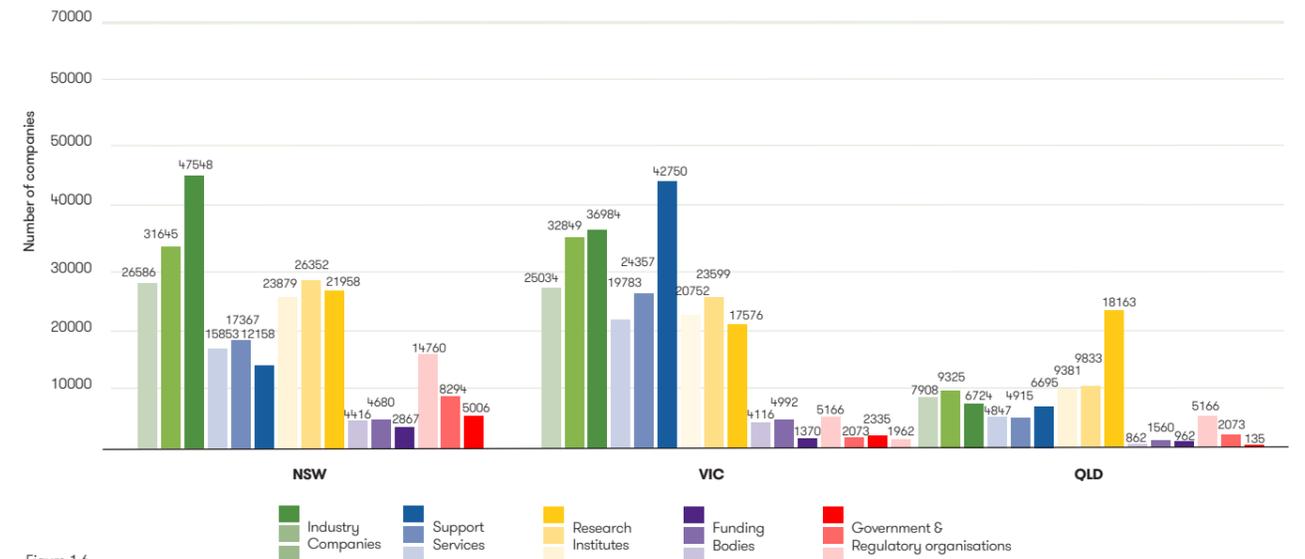


Figure 1.6

State-based employee growth by sector

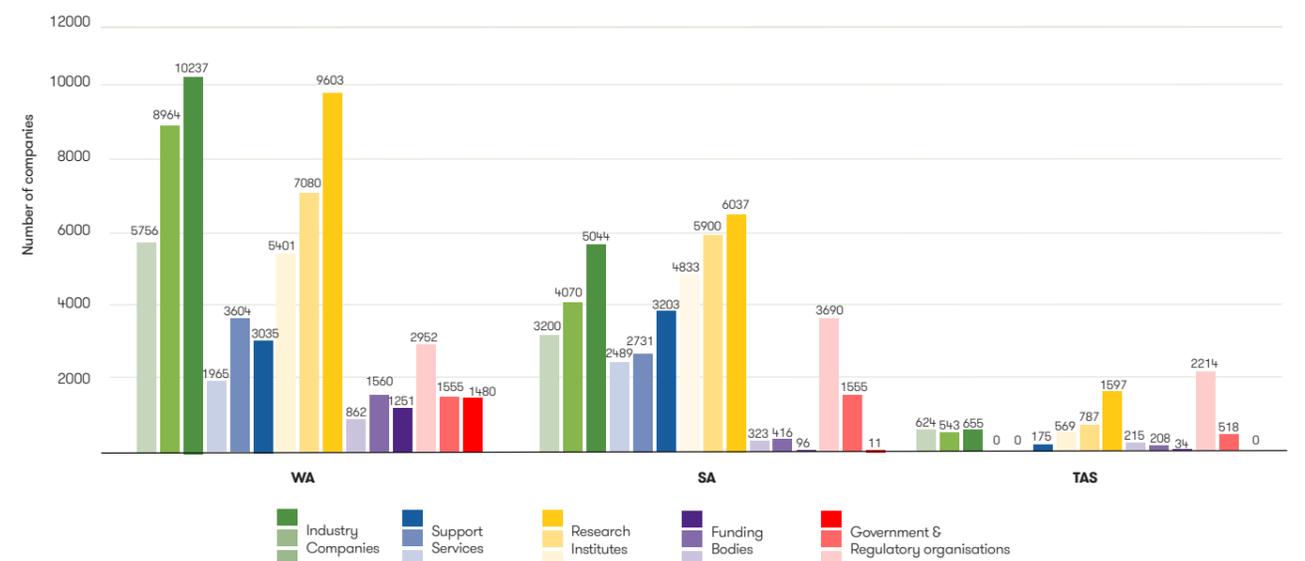


Figure 1.7

Key findings

State-based industry growth

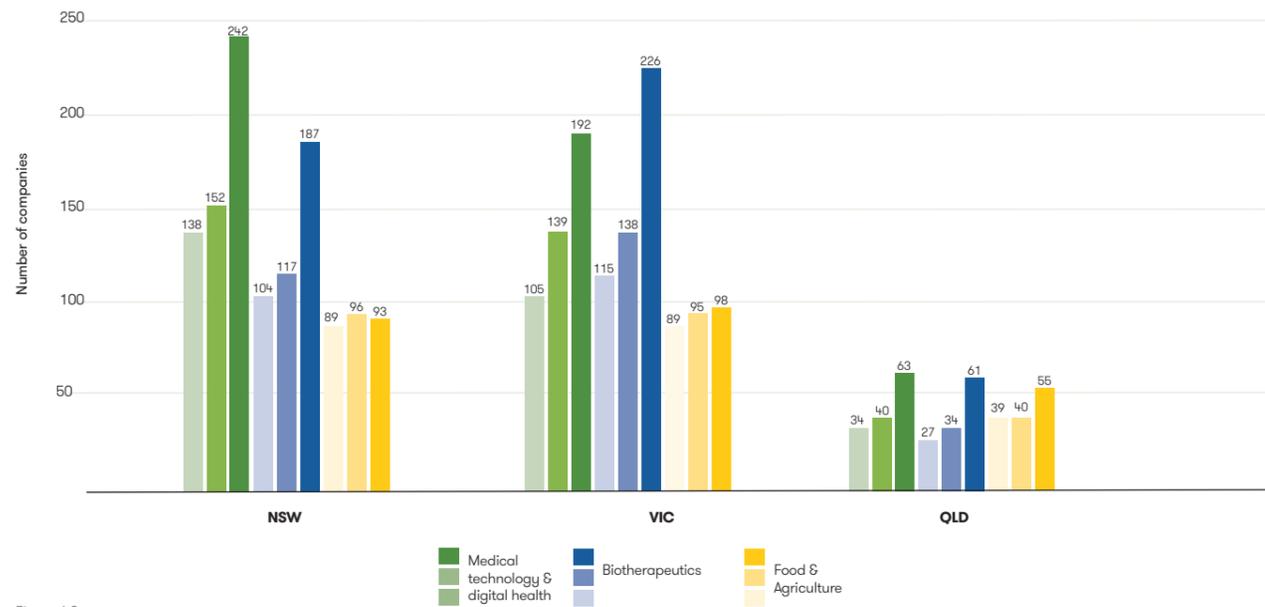
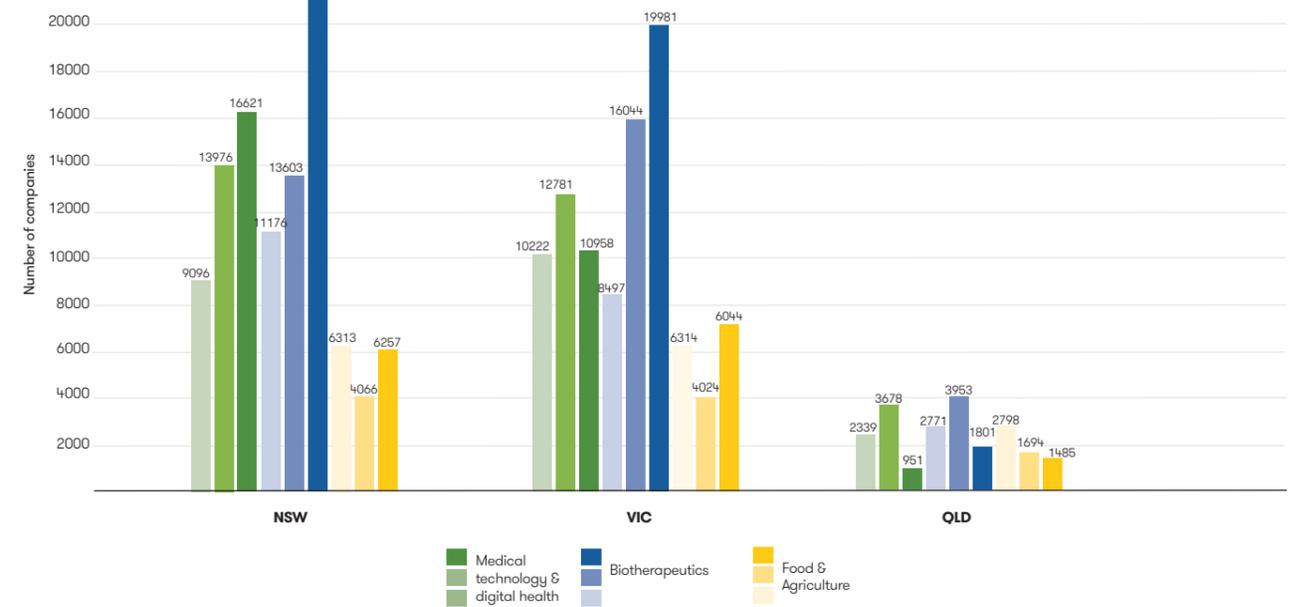


Figure 1.8

State-based employee growth by industry



State-based industry growth

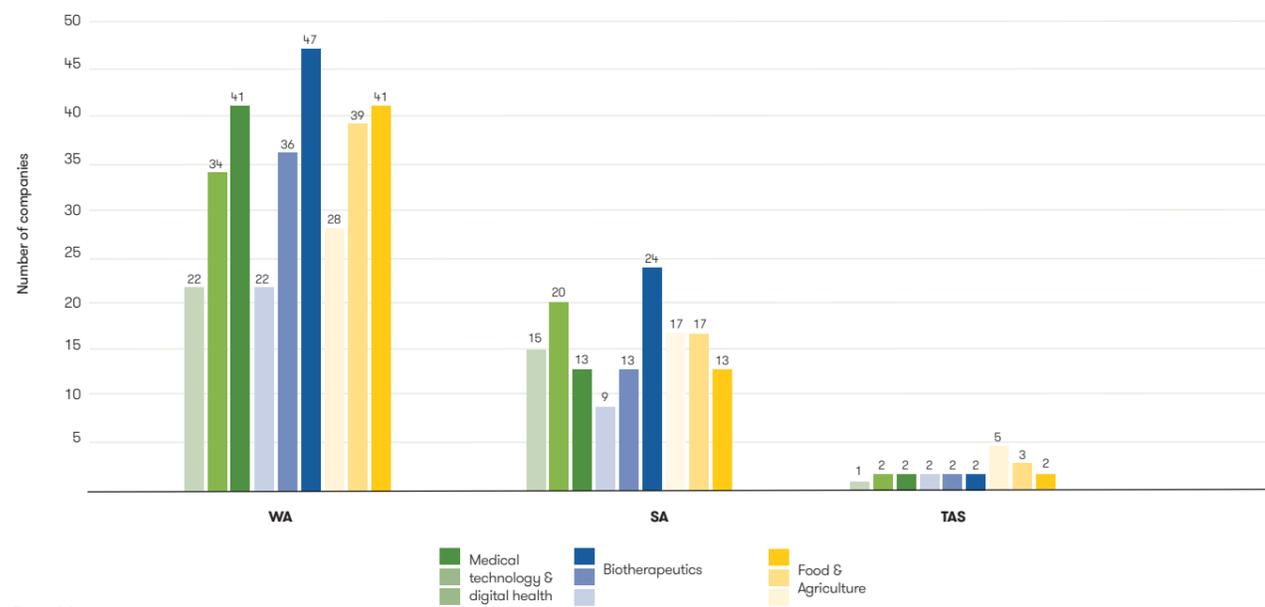


Figure 1.9

State-based employee growth by industry

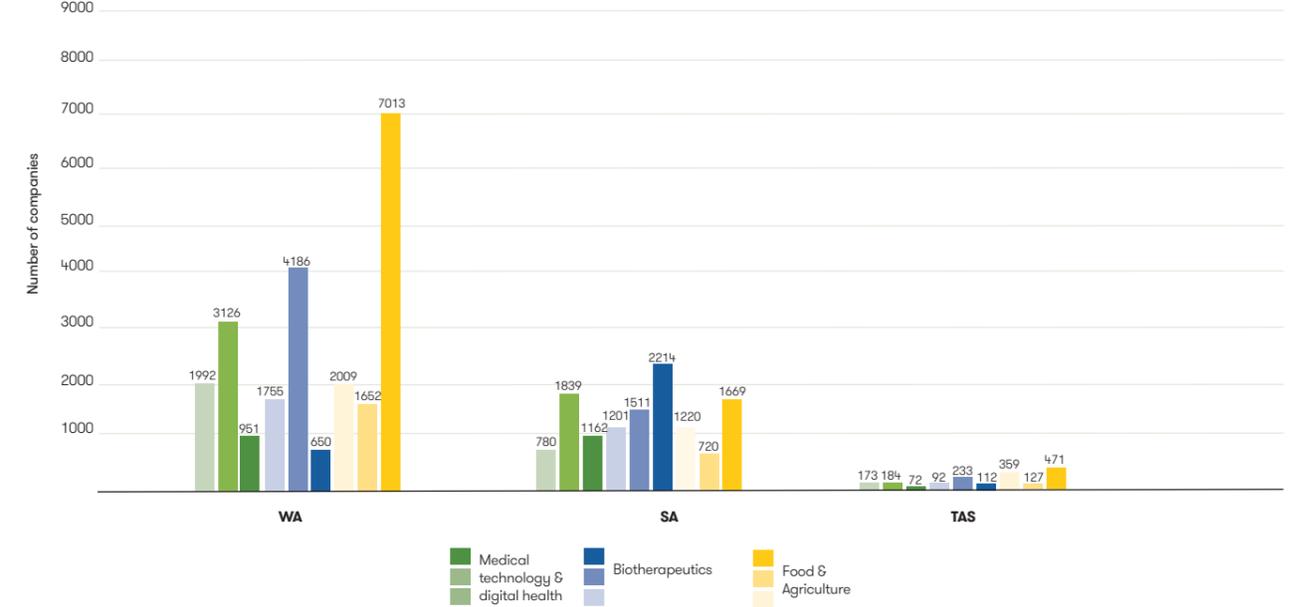


Figure 1.11

Funding and Government support for the biotech industry

In the 35 years since AusBiotech was founded as the Australian Biotechnology Association, the industry has grown from a mere handful of companies, to having an ASX-listed market capitalisation of more than \$232.8 billion in 192 industry companies, and a further 1,235+ companies creating value.

The last two years have been particularly significant for the life sciences sector. The transformative power of what we have collectively experienced has shone a light on our sector's capabilities and opportunities, and has cemented the industry's importance in the eyes of the Australian Government and investors alike.

Pre-COVID-19 life sciences was already an economically significant industry; now the social and economic opportunities and benefits the sector provides to Australia and the world is respected even more. Australia's mature and thriving industry is well-placed to participate in the global industry growth being experienced.

A record-high for life sciences capital raising was experienced in 2021, however, unquenched, the thirst for capital and skills remains as industry feeds its need for commercialisation, clinical development, and growth amid an expanding industry that is being driven by a flourishing digital health sector.

Capital raising

A host of listings has taken place since 2020, with 26 new biotech and medical technology companies listing on the ASX. This has resulted in the total number of life sciences companies working on commercialising Australia's leading science, and developing and/or delivering for patients and consumers rising to 192. The number of ASX-listed biotech companies has grown significantly, with a 19 per cent increase since 2019 (161 companies), or a 37 per cent increase since 2017 (140 companies).

In line with global trends, there has also been an influx of investment and value into these companies, and the collective market capitalisation now stands at approximately AUD\$232.8 billion¹. The market cap is one quantifiable measure of the life science sector's economic contribution to the Australian economy. This has increased 37% since 2019 (approximately \$170 billion).

Of the 192 companies, 13 companies (7 per cent) have a market cap of more than \$1 billion, and 69 companies (36 per cent) are worth more than \$100 million. The proportion of biotech companies achieving market valuations greater than \$100 million measures the industry's ability to create companies of significant future value.

Over the past 24 months, we have seen the highest level of capital raising for Australian life science companies on record. Annual data collected and reported by Bioshares shows that the capital raised by ASX-listed biotech companies in 2021 was a record high of \$8 billion, of which \$6.3 billion can be attributed to home-grown biotherapeutic multi-national giant CSL. This capital raising builds on the \$1.7 billion in 2020, and the \$1.08 billion raised the year prior. The year-on-year record-breaking capital raising indicates investors' support and recognition of the biotech industry's future growth, as well as buoyant capital attraction globally.

Government support

At the time of writing, Australia recently elected its 31st Federal Government of Australia. While the details behind the incoming Government's pledges are yet to be revealed, it is notable that the Australian biotechnology and life sciences sectors have enjoyed non-partisan, solid support from governments over many years, including Federal and State governments; this ongoing support will be critical as industry's growing need for capital attraction and skills reflects its mature and vibrant ecosystem.

Governments at Commonwealth and State level have played an important role in developing the biotechnology industry, ranging from investments in R&D and support for skills development, to the framing of regulatory and tax policies that impact the sector. Even before the COVID-19 pandemic, governments identified biotechnology as a priority growth sector. This has proven to be a valuable investment, with numerous Australian companies playing a part or taking the lead in the pandemic response.

In a globally mobile industry such as biotechnology, a strong and supportive policy environment is essential to attracting new investment and intellectual capital and retaining the value that has and can be created by companies and their investment.

Therefore, the role of the incoming and future governments will be to continue existing support, particularly in enabling policy levers that enable ongoing attractiveness of the sector relative to competing markets and also to other sectors. It is critical for industry's ongoing success in accessing and deploying investor capital that Australia and Australian companies remain competitive, and that the business operating environment is conducive to biotechnology investment.

Investment in 'medical science', innovation, and advanced manufacturing, as well as support to legislate the Australian Economic Accelerator as part of the University Research Commercialisation Action Plan, was announced by the Australian Labor Party during its lead-up to Election. The Party also pledged a \$15 billion 'National Reconstruction Fund' to co-invest in Australia's national sovereign capability, including a dedicated \$1.5 billion Medical Manufacturing Fund.

AusBiotech's Biotechnology Blueprint is a key 'blueprint' for industry and governments (Federal and State) to navigate the pathway ahead and deliver on our national purpose as we improve patients' quality of life. A shared understanding and strong relationships will be key to understand each other's needs, and in obtaining agreement and meeting Blueprint recommendations in the short and longer term, including fulfilling Australia's ability to meet sovereignty, innovation, technology, and manufacturing goals.

¹ As of March 2022, *Australasian Biotechnology journal*

26 biotech companies listed on the ASX since 2020

Company name	ASX	Listing date
Nyrada INC.	NYR	January 2020
Emyria Limited	EMD	February 2020
Little Green Pharma LTD	LGP	February 2020
Atomo Diagnostics Limited	AT1	April 2020
Aroa Biosurgery Limited	ARX	July 2020
4DMedical Limited	4DX	August 2020
Cleanspace Holdings Limited	CSX	October 2020
Control Bionics Limited	CBL	December 2020
Hexima Limited	HXL	December 2020
Chimeric Therapeutics	CHM	January 2021
Truscreen	TRU	January 2021
Singular Health	SHG	February 2021
Island Pharmaceuticals	ILA	April 2021
Argenica Therapeutics	AGN	June 2021
Hitiq Limited	HIQ	June 2021
BCAL Diagnostics	BDX	July 2021
Lumos Diagnostics	LDX	July 2021
Clarity Pharmaceuticals	CU6	August 2021
Pacific Edge Limited	PEB	September 2021
Artrya Ltd	AYA	November 2021
Biome Australia	BIO	November 2021
EBR Systems	EBR	November 2021
Radiopharm Therapeutics Limited	RAD	November 2021
Tissue Repair LTD	TRP	November 2021
Firebrick Pharma Ltd	FRE	January 2022
Microba Life Sciences Ltd	MAP	April 2022

Gender diversity in the Australian life sciences sector

Women form 53 per cent of the workforce across the life sciences sector and this has not varied markedly since 2017 (50 per cent). Female representation in senior positions (executive, board, CEO/founder) was mostly under 50 per cent across the sector, except in government and regulatory organisations and support services. However, there was an overall increase in the percentage of women in board positions and as CEO/Founder roles, when compared to 2019 (Figure 2.1).

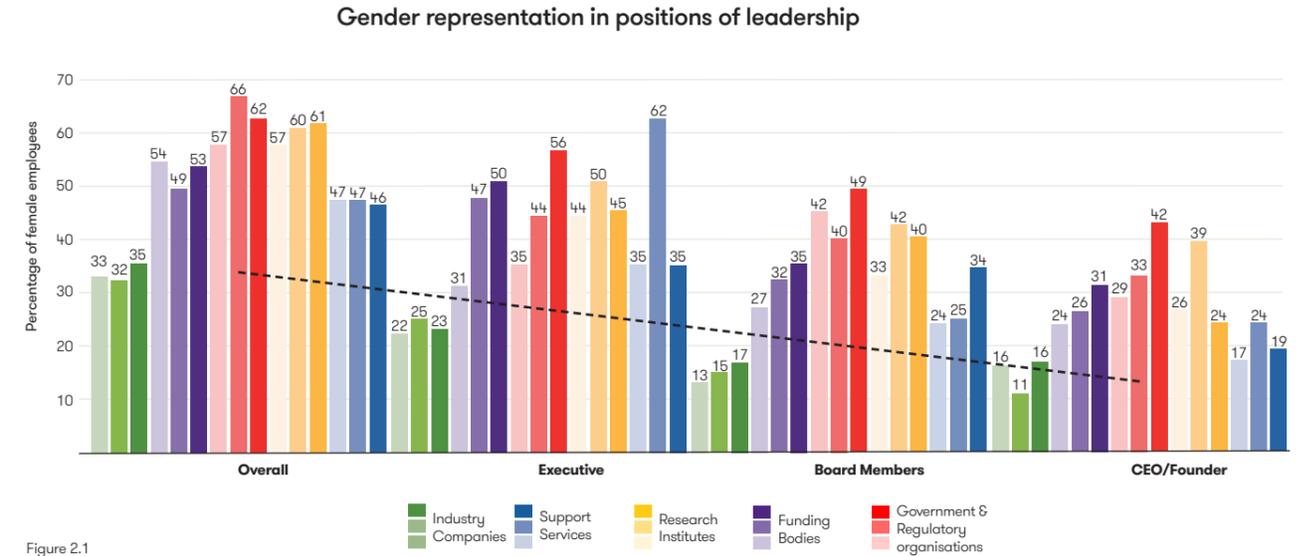


Figure 2.1

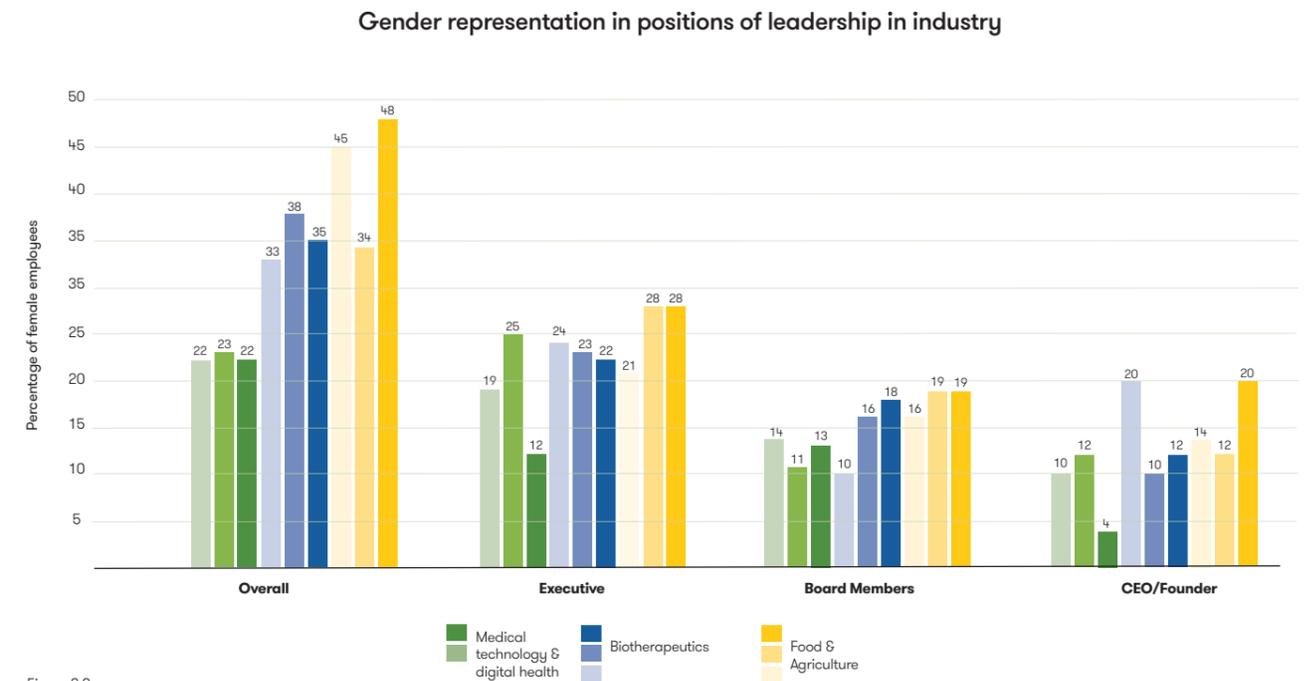


Figure 2.2

Appendix A – Definition List

Term	Definition	Rationale
Life sciences sector	As defined by the scope of the project, this includes all entities involved in sciences that have a direct or indirect impact on human life. This does not include animal sciences in terms of companion animals and sporting animals, but includes organisations involved in veterinary pharmaceuticals.	This definition includes all businesses, organisations, government sectors, and all individuals employed that support the growing life sciences industry i.e. sciences relating directly or indirectly to human life, including those used in the primary industries but not in sporting and companion animal life sciences. This sector is broken down into digital health, food & agriculture, biotherapeutics research institutes, funding bodies, support services and government & regulatory.
Food & agriculture	This category includes all organisations that develop and sell technological innovations (chemical and biological) to improve, or create new processes for food, agricultural, or environmental purposes. These innovations act on the life of an organism i.e. agricultural animal, crop or pest, or on an ecological system, directly or indirectly related to human life.	This has been modified from the Department of Industry definition. This sector is broken down into research and companies.
Medical technology & digital health	Medical technology includes a wide range of medical devices (including in vitro diagnostics) used to diagnose, monitor or treat diseases in humans that are used within a hospital, general practitioner or home setting. Digital health includes eHealth (information and communication technologies that work to improve, prevent, diagnose, treat, monitor and manage) and mHealth (mobile health that works to allow patients to manage their health - wearable or mobile data collection) that captures data about patient treatments and non-drug factors.	The definition for medical technology is obtained from the AusBiotech website. This category is broken down into companies, research, and clinical. The definition for digital health is a combination of the Nature and EU definition of digital health. This category is broken down into the un-regulated applications and software, as well as the regulated.
Biotherapeutics	This is defined as the industry concerned with the discovery, research, development, regulation and commercialisation of human and veterinary medicines.	This is the general definition for the industry including all cellular and regenerative therapeutic products.
Government & regulatory	This is defined as the bodies that govern businesses, research institutes and workers within the life sciences sector. The sector answers to, and finds guidance about ethics, regulations, funding, laws and governance, from government & regulatory bodies such as the Therapeutic Goods Administration (TGA; for therapeutics, medical technology and digital health technology), Food Standards Australia New Zealand (FSANZ; for food biotechnologies & GM foods), Office of Gene Technology Regulator (OGTR; for GMO products), Australian Pesticides and Veterinary Medicines Authority (APVMA; for agricultural and veterinary products, i.e. animal medicines and agricultural chemicals). Furthermore, the sector is supported by several federal and state government departments that specifically aid the growth of the sector such as Austrade.	Information from government websites, including:
Funding bodies	This category is defined by organised entities that privately invest in research, business development and commercialisation of life sciences companies and/or organisations.	This definition should include any entity (business or organisation) that invests large amounts of money to companies in return for a stake in the company or equity but does not include stakeholders through Australian Securities Exchange (ASX). This also includes business incubators and accelerators that operate in the life sciences industry.
Support services	This category includes all organised entities that provide support for life science companies and/or organisations.	This sector should include any company or entity that supports the sectors including IP management firms, contract research organisations (CROs), contract manufacturing organisations (CMOs), and distributors.
Research institutes	This is defined by organised entities with the purpose of research in life sciences, either privately or publicly.	Universities and private research institutions will be considered.
Life sciences employee	A person employed (for tax purposes) within Australia for a life sciences company/institution/government organisation that operates in Australia.	Any person working in Australia that supports the sector and pays Australian taxes.
Current	Data collection for this report occurred between July and September 2021.	The most current and reliable available sources were used for data collection, including government websites, company websites, peer reviewed websites/databases.
Company size	Defined by the number of employees, where: a small company has less than 20 employees; a medium company has less than 100 employees; and a large company has over 100 employees.	This follows the AusBiotech definition of company sizes on its website.

Appendix B – Methods & Statistics

Overview

The comprehensive list of 2,654 organisations obtained in 2022 was verified using various public websites and databases¹. Companies with no websites, those which were acquired, insolvent, irrelevant or without products/patents were removed. New companies were identified using the AusBiotech member list and sector databases in combination with the databases referred to previously and stakeholder engagement. Of the resulting list of 2,654 organisations, 1,210 random organisations were further probed to determine their employee numbers along with the percentage of employees that work in the life sciences sector, gender distribution as well as whether they were public or private organisations². The percentage of staff involved in life sciences in each category was determined based on company/organisational background.

The assumptions made for the proportion of staff directly involved in the life sciences sector are as below:

- In large universities (over 35,000 students) 15 per cent of the staff were assumed to be involved in the life sciences, whereas in smaller universities (less than 35,000 students) 25 per cent of the staff were assumed to work in life sciences³.
- 10 per cent of hospital staff are estimated to be involved in the life sciences sector i.e. involved in research, including physicians that are involved in clinical trials.
- For organisations that have less than 30 employees, it was assumed that 100 per cent of the employees are involved in the sector as smaller organisations usually have employees that perform overlapping functions.

These percentages were used to determine the total number of employees directly involved in the life sciences in each organisation.

Total number of employees x percentage involved in life sciences = total number of life sciences employees

The size of each organisation was determined based on the total number of employees, accordingly the proportion of small, medium and large organisations in the sector was determined. This information was used to extrapolate the total number of employees in the life sciences sector

Detailed methodology

A refined list of 2,654 life sciences organisations was randomised and information on 1,120 companies/organisations was obtained. Of this, complete employee numbers were obtained for 1,182 companies/organisations. These numbers were multiplied by the per centage of employees in each organisation/company that were involved in life sciences to obtain the number of employees that are in life sciences in each organisation/company.

Number of life sciences employees = total employee numbers x percentage of the employees involved in life sciences

The 1,182 life sciences companies/organisations were stratified by each sub-sector and then grouped into small, medium and large organisations based on the total number of employees. The average number of employees and standard deviation (SD) for each group was also obtained using standard Microsoft Excel functions.

Based on the proportion of small (S), medium (M) and large (L) organisations in the sample group, the total number of companies in each group were determined as below.

$$\left(\frac{n_{S/M/L}}{n_{\text{sample size of S/M/L}}} \right) \times 1,852 = \text{total number of S/M/L life sciences companies/organisations}$$

Statistically, based on the data collected, a confident projection of the total employee number can be obtained. The very large CI is predominantly due to large organisations with sizes ranging from 200 to 6,000 employees. This range is much lower for small and medium organisations. Reducing the CI would require data to be collected for all organisations on the list and is not feasible within the resources allotted to this study.



Acknowledgements

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Disclaimer

This report provides a statistically quantified snapshot of the employment numbers as well as the sector, state and gender distribution within the Australian life sciences sector. The information presented within this report has been derived from data that was collected over a six-month period from July to September 2021. It should be noted that the employee numbers presented are approximations based on statistical calculations and should not be taken as definitive.

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