GO8 INDUSTRY SUMMIT:
SECURING THE FUTURE OF AUSTRALIA'S IT WORKFORCE

PROGRAM

Friday, 26 August 2022
10:00am – 12:00noon (AEDT)

HYBRID EVENT:

Monash University Conference Centre Boardroom
Level 11, 30 Collins St
Melbourne

Join Zoom Meeting
Meeting ID: 899 5047 6096
Passcode: 919228

GROUP OF EIGHT AUSTRALIA


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GROUP

CONTENTS

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PROGRAM

09:45	***Virtual Room Open***
09:45	Virtual room open for attendees to test/connect before forum
10:00–10:30	**WELCOME AND OVERVIEW**

- **Vicki Thomson** Go8 Chief Executive & Summit Facilitator – Welcome
- **Professor Margaret Gardner AC** Go8 Chair, President and Vice-Chancellor, Monash University – Outline of Summit objectives and outcome
- **Dr Nick Tate** President, Australian Computer Society – IT and computing profession overview
- **Professor Tony Hosking** Director, School of Computing, Australian National University – University IT and computing overview

10:30–11:10 **SESSION 1: AUSTRALIA'S CURRENT AND FUTURE IT AND COMPUTING WORKFORCE NEEDS**

Facilitator: Vicki Thomson, Go8 Chief Executive

- What step-change is required in the national computing and IT workforce and what are the best solutions to achieve this (that universities can contribute to)?
- What is at stake for industry and the nation if we do not take action?

Summary of industry insights on the computing and IT workforce problems – including timeframes, solutions, consequences of inaction and what keeps industry leaders up at night:

- **Steve Davies** Partner, Client Innovation Centres Australia & New Zealand, IBM Australia

Facilitated discussion amongst all participants.

FRIDAY 26 AUGUST

11:10–11:50	**SESSION 2: FUTURE OPPORTUNITIES WITH NEW AND EMERGING TECHNOLOGIES**

Facilitator: Vicki Thomson, Go8 Chief Executive

- Beyond computing and IT as a service workforce, how does Australia get a workforce that can drive innovation in the economy?
- What is the role of research and a research trained workforce in delivering this innovation?
- What are the key fields of computing and IT to underpin this innovation and what is the role of universities?

Summary of insights:

- **Distinguished Professor Genevieve Bell** Director, School of Cybernetics, Director, Autonomy, Agency & Assurance (3A) Institute, Australian National University

Facilitated discussion amongst all participants.

11:50–12:00	**SUMMIT WRAP**

Summary of outcomes and next steps

- **Professor Margaret Gardner AC** Go8 Chair, President and Vice-Chancellor, Monash University

12:00	***Summit Close***

DISCUSSION PAPER

CONTENTS

CONTEXT AND RATIONALE

Australia can choose to be a future leader in high-technology industries by further investing in high skilled information and computing technology university graduates.

INTRODUCTION

Information and computing technologies are an ever-present part of people's daily lives – our reliance on computers, the internet, and other technologies such as smartphones is constant.[1]

Information technologies and computing includes but is not limited to the specific field of computer science: "the study of the design and development of computer systems".[2] It also encapsulates broader and related fields, skills, and technologies such as data analytics, artificial intelligence, and machine learning.

Over recent decades, these technologies have changed the way knowledge and information is produced and disseminated, the way businesses and government function, the size and growth of the Australian economy, and the nature of individuals' participation in the economy as both consumers and participants in the workforce.

Consequently, the nature of work and skills needed to remain economically competitive has also dramatically changed – for example, automation has substituted for some employees, changed the scope of others, and induced demand for new tasks and occupations (such as 'data engineers').[3]

The rapid technological advancement embodied in these technologies and their widespread application across all sectors of the economy, has resulted in unprecedented demand for a high skilled workforce. The majority of information technology and computer related occupations (see Appendix A1) are classified as high skill – meaning that these occupations predominantly require a university bachelor degree or higher.

Further, according to the National Skills Commission (NSC), since 2015 demand for software related skills has grown almost 30 times and according to the Tech Council of Australia (TCA), more software programmers are employed in other industries than within technology sector businesses.[4]

… since 2015 demand for software related skills has grown almost 30 times and … more software programmers are employed in other industries than within technology sector businesses.[4]

1 There were over 31 million mobile voice and broadband services active in Australia as of June 2021, more than Australia's population. Source: Australian Communications and Media Authority (2021), 'Communications and media in Australia: trends and developments in telecommunications 2020–21'.

2 https://www.abs.gov.au/ausstats/abs@.nsf/0/A053B5F962D23045CA256AAF001FCA83?opendocument

3 Jeff Borland and Michael Coelli, 'The Australian labour market and the digital economy', University of Melbourne, February 2022.

4 Tech Council of Australia/Accenture (2022), 'Getting to 1.2 million: our roadmap to create a thriving Australian tech workforce'.

CONTEXT AND RATIONALE *continued*

Australia is now at a critical juncture where investment in a high technology-enabled workforce is essential to meet growing industry demand and reap economic reward.

The disparity between workforce demand and supply is particularly relevant to the higher skilled elements of the information and computing technologies workforce where university qualifications and training are essential – in particular, research training.

Given the above, the aim of this Summit is not to add to the myriad of analyses and reports on the IT and computing workforce, nor to make recommendations on migration policy. The Summit's goal is to address **one specific and critical part of the IT and computing workforce pipeline – education and research training in Australia's world-class university sector**.

The Summit will seek to identify broad-based solutions to issues and barriers industry is experiencing in accessing this university-educated innovative workforce, now and into the future.

The Group of Eight Information Technology and Computing Workforce Summit will explore and develop strategies that increase the national supply of information technology and computing university graduates to position Australia to capitalise on future economic opportunities.

INFORMATION TECHNOLOGY AND COMPUTING IN AUSTRALIA'S ECONOMY

Our capacity to exploit information and computing technologies is directly linked to Australia's economic prosperity. The 'technology sector' broadly defined (see Appendix A2) is equivalent to Australia's sixth largest industry, contributing $122 billion each year to gross domestic product (GDP) and providing an estimated $44 billion a year in economic value to consumers.[5]

According to the Tech Council of Australia (TCA), labour productivity of Australia's technology sector expanded by 3.8 per cent annually over the past two decades, double the growth rate for the whole economy.

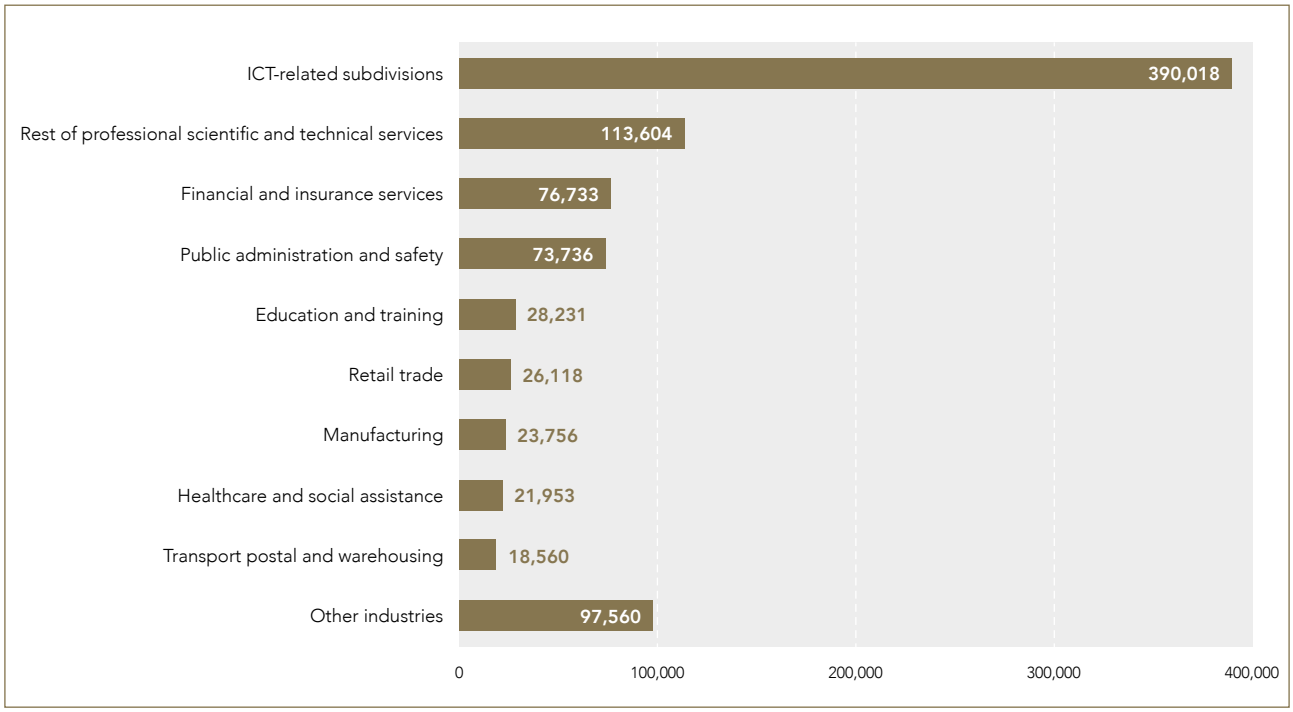
The technology sector employs around 860,000 people (or 1 in 16 people are employed in technology jobs) and the TCA estimate technology sector jobs pay 64 per cent higher than the economy-wide average.[6] The TCA also highlight broader technology-related roles in sectors such as banking, mining, and professional services. The chart below from the Australian Computer Society (ACS) shows the breadth of technology workers by Australian industry.

The 'technology sector' broadly defined is equivalent to Australia's sixth largest industry, contributing $122 billion each year to gross domestic product (GDP) and providing an estimated $44 billion a year in economic value to consumers.[5]

5 AlphaBeta (2019), 'Australia's digital opportunity: growing a $122 billion a year tech industry'.

6 Tech Council of Australia (2022), 'Australia's tech jobs opportunity – cracking the code to Australia's best jobs'.

Chart 1: Number of technology workers by industry, Australia, 2021



Source: Deloitte (2022), 'ACS Australia's Digital Pulse Unlocking the tech sector: beyond one million'.

According to the ASC the technology workforce is more culturally and linguistically diverse than Australia's professional services workforce, but is less diverse in areas of gender, age, ability status and location of workers. For example, women make up 31 per cent of the technology workforce compared to 46 per cent for professional services.[7]

In terms of higher education completions in IT, only 28 per cent are by women although this is slightly higher at 31 per cent across the Go8.

Australia's expenditure on research and development (R&D) in relation to information and computing technologies is significant. Australian Bureau of Statistics (ABS) data for 2019–20 (latest year available), shows that combined expenditure by business on information and computing sciences was $7.1 billion or 39 per cent of total business expenditure on R&D.[8]

7 Deloitte (2022), 'ACS Australia's Digital Pulse Unlocking the tech sector: beyond one million'.

8 https://www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-businesses-australia/2019–20

CONTEXT AND RATIONALE *continued*

WORKFORCE SUPPLY AND DEMAND

Rapid technological change in information and computing technologies will continue to change the nature of work and consequently the skills and qualifications needed to participate in the workforce. According to the TCA, 62 per cent of workers in technology occupations hold a university degree, compared to 31 per cent of all workers.

Emerging technologies at the intersection of information technology (IT), computer science and physical sciences, such as advanced robotics, artificial intelligence (AI), quantum computing and internet of things (IoT) will accelerate change and provide opportunities for the global and Australian economies.

A major barrier to Australia capitalising on the economic opportunities available as a result of these new and novel technologies is access to a highly skilled workforce. This workforce will require, at a minimum, university undergraduate qualifications and most likely postgraduate university qualifications.

Both the TCA and the ACS suggest that overall, technology industry workforce demand exceeds supply. For example, **the TCA indicate job vacancy rates are 60 per cent higher than the national average and industry projections to reach 1.2 million technology jobs by 2030 will mean Australia needs an extra 653,000 by the end of this decade (relative to business as usual, this represents an increase of 186,000). To meet this need, the number of university and vocational education and training graduates will need to increase by a further 42,000 to 2030.**[9]

To put the workforce needs into perspective, award course completions in 2020 (including non-university providers) were 31,737, which is around four per cent of the technology workforce.

The NSC points to high demand for computing skills, including specialised technical skills (software automation, artificial intelligence, and data analysis) is expected to rise by 15 per cent between 2022 and 2025.[10] Nine out of 10 new jobs will require post-school qualifications in science, technology, engineering, and mathematics (STEM).[11] In other words, advanced and highly skilled technology roles require (computer) science, technology, engineering, and mathematics (STEM) or technical skills that are taught by universities.

Information technology and computing related occupations classified by different skill levels (presented in Appendix A1) highlight the predominance of high skills (bachelor degree or higher) in the existing and future technology workforce. According to the NSC, as of November 2021 employment in information technology and computing related occupations totalled 828,000 with around 669,000 in high skill occupations.

Based on the NSC projections of employment growth to November 2026 for these occupations:

- The NSC employment projection of just over 1 million by November 2026 indicates that reaching 1.2 million technology jobs by 2030 will not be achievable under the status quo.
- By November 2026, employment growth will be dominated by high skill occupations (with the top 10 occupations by growth in employment requiring a bachelor degree or higher, as illustrated in Table 1).

9 Tech Council of Australia/Accenture (2022), 'Getting to 1.2 million: our roadmap to create a thriving Australian tech workforce'.

10 Angela Hope, Natasha Yemm, Giang Nguyen, Mohammad Ali Raza, Erica Sparke, Carissa Buhagier, and Rachel Neumann, National Skills Commission (2022), 'Digital skills in the Australian and international economies'.

11 https://www.nationalskillscommission.gov.au/insights/projecting-employment-2026

Table 1: Fastest growing employment in information technology and computing related occupations

ANZSCO Occupation Code	Skill level	Occupation	Projected % growth to Nov 2026
2632	1	ICT Support and Test Engineers	43.7
2621	1	Database and Systems Administrators, and ICT Security Specialists	38.9
2630	1	ICT Network and Support Professionals nfd	35.3
2247	1	Management and Organisation Analysts	32.2
2613	1	Software and Applications Programmers	27.0
2249	1	Other Information and Organisation Professionals	26.2
2610	1	Business and Systems Analysts, and Programmers nfd	23.2
2631	1	Computer Network Professionals	22.2
2324	1	Graphic and Web Designers, and Illustrators	21.7
2600	1	ICT Professionals nfd	20.1

Notes: "nfd" means not further defined. Skill level 1 – Bachelor degree or higher.
Source: NSC: https://www.nationalskillscommission.gov.au/topics/employment-projections

These findings are consistent with research by the Reserve Bank of Australia (RBA) that show that long-term growth in total employment by skill level has been concentrated in high skill occupations and for high skilled workers doing non-routine cognitive tasks.[12]

In addition, the Digital Economy Strategy 2030 (released in 2021 by the previous Government) notes that there is a need to increase digital capabilities for participants in the Australian workforce.[13]

12 Alexandra Health, Reserve Bank of Australia (2020), 'Skills, technology and the future of work', Speech to Career Education Association of Victoria and Victorian Commercial Teachers Association Work Futures Conference.

13 https://digitaleconomy.pmc.gov.au/sites/default/files/2021-07/digital-economy-strategy.pdf

CONTEXT AND RATIONALE *continued*

SOURCES OF WORKFORCE SUPPLY

There are essentially three avenues for increasing the information technology and computing workforce:

- Increasing the number of graduates through higher education institutions.
- Skilled migration and temporary international workers.
- Re-training/re-skilling graduates and workers from other sectors.

Universities have a direct role in the first but are also important in the second and third avenues.

In terms of university enrolments and graduates, the number of commencing university students whose field of education is information technology has increased by 12 per cent annually from 2016 to 2020 (the latest year published data is available). Chart 2a shows the number of commencements has increased year on year to 2019 but declined in 2020 during the COVID-19 period.

Chart 2b shows the number of award completions for information technology, which has grown at 21 per cent annually. Despite Chart 2b showing the yearly increase in award completions, the TCA indicates that this 'business as usual' trend will not be enough to address the demand through to 2030.

COVID-19 related restrictions not only impacted the number of university commencements in information technology but according to the ASC, also reduced the supply of the technology workforce from overseas. The number of ICT temporary work visas declined by 50 per cent in 2020–21 compared to 2018–19.[14]

Go8 consultation with industry has raised a similar theme – while a large proportion of graduates in information technology are international students (see Table 2), for the majority there is no pathway to remain in Australia longer term.

So skilled migration and temporary international workers assist in meeting workforce demands but are not the complete answer.

Finally, in terms of re-training/re-skilling people from other sectors, the ACS see this as critical to improving workforce supply and points to motivations such as higher wages and associated benefits.[15]

In terms of the general uplift in digital skills in university graduates across all disciplines, one proxy measure for this is the number of IT units being taken by university students or the Effective Full Time Student Load (EFTSL). While over the five-year period 2016–2020 this figure did increase by 71 per cent, more than 76 per cent of this increase was due to a more than doubling of IT units taken by international students.

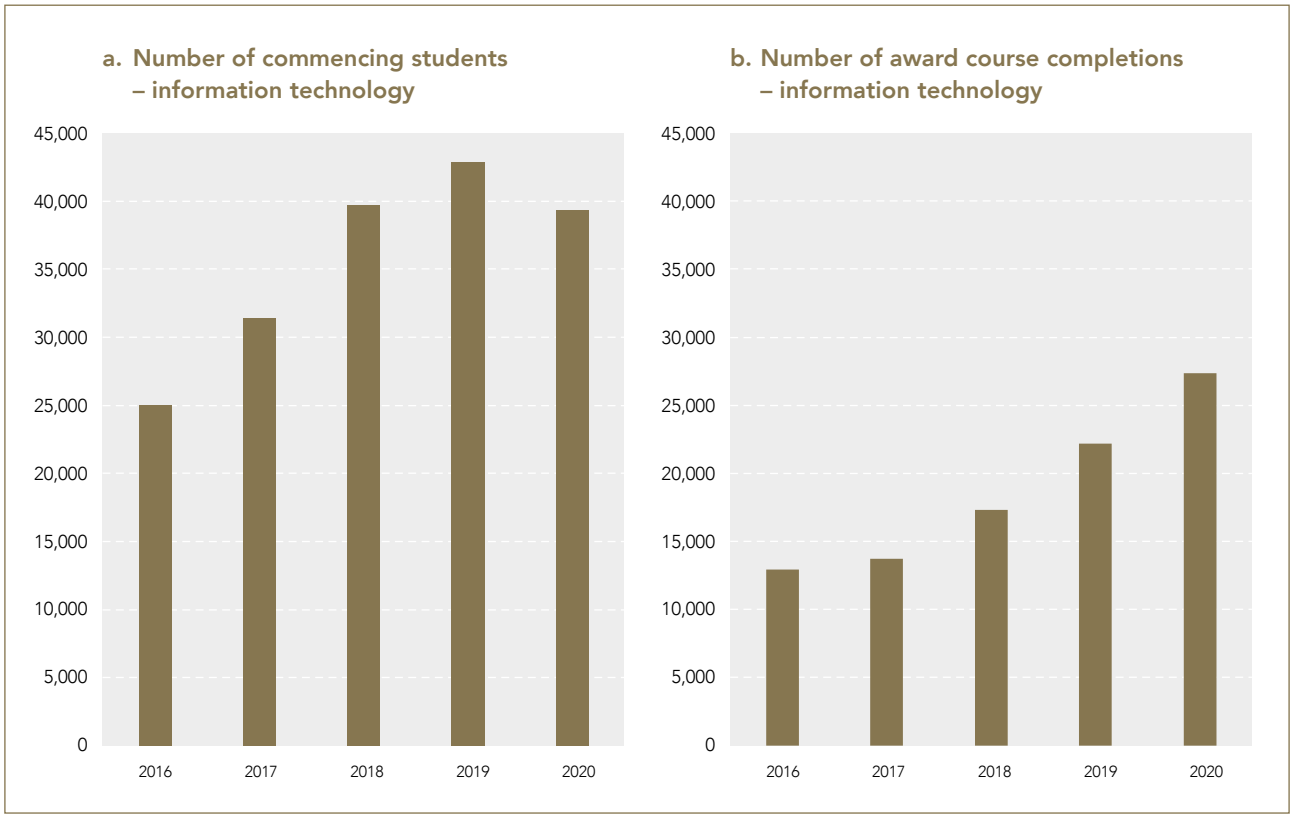
The number of ICT temporary work visas declined by 50 per cent in 2020–21 compared to 2018–19.[14]

The COVID pandemic highlighted the importance of building sovereign capability. To remain internationally competitive Australia will need a strong pipeline of research trained experts in a broad range of IT and computing fields.

14 Tech Council of Australia/Accenture (2022).

15 Deloitte (2022).

Chart 2: Information technology university commencements and completions, Australia



Notes: Excludes non-university higher education providers. Source: DESE data.
https://www.dese.gov.au/higher-education-statistics/student-data

Table 2: Award course completions (2020 – most recent year available)

		Information technology	All fields
Group of Eight universities	Domestic (number)	2,014	61,049
	All students (number)	7,390	110,959
	% Domestic	27%	55%
	% International	*73%*	*45%*
National	Domestic (number)	8,675	228,480
	All students (number)	31,737	379,800
	% Domestic	27%	60%
	% International	*73%*	*40%*

Notes: Figures include non-university higher education providers. Sources: Go8 data and
https://www.dese.gov.au/higher-education-statistics/resources/2020-section-14-award-course-completions

CONTEXT AND RATIONALE *continued*

In November 2021 the Department of Prime Minister and Cabinet released the *Action Plan for Critical Technologies.*[16] The Action Plan identifies a list of 63 technologies in eight categories that are either critical for Australia today or are expected to become critical within the next ten years. From this list an interim short list of nine technology areas have been prioritised including 23 specific critical technologies each with identified research areas.[17] Approximately **half the research areas underpinning Australia priority critical technologies are in Information and Computing Sciences, and Engineering.**

This includes not just obvious areas such as artificial intelligence and machine learning but capability across a dozen broad areas of IT and computing research.[18] In 2020, 417 students completed a postgraduate research qualification in IT at Australian universities (the majority of these PhDs) with over a third at Go8 universities. This number of completions has not changed significantly over the five-year period 2016–2020, although the share of international student completions has risen from half in 2016 to approximately 56 per cent in 2020.

Despite this lack of growth, Australia is not yet significantly behind in global terms. There is however a limited window of time for action.

The OECD reports that in 2019 Australia had 376 PhD completions in IT compared to 282 in Canada, 1,032 in Germany, 1,216 in the UK and 2,192 in the US.

In a more sophisticated future economy, it is expected that there will be a need for more research trained experts in IT to both work in industry and in academia, responsible for both research and teaching in demand Australian IT graduates.

Providing this research trained pipeline will require a combination of both domestic training and migration policy levers.

GOVERNMENT POLICY AND THE ROLE OF UNIVERSITIES

The Australian Government has an agenda for a bigger, more productive, and better skilled workforce as the basis for more stable and well-paid employment and economic growth. The Government has also endorsed an industry target of achieving 1.2 million 'technology' jobs in Australia by 2030 and has indicated it will support the TCA call for:[19]

- Increasing awareness of job opportunities.
- Addressing education and training.
- Improving workforce diversity.
- Increasing skilled migration.
- Improving industry-level workforce analyses.

While measures such as a proposal for a new "digital apprenticeship scheme" given that "40 per cent of technology jobs did not need a university degree"[20] will go part way to addressing the workforce skills needs, it will not address the priority demand for higher skilled workers that require undergraduate or post graduate university qualifications.

16 https://www.pmc.gov.au/sites/default/files/publications/ctpco-action-plan-critical-technology.pdf

17 These comprise critical minerals extraction and processing; advanced communications; Artificial Intelligence (AI); cyber security technologies; genomics and genetic engineering; novel antibiotics, antivirals and vaccines; low emission alternative fuels; quantum technologies; and autonomous vehicles, drones, swarming and collaborative robotics.

18 Ibid.

19 https://www.minister.industry.gov.au/ministers/husic/media-releases/mapping-out-australias-path-tech-jobs-future

20 https://www.theaustralian.com.au/business/husic-ponders-digital-apprentice-scheme-for-tech-sector/news-story/a7d328be607036616bb14d4c05d71381

Universities and the Go8 universities in particular, have a critical role in addressing education and training so that there is a strong, reliable long-term supply of information technology and computing workforce in Australia for roles that are increasingly high-skilled and that will not be addressed by VET.

The Australian Government's target of achieving 1.2 million technology jobs in Australia by 2030 will only be achieved if the number of information technology and computing graduates are increased. For more advanced fields such as quantum computing and AI, an increase in the number of post-graduates in advanced computing related fields is essential. The Federal Minister for Industry and Science, Ed Husic, has recognised the importance of these critical technologies:

> *"It's why I've been really focused, for example, on championing the case of about what we can do in AI, robotics but also quantum, not losing our edge with some of these critical technologies, making sure that we've got the capital investment in place, because I do really genuinely think longer term there'll be two types of economies – there'll be makers and there'll be takers. And we cannot just be a passive importer of technology."*[21]

In terms of universities' funding, the Australian Government sets funding clusters and student tuition contributions by fields of education. For 2022, units of study in the areas of computer science, information systems and other information technology fall under Funding Cluster 2, with a maximum student contribution of $8,021 and a Commonwealth contribution amount of $13,369. This compares, for example, to engineering units of study that fall into Funding Cluster 3 that attract the same maximum student contribution but a Commonwealth contribution amount of $16,396.[22]

This difference in funding rates presents challenges for universities in being able to deliver education in IT and computing fields where necessary equipment and technology are becoming increasingly expensive.

Group of Eight universities

In 2020, the Go8 universities contributed around 26 per cent to both the total number of commencing university students in the broad field of information technology and to the total number of award course completions.

Over the period from 2016, the annual growth rate of commencing university students in Go8 universities in the broad field of information technology was 19 per cent compared to 12 per cent for all universities, while the annual growth rate of award course completions in Go8 universities was 30 per cent, well above 21 per cent achieved by all universities in Australia.

The Go8 universities value proposition relates to educating and training high-end computing graduates who will work at the cutting edge of computing knowledge and innovation – this 'lifelong' learning environment is not available at other Australian universities or through the VET sector.

21 https://www.minister.industry.gov.au/ministers/husic/transcripts/doorstop-tech-council-australia-report-launch-australian-parliament-house

22 https://www.dese.gov.au/download/11647/2022-allocation-units-study-funding-clusters/22264/document/pdf

OBJECTIVES AND OUTCOMES

The objective of this Summit is to provide the opportunity for industry, university, and government stakeholders to discuss and develop policy solutions so universities can deliver the domestically trained information technology and computing workforce that is critical to the Government and industry agreed objective of 1.2 million technology jobs by 2030.

The previous discussion highlights the challenge facing Australia. Relying on expanding VET places and skilled migration alone will not deliver the highly skilled workforce Australia needs.

The Go8 has engaged with the Minister for Industry and Science on this issue and agreed to provide a summary of key findings and recommendations as a matter of urgency, to assist in informing discussions at the upcoming National Jobs and Skills Summit on 1–2 September 2022.

Outcome of this Summit:

- Develop policy solutions and recommendations that can enable universities to successfully deliver the domestically university-trained high-end information technology and computing workforce.
- Provide a summary of the key findings and recommendations to the Minister for Industry and Science ahead of the National Jobs and Skills Summit on 1–2 September 2022.

Relying on expanding VET places and skilled migration alone will not deliver the highly skilled workforce Australia needs.

PRIORITY AREAS FOR DISCUSSION

The ABS found that in 2019–20, 69 per cent of all businesses recorded using one or more information technologies, yet two of the main factors that prevented or limited businesses from using these technologies were lack of skilled persons within the business and insufficient knowledge of the IT.[23]

TOPIC 1: AUSTRALIA'S CURRENT AND FUTURE IT AND COMPUTING WORKFORCE NEEDS

Many different industries and sectors central to the Australian Government's National Reconstruction Fund agenda have a heavy reliance on a computing and IT workforce as well as a general workforce with increased digital literacy and skills. This includes national and competitive strengths such as resources, agriculture, transport, medical science, renewable and low emission technologies, and defence capability. They also underpin increasing enabling capabilities such as AI, machine learning, data analytics, and robotics as well protective capabilities in cyber security.

Each of these sectors – and indeed individual employers in each of these sectors – will have specific needs for an IT and computing workforce.

Consequently, the national IT and computing workforce must have the scale and flexibility to accommodate these demands as well as those of emerging sectors.

Another potential challenge for IT and computing education and research training in Australia's world-class university sector is the availability and pipeline of teaching and research staff. Increasing the number of university students to achieve technology job targets will also require additional university teaching staff to ensure student-staffing ratios provide an optimal university learning environment for students to thrive.

Key Questions

1. What are the pressure points for Australia's current and future IT and computing workforce and what has been the impact of the COVID-19 pandemic?
2. What is the scale of the increase in/pivot of the IT and computing workforce required by Australia in the:
   - **a.** Short-term: 0–2 years
   - **b.** Medium-term: 3–5 years; and
   - **c.** Long-term with a focus on emerging industries and technologies?
3. What is the mix of IT and computing disciplines needed for the future Australian workforce?
4. What balance should be struck between upskilling IT and computing professionals already in the workforce, graduating new IT and computing professionals, and a general uplift in digital skills amongst all university graduates?
5. What are the impediments to delivering Australia's current and future IT and computing workforce?

23 Australian Bureau of Statistics (2021), 'Characteristics of Australian business, 2019–20 financial year', https://www.abs.gov.au/statistics/industry/technology-and-innovation/characteristics-australian-business

PRIORITY AREAS FOR DISCUSSION
continued

TOPIC 2: FUTURE OPPORTUNITIES WITH NEW AND EMERGING TECHNOLOGIES

Beyond an IT and computing workforce that can service the present needs of the economy, Australia needs to consider the workforce that is needed to drive the nation to become a global leader in computing and IT. This includes generating new industries, revolutionising existing industries and driving the continual creation of new businesses and economic activity.

Innovation must be at the heart of this drive and in particular high-end research outcomes and research skills to create paradigm shifting industries as well as facilitating rapid adoption of international innovations.

Australia is well-placed in this regard, for instance six of the Go8 members are ranked in the top 100 globally for computer science and information systems.[24]

Key Questions

1. What is the current and future industry demand for research skills in IT and computing broadly interpreted:
   - **a.** By scale of the research trained workforce needed?
   - **b.** By disciplines and fields of expertise?
2. How do we ensure that the boundary between the academic and industry research workforce in IT and computing is "porous" – allowing movement back and forward between sectors? How important is this and are there existing examples of where this is done well?
3. What other commercialisation and business skills need to be in place to maximise the impact of a research trained IT and computing workforce? To what extent is this a matter of additional skills for researchers or a supporting "ecosystem", and in both cases what does this look like?

… six of the Go8 members are ranked in the top 100 globally for computer science and information systems.[24]

24 QS World University Rankings by Subject 2022.

APPENDICES

A1: TECHNOLOGY SECTOR OCCUPATIONS BY SKILL LEVEL AND EMPLOYMENT

ANZSCO Occupation Code	Skill level	Occupation	Projected employment level – November 2026 ('000)	Projected growth	
				Number ('000)	%
1351	1	ICT Managers	95.6	14.4	17.7
2232	1	ICT Trainers	1.1	–0.2	–14.8
2247	1	Management and Organisation Analysts	115.6	28.2	32.2
2249	1	Other Information and Organisation Professionals	63.8	13.3	26.2
2252	1	ICT Sales Professionals	12.8	0.1	0.9
2324	1	Graphic and Web Designers, and Illustrators	78.1	13.9	21.7
2611	1	ICT Business and Systems Analysts	51.2	5.9	12.9
2612	1	Multimedia Specialists and Web Developers	15.6	1.9	13.7
2613	1	Software and Applications Programmers	198.4	42.2	27.0
2610	1	Business and Systems Analysts, and Programmers nfd	0.1	0.0	23.2
2621	1	Database and Systems Administrators, and ICT Security Specialists	104.0	29.1	38.9
2631	1	Computer Network Professionals	43.2	7.9	22.2
2632	1	ICT Support and Test Engineers	15.7	4.8	43.7
2633	1	Telecommunications Engineering Professionals	20.8	3.1	17.6
2630	1	ICT Network and Support Professionals nfd	1.1	0.3	35.3
2600	1	ICT Professionals nfd	20.9	3.5	20.1
3132	2	Telecommunications Technical Specialists	4.5	0.1	1.6
3130	2	ICT and Telecommunications Technicians nfd	0.1	0.0	16.4
3131	2	ICT Support Technicians	94.2	14.0	17.4
3424	3	Telecommunications Trades Workers	14.7	–0.8	–5.2
6212	5	ICT Sales Assistants	24.0	1.6	7.0
3123	2	Electrical Engineering Draftspersons and Technicians	10.1	0.1	0.7
3124	2	Electronic Engineering Draftspersons and Technicians	4.8	–0.1	–2.9
3423	3	Electronics Trades Workers	20.1	–0.9	–4.2
		TOTAL	**1,010.2**	**182.2**	**22.0**

Notes: "nfd" means not further defined. Skill level 1 – Bachelor degree or higher; Skill level 2 – Advanced Diploma or Diploma, Skill level 3 – Certificate IV or III, Skill level 4 – Certificate II or III, Skill level 5 – Certificate I or secondary education.

Sources: Deloitte (2022), 'ACS Australia's Digital Pulse Unlocking the tech sector: beyond one million', and NSC: https://www.nationalskillscommission.gov.au/topics/employment-projections

A2: THE SCOPE OF INFORMATION TECHNOLOGY AND COMPUTING

There are both narrow and broad definitions of information and computing technologies. This is because these terms refer interchangeably to physical infrastructure, fields of education and research, occupations, and industries. Related terms such as the 'technology sector' and 'digital economy' are also prevalent.

Information technologies and computing includes but is not limited to the specific field of computer science. It also encapsulates broader and related fields, skills, and technologies such as data analytics, artificial intelligence, and machine learning.

From an industry perspective, the Australian Bureau of Statistics (ABS) defines a specific Information Media and Telecommunications industry division under the Australian and New Zealand Standard Industrial Classification (ANZSIC) classification system. This industry division includes:

> *"Creating, enhancing and storing information products in media that allows for their dissemination;*
>
> *transmitting information products using analogue and digital signals (via electronic, wireless, optical, and other means); and*
>
> *providing transmission services and/or operating the infrastructure to enable the transmission and storage of information and information products".*[25]

According to the ASC, in 2020–21, this industry contributed nearly $56 billion in gross value added to the Australian economy and $5.09 billion in exports.[26]

Beyond this, there are other industry divisions within the ANZSIC classification system that have elements of information and computing technologies. For example, the provision of specialised computer services such as programming and systems design fall under the Professional, Scientific, and Technical Services ANZSIC industry division. Further, some employment in industries such as Retail and Wholesale Trade involves sophisticated computing skills and equipment that could more broadly be defined as 'technology sector'.

According to the ASC, in 2020–21, this industry contributed nearly $56 billion in gross value added to the Australian economy and $5.09 billion in exports.[26]

Definitions of 'technology sector' and 'digital economy' are broader than any one ANZSIC industry, and there is not one agreed definition. For example, the ABS define 'digital economy' as a broader term encapsulating "platforms such as the internet, mobile and sensor networks, including ecommerce". The TCA define the technology sector to include the Information Media and Telecommunications industry division but some parts of Retail and Wholesale Trade (online commerce jobs), and technology-related roles in other industries such as banking and mining.

25 https://www.abs.gov.au/statistics/classifications/australian-and-new-zealand-standard-industrial-classification-anzsic/2006-revision-2-0/division-definitions#division-j-information-media-and-telecommunications

26 Australian Computer Society (2022), 'Australia's Digital Pulse Unlocking the tech sector: beyond one million'.

A3: PROFILE OF THE GO8

The Group of Eight (Go8) is the peak body for Australia's eight leading research-intensive universities. Membership of the Go8 comprises The University of Queensland, UNSW Sydney, The University of Sydney, The Australian National University, The University of Melbourne, Monash University, The University of Adelaide, and The University of Western Australia.

The Go8 members are in the top tier internationally with **seven ranked in the top 100 universities in the world and two in the top 50 globally for computer science and engineering**.

Collectively, the Go8 members educate over 425,000 students and over one in three international students that study at Australian universities do so at a Go8 member.

Go8 members produced over 110,000 graduates in 2020 including 7,390 in the field of information technology, which is 23 per cent of the national total.

The Go8 spends $6.5 billion on R&D including over $330 million on research in the fields of Information and Computing Sciences and Technology.

To prosecute this research agenda, the Go8 has around 23,000 researchers and 31,000 higher degree by research students. In 2020 the Go8 graduated just under 4,400 PhDs, representing 49 per cent of the national total.

This research is conducted at a standard that sees over 99 per cent of Go8 research rated as world class or above by the Australian Government's official university research audit – Excellence in Research for Australia (ERA). ERA also rated four Go8 members at the maximum rating of 5 (well above world standard) for research in information and computing sciences.

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GROUP OF EIGHT AUSTRALIA

MEMBERS

go8.edu.au

THE UNIVERSITY OF WESTERN AUSTRALIA

MONASH University

Australian National University

THE UNIVERSITY of ADELAIDE

THE UNIVERSITY OF MELBOURNE

UNSW SYDNEY

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

THE UNIVERSITY OF SYDNEY