2022 NATIONAL INNOVATION POLICY FORUM

MONDAY, NOVEMBER 21
PARLIAMENT HOUSE, CANBERRA

Hosted by

Cooperative Research Australia

Australian Government
Department of Industry, Science and Resources

AusIndustry
Cooperative Research Centres Program

COOPERATIVE RESEARCH CENTRES (CRC) PROGRAM

The Australian Government's CRC Program supports industry-led collaborations between industry, researchers and the community. The focus is on research and development that solves industry identified problems and leads to commercial uses.

The CRC Program is delivered by AusIndustry in the Department of Industry, Science and Resources. It is open to all industry sectors and research disciplines with grants awarded through competitive funding rounds.

The CRC Program has two funding streams:

- **CRC grants –** supporting medium to long term industry-led collaborations (up to 10 years), funding up to 50 per cent of eligible grant project costs.
- **CRC Project grants –** supporting short term, industry-led collaborative research, funding up to $3 million for projects up to three years in duration.

Where can I find more information?

For further details on CRC and CRC Project funding rounds and how to apply, visit **business**.gov.au or call **13 28 46**.

"Outcomes from HEARing CRC research have been commercialised and used clinically, and have returned more than $12 million in royalties and other income."

PROF. ROBERT COWAN, CEO, HEARING CRC

"This project allowed a number of organisations with diverse skills to come together and share their knowledge to look at some advanced technology in a completely different way. A project of this type would have been impossible without the funding provided by the CRC-P Program."

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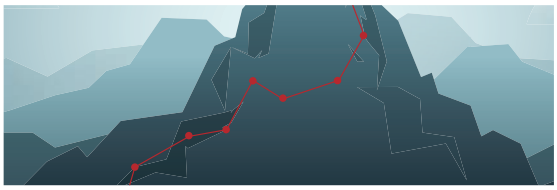

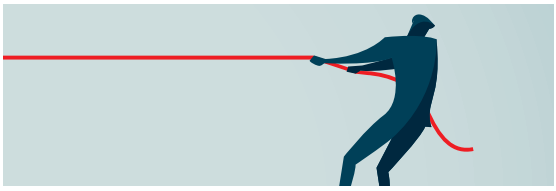

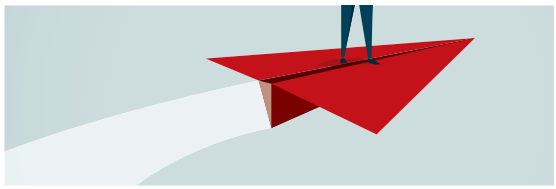

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Cooperative Research Australia

NATIONAL INNOVATION POLICY FORUM CANBERRA 2022

PUBLISHER
Cooperative Research Australia

For further enquiries contact:
admin@cooperativeresearch.org.au

Cooperative Research Australia
Level 1, 33 Allara Street
Canberra ACT 2601

02 6260 3988
www.cooperativeresearch.org.au

This publication was made possible by the support of Coretext

CORETEXT
LEADERS IN SCIENCE JOURNALISM

Cooperative Research Australia acknowledges the traditional custodians of the land on which we operate, the Ngunnawal people.

We also acknowledge the traditional custodians of the various lands across Australia upon which our members and stakeholders operate.

We pay our respects to Elders past, present and emerging and celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to our lands and waters.

MINISTERIAL MESSAGE

REVITALISING SCIENCE AND TECHNOLOGY

All of us – government, industry and research sector – need to work together to revitalise Australian science and technology. Our scientists, researchers and innovators have made extraordinary contributions to this country's prosperity and wellbeing over the past century.

However, deeper science and industry collaboration will be needed to create the higher-value jobs and industries of the future – and to make Australia more resilient to natural disasters and seismic events like the COVID-19 pandemic.

The Cooperative Research Centres (CRC) Program has been enabling high-value collaborative research between industry, researchers and end-users for 30 years.

It has delivered real outcomes spanning industries as diverse as manufacturing, agriculture, waste recycling, artificial intelligence, aerospace, energy, health and mining.

Since 1991 the program has committed $5.5 billion of grant funding to support the establishment of 236 CRCs and 189 of the shorter-term CRC projects (CRC-Ps).

Collaborating partners from industry, research, government and community organisations have more than matched this funding, with commitments of more than $16.8 billion of cash and in-kind contributions.

That is a tremendous reflection on how much the program and how much these CRCs are valued.

More than 35,400 commercialisation agreements have resulted from work undertaken in the CRCs and the CRC-Ps.

More than 140 spin-off companies have emerged out of the program, an incredible statistic.

Our CRCs and CRC-Ps have been involved in over 38,000 collaborations across the world and produced more than 121,000 publications.

To continue to build on these successes, the Albanese Government delivered continued support for the CRC Program in the 2022–23 Budget.

We want to better publicise future CRC funding rounds, thereby creating a more level playing field.

The Department of Industry, Science and Resources is working towards publishing routine schedules for new rounds so that prospective applicants can better prepare their applications.

Potential applicants will know precisely when new rounds open, when they close and when funding is due to commence.

As part of our government's goal of having more great ideas developed and commercialised onshore, we have started work to revitalise Australia's national science priorities.

That 12-month process is being led by Australia's Chief Scientist Dr Cathy Foley. It will help us identify opportunities and growth areas across the science, technology and commercialisation system.

That, in turn, will allow us to better align effort and investment.

We've got a range of other initiatives to support innovation in our ecosystem and boost collaboration.

These include a new Startup Year Program to help the next generation of young entrepreneurs bring their ideas to life, and the Global Entrepreneurs Congress in Melbourne in 2023.

In my portfolio, the CSIRO is aiming to produce the next generation of innovation leaders through its Industry PhD scholarship program, which will support candidates to undertake research and internships supervised by an industry partner, a university and the CSIRO.

We're also thinking longer term about how we boost the R&D contribution to GDP from where it is at the moment to something that reflects an OECD standard.

This is an ambitious objective, but it's one we do need to work on together.

A joined-up approach to problem-solving will help to ensure the science, technology and research system delivers for our economy and for current and future generations of Australians.

Hon. Ed Husic MP
Minister for Industry and Science.

This is an edited version of the Minister's speech speech to the National Innovation Policy Forum in Canberra on 21 November 2022.

FORUM OF LEADERS COMES TOGETHER, FINDING SHARED AMBITION

It was a great honour to bring together Australia's innovation leaders for the inaugural National Innovation Policy Forum in Parliament House on 21 November 2022. Our goal was to bring together Australia's policymakers with leaders from the forefront of the country's innovation sector.

Those gathered supported a bold agenda for a dynamic and inclusive innovation nation, backing ambitious targets and committing to work to break down silos across the system. The forum welcomed Industry and Science Minister Ed Husic's full-throated support for science and its capacity to transform Australian industry, starting with initiatives such as the National Reconstruction Fund and the national Science and Research priorities.

Forum participants agreed that Australia could set its ambition high to harness our capacity to be a world-leading innovative nation. Improvement across all measures is possible through strong leadership and collective effort that taps into the expertise of those at the coalface of our research and innovation system. If we have a shared aspiration, we can improve our standard of living, drive jobs growth, drive environmental and social leadership, and build new industries.

The forum suggested that Australia aim to:

- be in the top 10 nations in the world for expenditure on R&D as a percentage of GDP by 2035. This includes spending by government, firms and research institutions
- arrest our decline in economic complexity as measured by the diversity and research intensity of our export mix, aiming reach the top 50 by 2050
- rebuild our manufacturing share of GDP from 6 per cent to 12 per cent by 2035 to contribute to an increase in Australia's economic complexity and to provide high productivity and high-wage jobs
- be in the top 10 nations in the world for digital competitiveness by 2035.

Australia has the potential and the talent to make the shift to a more complex and diverse economy and to build its capacity for advanced manufacturing as part of national reconstruction. However, we need national leadership backed by commitment from across the research, business and government sectors; all three need to be committed and aligned in this aspiration.

The Australian Government invests $12 billion in 157 programs across 12 portfolios in addition to investment by the states. If this investment is understood as a national investment, it can be better harnessed by:

- improved coordination and collaboration across the system
- mapping and grouping effort into research and translation ecosystems, linking these to attract investment in place-based facilities and knowledge-led manufacturing capacity
- removing the barriers for working across programs and institutions, so that we can better harness that investment in a 'whole-of-government' approach to building innovation and enterprise capability.

A strong policy approach – underpinned by the National Reconstruction Fund, clear national Science and Research priorities being developed by the Chief Scientist, and manufacturing priorities – is critical. The forum was enthusiastic in its support of the work of the Prime Minister, Anthony Albanese, Minister Husic, Education Minister Jason Clare, Skills and Training Minister Brendan O'Connor, and all relevant portfolio ministers to build an approach that delivers an exciting action plan for the future of all Australians.

Cooperative Research Australia looks forward to supporting the achievement of these ambitions with forum participants and looking towards the horizon again when we host the second National Innovation Policy Forum in 2023.

Jane O'Dwyer
Chief Executive Officer
Cooperative Research Australia

Professor Tom Calma AO FAA FASSA

RALPH SLATYER ADDRESS ON SCIENCE AND SOCIETY 2022

Professor Tom Calma AO FAA FASSA

Speech to National Innovation Policy Forum, Parliament House, Canberra, 21 November 2022

Presented with the support of:

Australian Government
Department of Industry, Science and Resources

May I begin by recognising the Ngunnawal and Ngambri Peoples, the traditional owners of the land on which we are meeting on today.

I pay my respects to you, to your Elders and to your youth as I do to all youth who will be our future leaders and the custodians of our stories, languages, histories and cultures.

I also want to acknowledge people from other First Nations groups, organisations and other distinguished guests from around Australia who are with us today.

Thank you, too, to Cooperative Research Australia, its Chair Belinda Robinson, the Board of CRA, and David Thodey, the forum's patron, for the invitation to speak to your National Innovation Policy Forum. I also thank the Slatyer family for your ongoing support.

I acknowledge Minister Tim Ayres, Assistant Minister for Manufacturing, along with other MPs and senators here today.

It's a great opportunity to engage with an informed audience who are perhaps looking for some inspiration or ideas that will meet the policy objectives of the new government.

There are three broad concepts that I would like to explore with you today and, in doing so, take you on a whistle-stop tour of the impact of the CRC Program and how it has continued to deliver on specific research objectives and in many cases provides a wider benefit to our community.

First, taking a holistic approach – some call it a systems approach – to problem solving. Because problem solving is what we as a community need to do, right?

And if we can get everyone involved to consider a problem at the beginning, we can explore solutions together and achieve better outcomes that benefit us all.

The second concept is lining up that approach against specific priorities – the most pressing issues or the best opportunities for results – then you are more likely to have success.

And my third idea is that by investing in research projects that address wider community challenges and some of the many 'wicked problems' that we face, we can achieve a greater benefit – a public good. We shouldn't always just focus on commerce or services from a commodity trading perspective, but there are times where we must re-frame our thinking to an economic benefit perspective that entails creating social economy ecosystems.

Given recent public discussion that maybe … just maybe … relying on market-driven forces is probably not enough to solve problems – the trickle doesn't actually trickle much at all – I think the time is right to invest in projects that do both – develop commercial outcomes and also have a positive impact on our community.

Firstly to the holistic approach.

I think Australia's Chief Scientist captured it well in a recent speech:

"Science (*and by that I think we can infer 'research'*) needs to make connections and work with a range of other disciplines to bring together different tools to solve complex problems – engineering tools, social science tools including marketing and communication, and philosophy tools such as ethics.
It also needs to make connections with the broader community, including not-for-profit organisations."

Now, I know there are a lot of scientists and engineers and business and project managers in the room. And you might be thinking, why is this my problem?

I am not a scientist myself – I am a social scientist – but I have been using evidence from research to develop policy for much of my career – initially through my work in the Indigenous employment, education and training sector, and for the past decade or so in the health sector, on smoking impacts particularly in First Nations communities, and in mental health, suicide prevention and cancer prevention programs.

As a social scientist, what I have learnt through those many years is that the science – or the research outcomes – is NOT enough. It's the starting point, but it's not the whole solution.

Just because the evidence points to something needing to be changed or improved doesn't mean it will automatically be adopted by governments or the corporate sector.

And we can all think of examples where this has proven particularly challenging because of vested or competing interests. Smoking, vaping, climate, asbestos and lead-containing products to name a few.

But what if we planned to have ALL of the ingredients – or as many as possible – included in the beginning of a project?

- What's the problem?
- What are some options?
- How's the research output going to work?
- What does it cost?
- Who's going to be affected?
- How do we communicate it?

My view is that if you do all of these things, you will break through to the other side. And that's why it should matter to you.

Let's explore this through the lens of the Cooperative Research Centre program, because it's a CRA event and as I have chaired a CRC, the CRC-REP, and worked with many others, I know a bit about them.

Also, they provide some great examples of how relatively minor investment has resulted in wider impact and achieved ongoing public good.

The CRC-REP – the CRC for Remote Economic Participation – ran from July 2010 to June 2017. It was mainly a public good CRC with a multidisciplinary research focus on social sciences. It was strongly aligned with government priorities including, at the time of the bid, the National Indigenous Reform Agreement (Closing the Gap) and Stronger Futures and, later on, the Northern Australia Development agenda, the Indigenous Advancement Strategy and the promotion of science and innovation.

Most of the knowledge and other outputs from the CRC-REP's research are in the public domain and available to end users and other stakeholders. Some projects produced significant intellectual property, with commercial benefit or application available to be licensed for use.

The total investment through cash and in-kind contributions was valued at approximately $120 million.

Its 59 partners included Australian, state and territory governments; universities; communities; businesses; and Indigenous and non-Indigenous people in remote regions of Australia. That's a complex set of stakeholders who experience unique challenges not known or experienced in urban and inner regional areas. Their challenges were best addressed through locally driven solutions as they were within the frame of reference of the local community.

Industry partners included mining, agribusiness and tourism businesses and organisations, and a third of the partners were from Aboriginal and Torres Strait Islander businesses, organisations and communities. This ensured genuine and strong local Aboriginal and Torres Strait Islander engagement and collaboration in the research and solution identification.

But, as well as the economic benefits from the projects involved, the CRC also delivered direct social benefits to people living in remote Australia. And those benefits had knock-on effects that continue today.

Some of the outputs of its education program, for example, are really powerful.

- The development of the Red Dirt Curriculum with models and strategies to improve education delivery in remote Australia, as well as 75 peer-reviewed research outputs.
- Improvement in the education and training pathways in remote areas to build workforce capabilities and expertise in remote Australia.
- 36 students graduated: 16 PhDs, three masters, five honours, five VET and seven vacation students – five of those students received First Class Honours degrees.
- Those PhD and masters students continue to build capacity and networks, taking their insights, knowledge, skills and experience to other roles.

A unique feature of CRC-REP was the training and employment of more than 200 local Aboriginal Community Researchers (ACRs), many of whom went on to secure employment in government, research and service delivery sectors.

The predecessor to the CRC-REP, the Desert Knowledge CRC (DKCRC) ran from 2003 to 2010. These two dates frame a remarkable and intensive

seven-year period of research, training, capacity building, research application and community engagement in Australia's desert regions.

In that short period of time, a diverse array of organisations and individuals set out on a course of dramatic change:

- change in the way research is framed in the desert;
- change in the way communities were engaged in research;
- change in the way organisations collaborate; and
- change in the way that the outcomes of research can be applied on a day-to-day level in the real lives of desert people.

Major achievements included:

- a research report on Population and Mobility in Town Camps, which resulted in $120 million for new housing, water and sewerage works. Aboriginal researchers involved in the data collection then worked on the 2006 Australian Census and in other roles.
- Australia's first large-scale investigation into the scale, frequency and impact of wildfires on infrastructure, productivity and biodiversity.
- Work on remote settlement water management led to project outcomes being included in the NHMRC's Australian Drinking Water Guidelines.

The work produced more than 59 research reports, 61 working papers, 287 conference papers and 102 journal papers.

A number of the parties to DKCRC made a bid for the CRC-REP that was funded for a further seven years. But when CRC-REP fell victim to the phasing out of funding to public good CRCs in 2015, a spin-off not-for-profit company, Ninti One, with similar objectives was established.

Ninti One is now a domestic and international consultancy firm that has continued because the impact and outputs of the CRC provided a foundation for growth.

It is a multimillion dollar Indigenous enterprise and the biggest provider of Indigenous services to the Department of Foreign Affairs and Trade.

Central to this is the Indigenous Procurement Policy that is designed to "stimulate Indigenous entrepreneurship, business and economic development, providing Indigenous Australians with more opportunities to participate in the economy".

The policy requires agencies and departments to have targets for buying services from Indigenous enterprises and has reporting requirements in annual reports.

In 2020–21, contracts totalling $1.09 billion were let across a wide range of departments and agencies, including Agriculture, Water and the Environment, Social Services, DFAT, Infrastructure, Education, Defence, Health, Border Force and Prime Minister and Cabinet, to mention a few.

State and territory governments have similar policies and they are making a difference, particularly for companies such as Ninti One, allowing them to put runs on the board while they build capacity.

So let me ask: how many CRCs or CRC-Ps are procuring products and services from First Nations businesses? If you are not, then I urge you to please adopt and apply the principles of the Indigenous Procurement Policy.

And now the poster child of public good CRCs.

Two years ago the Lowitja Institute fulfilled its long-held dream to become Australia's national institute for community-controlled Aboriginal and Torres Strait Islander health research.

It evolved from four CRCs:

- the Cooperative Research Centre for Aboriginal and Tropical Health (CRCATH) (1997–2003)
- the CRC for Aboriginal Health (CRCAH) (2003–09)
- the CRC for Aboriginal and Torres Strait Islander Health (CRCATSIH) (2010–14)
- the Lowitja Institute for Aboriginal and Torres Strait Islander Health Research CRC (Lowitja Institute CRC) (2014–19).

All iterations were funded through the Australian Government's Cooperative Research Centres program as 'public good' CRCs.

In 2020, Deloitte Access Economics assessed the economic and social impact of the Lowitja Institute and its earlier iterations, mostly over the previous 10 years.

It found that the Lowitja Institute had delivered a significant positive impact on the health and wellbeing of Aboriginal and Torres Strait Islander peoples through research, knowledge translation and by supporting Indigenous health researchers, including:

- $26.5 million in support to 148 health research projects
- 70 peer-reviewed articles and more than 130 research outputs
- 28 masters and doctoral scholarships awarded and a further 11 scholarships funded.

According to the report, the Lowitja Institute projects "generated new ways of thinking and addressed knowledge gaps through genuine inclusion of Aboriginal and Torres Strait Islander peoples' perspectives, inquiry and agency".

It also found the impact of many projects extended beyond healthcare and influenced approaches to service provision in education, housing and justice.

The Lowitja Institute has also built research leadership capacity in Aboriginal and Torres Strait Islander early to mid-career researchers who have been, and continue to be, mentored by experienced researchers.

And there has been a number of projects looking at data gathering to build evidence for future policy development – a valuable resource that is central to managing systems and service delivery for the health and wellbeing of First Nations peoples.

All of the CRCs that I have referred to have taken that holistic approach to involve partners through funding and in-kind contribution, through the research community, and through other stakeholder engagement in project development and adoption of results.

The achievements of these CRCs are and should be celebrated because they built or grew communities – communities of practice, communities with shared outcomes. And they developed people. They offered safe environments to learn skills and grow experience to support confidence and self-determination – in the true sense, people who can make their own choices. That is, they provided public good as well as new knowledge.

So I am sure that you will agree that we can see the benefits of the capacity building from these earlier programs are paying off and developing further opportunities.

For example, today:

- the CRC for Developing Northern Australia is focusing on increasing the competitiveness and productivity of industry in northern Australia with research projects in the food, tropical health and agricultural sectors;
- a simple telehealth system using satellites will help remote communities to have better access to healthcare in Aboriginal community-controlled health organisations;
- the Business on Country program is looking at how to connect cultural values, rights and interests with Indigenous business creation and activity; and
- a grass-roots program to develop self-employment and business skills for East Kimberly Indigenous women is working to build small business skills for women in remote community settings.

The second element I mentioned earlier was the importance of lining up with science and research priorities. Understanding what are the things that matter specifically to us here in Australia, what are we good at or have an edge on, and how we should use them to guide investment.

In announcing a review of Australia's science priorities recently, the Minister for Industry and Science, Ed Husic, said that the existing policy frameworks, and I quote: "are out-of-date and require renewal. … The current priorities do not mention First Nations knowledge …".

This embrace of the importance of First Nations knowledges is a significant acknowledgement. I welcome it and look forward to the opportunity to contribute to the process that is being undertaken.

More importantly, I want to ensure that those who hold that knowledge have an opportunity to contribute and be included. To this end, as a Fellow of the Australian Academy of Science, I am convening a workshop for Fellows in a couple of days' time with Aboriginal and Torres Strait Islander Knowledge holders to develop understanding on the intersection of Indigenous Knowledge and contemporary science.

We hope to design, develop and publish a policy paper that will demonstrate leading practice and provide guidance on including Indigenous Knowledge appropriately and meaningfully to inform and enhance our collective knowledge systems.

As an aside, it remains of serious concern that the numbers of First Nations peoples on boards of Australian companies and entities remain very low.

As part of a recent CRA benchmarking survey, within the CRC Program itself, it was reported that from the 17 organisations that responded on this measure, there were three First Nations board members; zero … yes zero executive staff members; and zero First Nations non-executive staff.

This is despite the work of these previous cited CRCs producing many First Nations peoples who are qualified to support decision-making at management and board level.

For example, the CRC-REP had up to five First Nations board members, three of whom are now on the board of Ninti One. The Lowitja Institute CRC board comprised seven First Nations board members.

In the same survey, 11 organisations reported on the number of First Nations students: there were two students. And 14 organisations reported that there were seven First Nations-owned or controlled organisations as partners in their work.

Even if you accept that some people may choose to not self-report on these measures, these are still pretty disappointing numbers.

In fact, they are extremely disappointing when we consider the number of CRC university partners and that across the university sector in 2019 and 2020 there were 527 First Nations academics

including DVCs, a Provost, PVCs and deans, and that 24 universities (62 per cent) reported having First Nations' representation on either Executive or Council. So surely CRCs can do better than they are and I make the same call for other agencies with us today.

Getting back to research priorities …

I do note that one particular area ripe for attention – and that offers opportunity for First Nations peoples – is that of agriculture.

The agricultural sector's engagement with First Nations peoples is very complex and, in some ways, goes to one of the core tenets of our modern nation – the land, who is using it and what they are using it for.

A recently completed landmark study from the ANU's First Nations Portfolio and the Fenner School conducted a preliminary examination and delineation of the agricultural capacity of the Indigenous Estate. It found that:

- while a significant amount of primary production occurs on the First Nations Estate, most of it is not undertaken by First Nations primary production enterprises;
- there is still a relatively small but emerging and unique First Nations primary production industry that is diverse, increasingly financially sustainable, and delivering significant cultural, environmental and social benefits to local First Nations communities; and
- there is opportunity to grow the First Nations primary production industry so that it makes a significant and unique contribution to the growth targets of Australian primary industries – beyond what the agricultural industry or the Australian Government have contemplated.

So the opportunity is huge, but there is much more to do and workforce is a priority. We will need more of our young people to be involved.

The large agricultural companies also have a key role to play here, particularly through the development of reconciliation action plans that offer a pathway into communities, a process of consultation and understanding, and the development of shared objectives.

Technology adoption for on-farm management continues apace partly in the drive for efficiency, but also in response to decreasing population in regional areas. It's a double-edged sword – they leave because there's no work, but if new training opportunities are offered, people are more likely to stay, using their new skills and remaining in communities.

The Indigenous Land and Sea Corporation supports strategic investment in the agribusiness sector and is working with Traditional Owners to make choices to build their capacity, take greater control of businesses run on their country and diversify their skills and revenue streams. However, their current agribusiness involvement is in cattle grazing and wool production.

Professor Tom Calma AO FAA FASSA

And the CRC for Developing Northern Australia is similarly focused on conventional crops and cropping, yet the potential for the development of bushfoods across Australia is where the economic and social and wellbeing gains for Aboriginal and Torres Strait Islander peoples will lie.

I mentioned the Chief Scientist earlier; I want to take a moment to talk about Ralph Slatyer, who was the Australian Government's first Chief Scientist. He was appointed to the role from 1989 to 1992 by Prime Minister Bob Hawke.

He was a Fellow of the Australian Academy of Science, a member of the Royal Society and the US National Academy of Sciences, and was committed to exploring and cementing the role of science in economic and social development at national and international levels.

He took the opportunity of being Chief Scientist to develop the concept of cooperative research. He actively explored the best ways for industry, universities and other research bodies to work together to achieve meaningful outcomes.

The resulting program, the Cooperative Research Centres program, was developed and funded in 1990 and with many reviews and iterations, continues today. Ralph's legacy is one for which we are all grateful, and I acknowledge his family here today, in person and online.

My third point is exploring how we can ensure there is a refocus on public investment in public good initiatives across the board, not just commercially focused initiatives, and to encourage private investment as well.

I think I have illustrated that thoughtful program planning works. The CRC Program is an excellent example of how to leverage investment to engage stakeholders and ensure organisations, groups and people are working together, not tinkering away by themselves in the corner.

Each of the programs I have talked about today was successful because its activities were developed through co-designed, participatory, on-ground research with end-user partners and active participants.

There was significant intellectual property developed through these projects. IP Australia has recently released a report outlining its consultation findings on ways to enhance Australia's IP system to support Aboriginal and Torres Strait Islander peoples to benefit from and protect their Indigenous Knowledge.

The ***Enhance and Enable Indigenous Knowledge Consultation Report*** summarises feedback on IP Australia's plans to:

- establish an Indigenous Panel at IP Australia and the scope of its activities;
- develop measures for trademarks and design;
- disclose use of Indigenous Knowledge in patents and Plant Breeder's Rights; and
- develop labelling for authentic products.

Of course, we must not confuse Indigenous Knowledge with intellectual property. They are two very different knowledge systems, each imbued with cultural heritage, systems and processes.

But the IP that was developed by the projects I have mentioned has been captured and we need to ensure that it is managed well to achieve the greatest benefit to the community.

Aboriginal and Torres Strait Islander peoples have been subjected to the misappropriation of their knowledge or been restricted from practising cultures, languages and knowledge, so this IP Australia initiative is welcomed.

It is an extension of the ***United Nations Declaration on the Rights of Indigenous Peoples***. Article 31 of the declaration provides that Indigenous peoples "have the right to maintain, control, protect and develop their Intellectual Property over such cultural heritage, traditional knowledge and traditional cultural expressions".

And finally, I do want to talk about the referendum for an Aboriginal and Torres Strait Islander Voice to Parliament and your role in its success.

After the release of the Uluru Statement from the Heart, a Joint Select Committee on Constitutional Recognition relating to Aboriginal and Torres Strait Islander Peoples was appointed in March 2018. The very first recommendation of its final report stated that:

"In order to achieve a design for The Voice that best suits the needs and aspirations of Aboriginal and Torres Strait Islander peoples, the Committee recommends that the Australian Government initiate a process of co-design with Aboriginal and Torres Strait Islander peoples."

Professor Dr Marcia Langton AO and I were appointed to co-chair the Indigenous Voice co-design process and our final report was submitted in July 2021.

Among the very first words to come out of Prime Minister Albanese's mouth in his victory speech on election night in May 2022 was a pledge to fully implement the Uluru Statement from the Heart – including the Voice to Parliament.

Subsequently, he committed to a referendum to enshrine the Voice in the Constitution in the first term of his government. Two referendum working groups have been established to progress the mechanics of the referendum.

The issue of recognising Australia's First Nations peoples in the Constitution has been considered and debated for more than a decade now by the Australian public, parliamentary committees, constitutional experts, and First Nations leaders and communities.

It is important to recognise Australia's First Nations peoples, who have been on this continent for more than 65,000 years and who have historically been excluded from Australia's Constitution.

For too long the process of how First Nations peoples are heard has been determined by the whim of ever-changing governments. An enshrined Voice will be a permanent means to

partner and advise the Australian Parliament and Government on the views of First Nations peoples on matters that are important to them.

For those of us involved in this work, it is vital that we use every opportunity to explain it, because this decision belongs to the whole Australian community – not just to First Nations peoples. As Vice-Chancellor of the University of Wollongong, Professor Davidson said: "The University was honoured to support the Uluru Statement from the Heart and was committed to the change needed to ensure an equitable and fair society for all. The Uluru Statement is a necessary step to ensuring we move forward as a nation and that First Nations people finally receive the Voice to Parliament and the Voice in the Australian Constitution that they need and so richly deserve."

I fully support these sentiments and call upon all here today to become fully informed about the myths and misinformation being promoted to oppose the referendum.

If we further develop the bridge metaphor that's been used by others then I see the science and research community as people who can both help to lead the way and also usher others onto the bridge.

By definition you are, in my view, people of influence in the broader community.

You are critical thinkers who are committed to gathering information and understanding the issues before taking a view or making a recommendation. So my key point to you is:

Support and encourage open dialogue among your family, friends and work colleagues to gain an accurate understanding of the role and purpose of the Voice Referendum.

Whatever the outcome of that process, I think the process that I have outlined today is the same.

What's the problem and what is needed to address it; who do we need to include?

What are our priorities, because if we address them, it feels like … and it is … success.

And let's (re)turn to investing in projects that offer more than a commercial product or process or system.

Let's invest in people and our community, because then there is natural growth in other areas through increased skills, confidence and ambition.

Like the song says, From Little Things Big Things Grow.

I know you know the song.

I know you know why it is significant.

I want you to think about how we can continue to work together to grow big things.

Let's make it happen.

Thank you.

A recording of the Ralph Slatyer Address on Science and Society is available at www.cooperativeresearch.org.au

For too long the process of how First Nations peoples are heard has been determined by the whim of ever-changing governments. An enshrined Voice will be a permanent means to partner and advise the Australian Parliament and Government on the views of First Nations peoples on matters that are important to them.

For those of us involved in this work, it is vital that we use every opportunity to explain it, because this decision belongs to the whole Australian community – not just to First Nations peoples. As Vice-Chancellor of the University of Wollongong, Professor Davidson said: "The University was honoured to support the Uluru Statement from the Heart and was committed to the change needed to ensure an equitable and fair society for all. The Uluru Statement is a necessary step to ensuring we move forward as a nation and that First Nations people finally receive the Voice to Parliament and the Voice in the Australian Constitution that they need and so richly deserve."

– PROFESSOR TOM CALMA AO FAA FASSA

IN CONVERSATION: PROFESSOR TOM CALMA AO AND DR CATHY FOLEY AO, CHIEF SCIENTIST OF AUSTRALIA

Dr Cathy Foley AO in conversation with Professor Tom Calma AO

"We're always in a hurry," said Dr Cathy Foley AO, Chief Scientist of Australia at the National Innovation Policy Forum. "Unconscious biases cloud our judgement as we forget to breathe and look at our options. We can't assume there's no one out there – we just need to reach out to Aboriginal and Torres Strait Islander people and ask for their advice."

Dr Foley participated in an In Conversation between herself, Professor Tom Calma AO, and moderator Dr Kerstin Oberprieler. Professor Calma, Chancellor of the University of Canberra and Aboriginal Elder of Kungarakan and Iwaidja heritage, had just delivered the 2022 Ralph Slatyer Address on Science and Society, where he urged Australia's innovation leaders to do better in embedding Indigenous knowledge and leadership in Australian science.

Dr Foley spoke of other areas where unconscious biases seep in to shift decision-making, such as in the language when discussing Indigenous and other knowledge systems.

"How do we integrate contemporary science with Indigenous knowledge? The language implies that Indigenous knowledge is not contemporary."

Resolving this issue is a point of focus for her as Chief Scientist of Australia, as she is playing a leading role in establishing the Australian Government's new Science and Research Priorities. She intends for the new priorities to be imbued with Indigenous knowledge through Indigenous co-design and co-leadership.

Dr Foley remarked that there are issues of unconscious bias more broadly in Australian science, such as when contrasting hard and soft sciences, and separating public good from commercial research.

She said that "public good always leads to prosperity."

Professor Calma added that the 2015 Miles Review on the Cooperative Research Centres (CRC) Program has caused these organisations to focus on commercial outcomes.

"That has been to the expense of better engagement with the community," he said.

He admonished the CRC community for low levels of Indigenous participation in boards, staff and students.

Dr Foley identified unconscious bias in the separation of the social sciences and humanities from STEM. She talked about the public debates around climate change and vaccine hesitancy where the humanities and social sciences are

as important as the hard science.

"It's about engaging with people so that these difficult technological situations can be understood, and we can chart a way forward together."

Professor Calma cited a similar example while welcoming the Labor Government's funding to address climate change in the Torres Strait Islands. He advised that the government also address the social aspect of this issue.

"Climate research is very important, but we must ensure that money and effort is also put toward what can happen on the ground to mitigate climate change."

Dr Foley left the audience to ponder on the impact of their work. Professor Calma had critiqued the commercial focus of Australian science, and she explored the limitations of academic metrics of success such as the h-index. So she asked, "How do we measure what is good?"

Professor Tom Calma AO

Professor Calma is an Aboriginal Elder from the Kungarakan *(Koong ara kan)* tribal group and a member of the Iwaidja *(Ee wad ja)* tribal group in the Northern Territory. He has been involved in Indigenous affairs at a local community, state, national and international level and worked in the public sector for more than 45 years.

He is a member of several boards and committees focusing on rural and remote Australia, health, mental health, suicide prevention, all levels of education, culture and language, justice reinvestment, research, reconciliation and economic development. In 2010, after a distinguished 38-year career in the Australian Public Service, Professor Calma retired and now works as a consultant, volunteer and academic.

Professor Calma is Chancellor of the University of Canberra and a Professor of Practice (Indigenous Engagement) at the University of Sydney.

Dr Cathy Foley AO

Dr Foley became Australia's ninth Chief Scientist in January 2021 after a lengthy career at Australia's national science agency, CSIRO, where she was appointed as the agency's Chief Scientist in August 2018. While working at CSIRO, Dr Foley made significant contributions to the understanding of nitride semiconductors and superconducting electronics. Dr Foley and her team's most successful application is the LANDTEM sensor system, used to locate valuable deposits of minerals such as nickel sulphide, silver and gold deep underground.

Dr Kerstin Oberprieler

Dr Oberprieler is an experienced entrepreneur, having developed and launched several new products and businesses to market. Most notable is PentaQuest, a technology startup she founded that delivered a gamified SaaS platform to help teams and organisations thrive.

Australian Academy of Technological Sciences & Engineering (ATSE)

ATSE is Australia's foremost impact network for leading applied scientists, technologists and engineers.

Our Academy celebrates excellence in science, technology, engineering and mathematics (STEM) by appointing prestigious Fellows, awarding upcoming innovators and equipping the next generation with skills to build a better Australia and world.

We are an authoritative and independent voice to government and our world-class STEM career programs demonstrate how to tackle our most urgent challenges. Delivering frank, fearless and evidence-based policy advice to government and industry we help drive a technology-powered, human-driven future.

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FORUM PATRON DAVID THODEY AO

A CALL TO ACTION FOR ALL PARTICIPANTS

David Thodey AO

"I have not in all my many years of working around this area actually been in a meeting with so many people from universities and CSIRO, CRCS, Growth Centres, RDCs and similar organisations, incubators and accelerators, business and government agencies. And it really is great, having us all in the same room talking about how we make this country even better," said Forum Patron David Thodey AO as he opened his scene-setting address to the National Innovation Policy Forum.

He reminded the forum that it was important to have an aspiration about where we can drive innovation and industry outcomes for the greater good of this nation, thinking about how we work together to build a stronger and better Australia.

He urged the forum – all leaders in the sector – to look at the bigger picture, not only focusing on what their organisation does and can contribute, but how they can work with other parts of the system to build a stronger and better Australia.

Mr Thodey acknowledged the passion of Minister for Industry and Science the Hon. Ed Husic MP to drive action and change within the sector and highlighted the need for direction in the aspirations and policy frameworks that spark this change.

"I do want to just stress at the beginning what we are trying to do. Firstly, it is about improving the quality of life of all Australians. I know that might sound a little bit alturistic, but it is very true. It's about creating new job opportunities. It is about economic growth, because with growth allows us options to do things, to fund things. It's about creating a more diverse economy, and it is about driving environmental and social outcomes."

Mr Thodey praised some of the great attributes that Australia has to offer; our education system, innovation potential (particularly across resources and agriculture), the quality and outputs of our researchers and our hard-working, diligent and creative spirit. He also acknowledged the significant funding and effectiveness of publicly and privately funded research organisations, as well as medical research, clean energy and defence innovation. He spoke on the need for more leaders willing to collaborate to create a shared ambition that pulls the various aspects of a complex ecosystem together.

Mr Thodey then discussed what became a guiding theme for the forum: a need for a national narrative that fosters communication across the system and better leverages the increasing amounts of capital invested, particularly at the early stages of commercialisation. This narrative would also help drive outcomes relevant to the average Australian, not just members of the ecosystem, while also helping direct National Reconstruction Fund investment to key priority areas within the sector.

"This is about government, industry, academia, the community all working together for a bigger vision. So, while I know we won't solve everything today, I do hope it's a positive step forward, a positive step forward to helping us come together for a bigger aspiration. And if we can do that, I think we can really drive outcomes that are relevant to all Australians." ⊙

David Thodey

David Thodey is a business leader with more than 40 years of experience, who is focused on the innovation, technology and telecommunications sectors. He chairs the boards of Tyro, Australia's only independent EFTPOS banking institution; Xero, a cloud-based accounting software provider; and the non-profit Great Barrier Reef Foundation. From 2015–21, Mr Thodey was chair of Australia's national scientific research agency, CSIRO.

SESSION 1: DECONFLICTING THE SYSTEM AND JOINING THE DOTS

Panel Discussion

WHAT'S IN IT FOR WE, NOT ME?

"We're way too focused on winning and losing in Australia – maybe it's a sport thing, or a states thing. But it's got to stop."

– SALLY-ANN WILLIAMS

Sally-Ann Williams challenged participants at the National Innovation Policy Forum to look at the culture behind research and innovation in Australia and how competition between groups was inhibiting advancement.

She urged the community to develop better ways of working together to improve the outputs of the Australian innovation ecosystem. "What is the collective vision that we need to have for Australia?" she asked. "How do we win collectively, not personally, or for our organisation?"

Participating in a panel discussion on 'Deconflicting the system and joining the dots', Ms Williams said there was conflict in the Australian innovation system, but it was less about disagreement and more about the conflict of interest between organisations.

"Everyone in the room here is conflicted, all fighting over a small, fixed pie," she said. She set the challenge for discussion: "Instead of going into competition with the people around the table, how do we all work together and win together? It's a different mindset." And if we work together, we grow the size of the pie.

The opportunity provided by the government's National Reconstruction Fund (NRF) to improve collaboration between industry, government and academia was also discussed.

Andrew Stevens echoed remarks made earlier in the day by the Minister for Science and Industry, the Hon. Ed Husic, who said that the government's approach "… is founded on collaboration between research and industry tackling some of the nation's pressing and persistent challenges".

Mr Stevens considered the NRF to be "a beacon for the economy", providing a focus for improving collaboration across sectors and industries.

"Its (the NRF) direction provides alignment, giving confidence to industry to invest alongside government – not just big companies or SMEs but scale-ups as well. … It's the lever of a lifetime."

Mr Stevens' vision was for 80 per cent of Australian businesses to compete using innovation that happened here; to turn R&D done in Australia into innovation that made it to market. Technologies at the technology readiness levels (TRL) 2 or 3 needed to find their way to a production specification at TRL 8 or 9. But for that to happen, the research sector and industry needed to get closer to each other.

Linked to that, and a likely inhibitor to collaboration, was the complexity of the system of support programs for research and industry. Dr Katherine Woodthorpe said that complexity in the large number of programs across departments and agencies could cause confusion for those seeking help.

"It's a red flag! … There's so many programs … if you are out there in the marketplace trying to scale up a rapid antigen test, for example, it's really hard to work out where you might get

Andrew Stevens

Dr Katherine Woodthorpe AO

Sally-Ann Williams

Belinda Robinson

assistance on that, not just financial assistance but broader assistance about how do I scale up manufacturing."

Along with a simpler system, Dr Woodthorpe called for more stability in the funding programs, referencing the US Small Business Research Innovation (SBRI) program that had been in place for 40 years. "The program itself works really well as a government procurement of R&D through earlier-stage companies … but it's been there for 40 years so you know it's there and you know how to manage it."

She also pointed to the R&D tax concession as a valuable mechanism in supporting and maintaining R&D investment in Australia. "Whether you are a large company looking for a reason to do your R&D here, or a small company looking for cash flow while you go through that scale-up phase – that for me has been one of the most terrific programs ever."

Bringing the conversation to a close, moderator Belinda Robinson charged the forum's participants to think about developing a narrative for what Australia as a country wanted to achieve, reflecting on these points:

- Are there too many industry support programs?
- How do we encourage industry to do more R&D? Should we rely on the R&D tax concession alone? (Ms Robinson's view was a definite "No!").
- How do we increase appetite for and investment in scaling-up of technology in Australia?
- How do we facilitate cultural change that improves collaboration between industry, the research sector and government?

SESSION 1 PANELLISTS

Moderator: Ms Belinda Robinson
Chair, Cooperative Research Australia

Ms Sally-Ann Williams
CEO, Cicada Innovations

Mr Andrew Stevens
Chair, Industry Innovation and Science Australia

Dr Katherine Woodthorpe AO
President, Academy of Technological Sciences and Engineering (ATSE)

Table discussions: a summary

All participants at the forum took part in table discussions exploring the issues raised in the panel discussion. This summary captures the common themes that emerged from the tables, captured by scribes.

The need for a national narrative

Australia needs a narrative about what we have and what we can do; a narrative that spans states, government programs, sectors, business and academia. We could harness the real opportunities available by breaking down the silos that exist across the landscape, including access to a greater flow of resources to where we can make a real difference.

This long-term national innovation narrative would foster accessibility, stability and directionality in a complex and often fractured system. It would nurture forward-thinking and collaboration, not competition, and would help build the frameworks and national priorities needed to drive alignment and consistency and maximise the economic and social outcomes of the system.

Creating such a narrative would need to include incentives for regional and rural innovation, and targeted measures to ensure that a variety of stakeholders are included from diverse backgrounds. This not only ensures the system is fair and equitable but also encourages greater problem-solving by allowing teams to source their ideas from an array of different perspectives. Furthermore, investment into these narratives and priorities not only needs to include research and technology development, but the human capital and critical skills that drive the system forward.

Having industry at the table

Industry in Australia needs to come to the table in far greater numbers and realise the potential to grow their businesses through collaboration with researchers. But making this an attractive pathway means helping businesses navigate the complicated world of government grants and incentives and the complexity of research institutions.

A deep understanding of different time frames and risk profiles across the sector is critical to change. Government has a key role to play in facilitating discussions around national priorities and alignment, as well as to resolve the duplication of disparate programs and initiatives by fostering cross-departmental engagement.

Although it is important to set goals to drive productivity and growth within the ecosystem, we need to be clear about the types of transformations we are hoping to achieve by striving to reach these goals. The impetus to achieve these goals should not only come from the leaders within the sector, but the willingness and energy from local businesses and grassroots community groups to see and make change.

Furthermore, grants and venture capital processes in the innovation sector incentivise competitive behaviour, which only increases fragmentation across the system. Creating a more collaborative and harmonious ecosystem, one that encourages and rewards collective innovation, is central to Australia's standing in these innovation rankings.

Investing in bold, nation-building innovation, similar to (or as part of) large infrastructure and transport investments, is key to harnessing Australia's potential as an innovation leader, as well as pulling through private investment.

Growing capability in select sites and sectors across the country, rather than trying to foster growth everywhere, all at once, is important in driving these national priorities forward. Through funding provided by the NRF, Australia has real potential to increase synergy within the innovation system, resulting in movement up the value chain for critical resources and the rapid development and scaling up of clean energy technologies.

Australian made with an international flavour

Due to our relatively small size in the scale of the global economy, Australia needs to look at both domestic and global collaborations to increase its innovation value and capacity. We are a great 'seeding ground' for innovation, with a large human capital key to the development of new technologies, but we need to ensure that this capital is aligned across sectors to create these global collaborations.

The emphasis placed on 'Australian made' does not need to conflict with this international growth; instead, domestic and global production can be optimally balanced by identifying and making targeted investments in what Australia is good at and has the resources, motivation and know-how to do, while also building strategic partnerships and sovereign capacity in the right areas.

Bringing out the best in the system

Researchers and businesses are interested in the creation of a national intellectual property bank, where researchers can 'store' their IP and businesses can access it from one central location. Commercialisation royalties could be standardised across the system, making sourcing and using IP easier. Furthermore, streamlining the IP access process, possibly to include a pathway to share IP across the industry to improve the efficiency of the commercialisation process and feasibility of spin-off products, could help defragment the system.

A major strength of the CRC Program is the instigation of a dialogue between industry and researchers from day one, meaning that the identification of a problem comes before the creation of a solution, which is often contrary to popular practice.

Furthermore, CRCs are useful in providing the first step in reaching out to SMEs for collaboration, as these small businesses often do not have the resources or know-how to reach out to academia. The system needs to incentivise not only cutting-edge research and collaboration, but also a focus on the customer and end-user experience of the technology to ensure its commercial viability.

Schemes such as the NSW Small Business Innovation and Research (SBIR) program are regarded as great successes in this regard due to their specificity, relative simplicity, longevity and customer-centric design.

Breaking down the 'publish or perish' ultimatum within the university system is a critical first step in achieving greater synergy between industry and academia. Leaders, trailblazers, entrepreneurs and mentors have an important role to play in the university system, where students can see the success of scientists commercialising their research and are inspired to follow in their footsteps.

Furthermore, identifying the champions of R&D innovation and commercialisation is critical to engaging and attracting the next generation of researchers to venture into industry collaborations. The creation of two-way career pathways between research and industry is an important step towards creating a more open discourse between the two sectors. Infrastructure such as innovation hubs or precincts can be a central point of connection for industry and research partners to collaborate on commercialisation opportunities.

The future economic and social wellbeing of Australia depends on a robust, thriving research and innovation ecosystem. Listening to and understanding the community's priorities for innovation and change through good science communication is key to scaling-up innovation. This creates the necessary public buy-in to fund research and collaboration, which could then help increase the share of GDP invested in R&D. Creating 'moon-shot visions' and capturing imaginations with the potential of innovation and collaboration are great ways to get the public engaged in research and science more broadly.

SESSION 2: CRITICAL TECHNOLOGY AND COMPARATIVE ADVANTAGE

Panel Discussion

TELL ME WHAT YOU WANT, WHAT YOU REALLY, REALLY WANT, FROM CRITICAL TECHNOLOGY.

With ideas flying around the room faster than shots from a Star Wars laser, the session on critical technologies provided an exhaustive, if not exhausting, discussion on which technologies should be critical to Australia's future and where we should focus our attention.

The Critical Technology and Comparative Advantage panel at the National Innovation Policy Forum began with moderator Kate Pounder setting the scene. She reminded participants that the tech sector activity in Australia today was valued at about $170 billion, with more than $90 billion of that in sectors such as mining, banking and health.

"It's contributing about 860,000 jobs – that's equivalent to the seventh biggest employing sector in our economy. A software engineer is a more common job in Australia today than a plumber or a hairdresser or a high school teacher," she said. "Economic growth with tech sector activity is on track to exceed the value of primary industries by 2030."

But before Australia went too much further, the panel agreed that it would be necessary to consider where we wanted to be in the future.

Not surprisingly, Professor Genevieve Bell urged a systems approach and going back to basics. Asking the questions of 'what' and 'why' were fundamental, rather than chasing other people's concepts.

"(We should) … ask the question 'critical to whom' and 'for what', and 'what's the kind of place we want to think about ourselves' and 'what would you want to invest in as a result of that' – so that we're not chasing other people's ideas of what is critical and, in fact, technology."

Professor Bell said we should be considering what systems we invest in, rather than "fetishising individual technologies". "Thinking about a systems level means you need to think about not just the technical piece, but the human piece, the environmental piece, the energy footprint of all of those pieces."

Identifying our comparative advantage was another element, according to Elanor Huntington; where do we need to invest to create a comparative advantage in particular areas? Coming out of the pandemic and identifying potential effects from future crises would provide a focus. "We have just been through a bit of a global crisis and we can all see that there are lots of transitions and turbulence coming."

Reflecting on the recent emergence of venture capital companies in Australia that are investing with superannuation funds, she said we might have gone through "a phase transition in terms of our willingness to be patient about our investments" – an important cultural change.

Anton Middelberg agreed about comparative advantage, noting that we needed to build economic complexity that would sustain our

Kate Pounder

Professor Anton Middelberg

Professor Genevieve Bell AO

Professor Elanor Huntington

economy and build high-tech jobs. "It's going to have to come out of things where we have a comparative advantage or can build a comparative advantage by leveraging the 'old economy' in resources and agriculture."

Professor Middelberg pointed to the inclusion of social sciences in technology development and the importance of collaborating with artists and ethicists in facilitating adoption of new technology. Implementing that approach through the ecosystem was also challenging, he said.

"We found that you need intermediaries to do that. … You actually need purpose-built groups that are multidimensional and multidisciplinary to prosecute some of those opportunities, particularly where the knowledge of tech and digital may not be at the level that we'd like it to be."

Linked to that, Professor Bell said, was the cultural challenge ahead of us, particularly in how Australia viewed success. "… how do we tell ourselves better stories about where we want to be invested and how we are going to be successful … we have a remarkable capacity to be very good at things and then stop investing in them, or tell ourselves that the only way we can be successful is if we look like something else on a global scale".

Kate Pounder, in wrapping up the session, said critical technologies could play a vital role in our economy and society and in the transitions ahead, including the coming energy transition.

"We can perhaps be more purposeful in thinking about the outcomes we want from them and about where we can take agency. And where we do take agency, what levers we want to pull to try and make sure we get the future we genuinely want, not the future we've set ourselves on the path towards." ⊙

SESSION 2 PANELLISTS

Moderator: Kate Pounder
CEO, Technology Council of Australia

Professor Anton Middelberg
Deputy Vice-Chancellor and Vice-President (Research), University of Adelaide

Distinguished Professor Genevieve Bell AO
Director, School of Cybernetics and 3A Institute, The Australian National University

Professor Elanor Huntington
Executive Director (Digital, National Facilities and Collections), CSIRO

Table discussions: a summary

All participants at the forum took part in table discussions exploring the issues raised in the panel discussion. This summary reports the common themes that emerged from discussions at the tables, captured by scribes.

What is critical tech?

Critical technology entails not only the critical manufacturing that is important to Australia's industrial sector, but also the technologies that are crucial to Australia's national security, social stability and future prosperity. These pressures mean that critical technologies need to be reliable, cost-effective and secure. Industry is a key stakeholder in deciding what critical tech we need and how we scale it up, while universities have a key role to play in incorporating cutting edge, critical technologies with current research to improve collaboration.

Priorities in critical tech and Australia's comparative advantage

What is included as 'critical tech' will change every few years with shifting priorities and the ever-accelerating emergence of new technologies. Broadly, Australia needs to align its critical tech priorities across states/territories and different sectors in the innovation ecosystem to optimise its capacity. Although many in government and industry are reluctant to discuss what technologies we need to stop investing in, decision-makers should take a whole-of-system approach to determine what the present and future critical technologies look like and strategically plan investments around these priorities. Investing in critical technologies that enable sovereign capability and strengthen strategic partnerships is also crucial in a region with growing tensions and conflict.

Instead of focusing too heavily on world rankings, technology-related goals should be approached first by understanding the technology's applications and how it can contribute to unmet domestic and global needs.

Positive social and environmental outcomes should also play a key role in building a collective narrative about Australia's innovation and critical technology sectors. Investment in critical tech should drive both strong economic outcomes and community innovation. Programs such as those addressing domestic violence responses that are co-designed by university and industry should also be considered for investment, alongside the technologies that offer significant financial returns.

Critical technology investment can also contribute to achieving net-zero emissions by 2050. It is vital that investments fund the scaling-up of these technologies, as well as those helping us to adapt and create resilience against climate change. As markets and consumers increasingly search for strong environmental, social and governance (ESG) outcomes from companies, Australia can derive a significant comparative advantage from the sustainability of its critical technology infrastructure and supply chains. Equally important, though, is the need to ensure that these technologies do not have a high energy demand that will only exacerbate the issue.

Designing investment schemes and support

Investment in R&D in critical technology needs to grow and be more specific to address a collective vision about what Australia is good at. The mindset on the part of multinationals can be that Australia is a consumer and not a market, which is a result of the somewhat fractured nature of the innovation system. This can be improved through sound, consistent, consolidated and accessible investment schemes that target a set of national innovation priorities.

Investment schemes that encourage new and scaled-up critical technology need to be simple and consistent across the sector. Flexibility is needed within these schemes in an ecosystem that is rapidly changing.

The ability to quickly test ideas and learn from the results within academia/industry collaborations could be harnessed through the development of a portal to facilitate linkages and address unmet needs in such collaborations. (For example, to find researchers working at the forefront of quantum technology that could be harnessed for commercial outcomes.)

There is a lack of support and investment in the Technology Readiness Level (TRL) stages 4–7, with academia and research investment centred on the first three stages and industry centred on stages 8 and 9. Possible solutions to this include increasing funding towards startups in this translation stage, allowing them to reach industry-readiness while

also creating conversations between researchers and industry in a language they can both work in to get startups across this 'valley of death'. Furthermore, encouraging more scientists and researchers into industry and management positions could provide the much-needed 'bridge' between industry and research, as well as a platform for cross-disciplinary problem solving.

Considerable Australian talent is lost to overseas industries, as they have the capability and pathways that startups need to get from the early stages of commercialisation to a market-ready, scalable product. Although planning for the future of critical tech is important, the sector needs to consider the present incentives (or lack thereof) for startups to stay in Australia to improve our sovereign capacity. It also needs to increase investment in and scale-up the technologies that Australia has the know-how, resources and willingness to manufacture.

Placing more monetary and strategic value on PhD students, as well as providing them with the networks and knowledge needed to commercialise research outputs, would help ensure that the scientists we need to improve our global innovation standing and adapt to future challenges stay in Australia. Creating more diverse and multidisciplinary teams within universities and industry would also help improve the efficiency, and the social and economic returns, of the ecosystem.

Public engagement in critical tech

Government, industry and academia need to ensure that investment in critical tech is targeted to key national priorities and that the general public understands and embraces the many possibilities that emerge from critical technologies.

This requires significant communication and translation work to provide context and inclusive engagement with people about the everyday benefits that critical technologies offer. Linking our critical tech priorities to a national narrative about Australia as the 'lucky country' for our exemplary standard of living and job opportunities can help secure political and community support.

SESSION 3: SCALING AND SPEEDING UP AUSTRALIA'S CAPACITY FOR INDUSTRIAL TRANSFORMATION

Panel Discussion

TAILWINDS OF POST-PANDEMIC INVESTMENT OFFER A HUGE OPPORTUNITY

Emerging from the COVID pandemic offers an enormous opportunity for addressing Australia's outdated industrial structure according to Professor Roy Green.

The session on scaling and speeding up Australia's capacity for industrial transformation at the National Innovation Policy Forum considered how re-framing industry policy could drive economic growth and productivity.

Post-pandemic investment offers a focus, Professor Green said, for Australia to move from a commodity-based economy to a more knowledge-based, dynamic economy, and improve the economic complexity from the low ranking we currently hold.

"Every country, every advanced OECD country is treating research and innovation investment as key to their post-COVID reconstruction," he said.

And while the opportunity offered by the National Reconstruction Fund (NRF) is crucial to success, now is also an appropriate time to revisit the broader context of industry policy.

"Modelled on the Clean Energy Finance Corporation (CEFC), the NRF is a key commitment of the government, so clearly its early implementation will be a priority."

Looking to the future, central to a more coherent and purposeful industrial policy are three key things, he said.

Firstly, and echoing concerns expressed in other sessions of the forum, Professor Green identified the plethora and complexity of government funding programs as a major barrier to long-term planning and investment.

"We could certainly take steps to ensure that our research and innovation system is more integrated and efficient, given we have 157 budget line items over 12 portfolios of government, and that's just the Commonwealth. This is not only confusing to business, but cuts across the development of a coordinated whole-of-government strategy."

Another key element to consider is consistent, mission-led funding of public research to remove the reliance on international student revenues, which should be primarily directed to teaching quality, and he pointed to the review led by Mary O'Kane as an important input to this policy discussion.

"There has to be a separate and defined public funding stream, as in most other advanced countries," Professor Green said.

Finally, developing local innovation ecosystems and hubs that encourage industry and research collaboration would accelerate the growth of high value, knowledge-intensive businesses in areas of current and potential competitive advantage. For this reason, increasing sharing of knowledge, insights and expertise was an idea endorsed by all panellists.

Pivoting to look instead at some recent successes in Australian industry, Dr Leanna Read identified the common features of companies from her own field of healthcare, such as CSL, ResMed, Cochlear and Pro Medicus and suggested what could be learned from their achievements.

"First of all, they all came to success in niche market opportunities, they're not massive healthcare companies. CSL in blood products, ResMed in sleep apnea – 'the "sexy" area of snoring', cochlear implant devices for serious hearing loss, and Pro Medicus has computerised

David Chuter

Dr Leanna Read

Professor Roy Green

Dr Catherine Livingstone AO

electronic imaging to replace physical X-ray films."

The second element, she said, is that each of these companies is number one in their field globally; and there are many more Australian companies emerging in this way – not just in health care, but in agriculture and mining as well.

"My key lesson is that we can transform our economy … by developing a range of innovative companies that dominate the world in their fields."

Dr Catherine Livingstone quickly jumped to the issues of investing in human capital and ensuring we have the skills we need for future innovation.

"It's people who innovate, not institutions, companies or governments. Continuing and increasing investment in people through things (events) like today. Interactions, collisions between people–that is part of innovation. And early childhood education needs to be a much bigger priority than it is."

"We'd all have to agree it has been a massive fail between business, government and universities that we now have an economy which has such a shortage of digital skills. So a major part of whatever we do to transform and restructure must be to find a way where we do not end up with a skills gap. There has to be a much more rapid adaptation to skills needs."

She too made a strong call for stability in policy and more certainty in government departmental structures.

"Over the last eight or nine years, where we have had no change of government, the degree of policy change, ministerial change in the departments that are relevant, has been very significant … and the impact that machinery of government change has on business. The second and third order impacts are very significant and can be very disruptive. So I think that's part of the transformation."

Moderator David Chuter encapsulated the discussion highlighting that although industrial transformation canvasses issues relating to infrastructure, facilities, grants, policies and programs, he identified the importance of "the softer side … there's behaviours, there's culture, there's some of the secret recipe that the successful companies have … behaviours that enable industrial transformation opportunities."

SESSION 3 PANELLISTS

Moderator: David Chuter
CEO, Innovative Manufacturing CRC

Professor Roy Green
Special Innovation Advisor, University of Technology Sydney

Dr Leanna Read
Chair, Carina Biotech and TekCyte

Dr Catherine Livingstone AO
Chancellor, University of Technology Sydney

Table discussions: a summary

All participants at the forum took part in table discussions exploring the issues raised in the panel discussion. This summary captures the common themes that emerged from the tables, captured by scribes.

Introduction

Participants discussed how Australian industry could transform in the post-pandemic world. Topics included coordination and consistency of government policy, skills and education, targeting niche industries that Australia could excel in, the importance of innovation precincts, and giving businesses the incentive to commit to transformation.

Government coordination and consistency

Industrial transformation in Australia requires a whole-of-government approach. There is a lack of coordination between programs from different federal government departments and agencies, which leads to duplication, overlap and sometimes competition. It also occurs between federal and state governments.

This can be rectified by defining missions to coordinate government departments and agencies towards common goals, such as net zero emissions. Another solution is that the Department of Industry, Science and Resources takes on the role of connecting the diverse stakeholders and players of the innovation system and uses an outcome-based approach to deliver industry funding. A third solution would be to create a new entity that connects government departments and agencies to encourage industrial transformation.

Consistency in government policy gives business the confidence to make the investments needed for Australia's industrial transformation. Machinery-of-government changes, frequent ministerial changes and changes to government funding schemes cause uncertainty in industry. Additionally, continued support for publicly funded research entities that have proven their beneficial impact is more effective than creating new entities. This can be aided by government developing deep domain expertise in-house and maintaining constructive industry funding programs.

Skills and education

Expanding the Australian workforce's digital skills through micro-credentials and TAFE will help create industrial transformation. Digital skills are highly valuable and scarce in Australia. Using the TAFE system will enable these skills to be cultivated in a shorter time frame than is possible through university degrees, as well as enabling workers to upskill or reskill without sacrificing as much time or capital.

For this to occur, the TAFE system will need reform and increased funding. Essential skills such as computer programming need to be easily accessible in the TAFE system. A cultural shift is also necessary to recognise that TAFE study is as valuable and important as university degrees.

Australia has a skills gap in researchers who can navigate both industry and academia; such workers are essential to achieving industrial transformation. Cultivating this talent involves leveraging Australia's world-class universities to cultivate talent while presenting students with maximum opportunities to obtain experience outside the academic context.

This begins with workforce training for students in areas such as résumé preparation as well as recognition of industry experience in the academic system. This experience can be obtained through a collaborative research entity such as a CRC, which brings together university and industry partners to pursue common projects. This will help cultivate specialists in technology transfer, which is a major gap in Australia and is a unique skillset that does not have a clear career pathway.

Early childhood education plays a part in Australia's industrial transformation. This is a longer-term project that involves building a pipeline from early education through to university to cultivate the talent needed. Valuable skills such as science, engineering and computer programming can be integrated in early childhood education.

Cultivating Australia's niche industries

For Australia to successfully transform its industry, we must play to our strengths and focus on niches that are globally in demand. Australia is a middle economy and cannot be competitive at mass scales, but can lead the world in certain niches. For example,

ResMed and CSL occupy niches in the medical sector to great benefit. Australia must identify other areas and support the industries to success.

Australia is endowed with strong R&D in agriculture, mining and AI. All these sectors have niches that can be exploited. Government has a large role in identifying and supporting niches. It can use powerful metrics to measure and narrow down promising industries then set national priorities, which could be coordinated between departments and agencies as well as state governments. Effective national priorities are narrow in their scope and it is necessary to deprioritise some areas to focus effort and funding on Australia's strengths.

Innovation precincts

Innovation precincts are important for cultivating business/research collaboration that leads to industrial transformation. They enable knowledge transfer, networking and industry input in research projects. It is important that precincts are industry-led, independent, standalone facilities that can survive changes in the political environment. They can have high-industry engagement if they are accessible to small–medium enterprises, including startups and scale-ups. Some precincts should be created in the regions, where a hub-and-spoke model is ideal.

Incentive for transformation

It is important to provide business with incentives for transformation; otherwise, it is too costly to implement. Australia's industries in general do not have the capital for climate change adaptation. Economic resilience and decarbonisation come with risk and cost, which must be mitigated with incentives.

It is imperative that government sets up incentives with outcomes in mind to ensure that the desired transformation occurs. Reforming the research and development tax incentive (RDTI) could be an effective measure to achieve this.

Specific policies around decarbonisation will help companies work towards net zero emissions. The RDTI can also be reformed by targeting specific industries in line with national priorities. Incentives can align with whole-of-government missions to simplify the system and make it accessible to business.

SECRETARIES AND POLICYMAKERS

Panel Discussion

THE TIME IS NOW, FOR ENGAGING WITH GOVERNMENT

The unique insights offered from the Secretaries Panel discussion were a highlight of the National Innovation Policy Forum.

The scene was set by Patricia Kelly who led off with the vexed issue of how to improve Australia's all-time low investment in research and development, now at 1.79 per cent of GDP.

Business R&D has been falling consistently over the past 20 years, impacting on productivity and our future standard of living. The question everyone wants to know the answer to: how do we tackle this issue?

More money, different culture, more tax incentives, more smart people?

Janean Richards said that was a very tough challenge and the solution is not easy.

She pointed to the government's $15 billion investment in the National Reconstruction Fund (NRF) as an opportunity for industry investment–with its priority areas of agriculture, resources, forestry and fishing, transport, medical sciences, low emissions economy, defence capability and enabling capabilities–including how to bring the value chain onshore and improve manufacturing capacity.

Andrew Metcalfe endorsed the opportunity offered by the forum in opening doors for communication and person-to-person engagement. "… telling the stories of the continuum of research and inquiry through to adoption of new practices. … it's about people learning and adapting and making a difference. And so I think your engagement (here) with policymakers and telling the stories is something that's really important."

He said that while the Australian agriculture sector has a good story to tell from past and current collaborations and across a range of programs, demonstrating that innovation is worthwhile is essential, and can lead to opportunities offered by initiatives such as the NRF.

Tony Cook endorsed the excellent record of Australia's research and higher education sector. The new government's continuing support for the Research Commercialisation Action Plan was significant, he said. He noted that the Trailblazer program, with six universities in partnership with industry, has investments in defence, space, clean energy, critical tech and critical minerals focused on moving research through to commercial products.

"What we have found is that by some level of initial upfront investment by government, about $50 million per Trailblazer, we've had a multitude of investment by industry, in some cases, hundreds of millions of dollars … to assist moving that research into a commercialisation package and commercialisation output."

Mr Cook encouraged participants and stakeholders to engage in the review of the Australian Research Council (ARC) by Professor Margaret Sheil. It is looking at the role of the ARC, its grant processes, and particularly the Linkage Grants and how they can work better to support the relationship between university research providers and industry.

The review into Australia's higher education system through the Universities Accord has also kicked off, he said, and contributions will be invited in the coming months, with a focus on the role of research, and how to improve the relationship between providers, government and industry more broadly.

"So it's really a rich opportunity at the moment to be engaged around two processes, which will come together for final advice to government."

Ms Kelly asked the panel about opportunities and barriers in growing partnerships between public sector agencies and the research sector more broadly.

Ms Richards noted that there was a real opportunity to change the conversation around the relationships among the stakeholders in the research-industry-government paradigm.

"I think it's a real weakness to focus on the barriers. And we tend to polarize the conversation about what's going on between researchers and our industry sector … (yet) we see through the administration of programs like the CRC Program, which everybody loves, is just the immense possibilities that can be achieved by our universities."

She also pointed out that everyone understands that there are areas that need work.

"As you said, Patricia, we don't always know the answers … (so) sharing

SECRETARIES AND POLICYMAKERS

From left, Andrew Metcalfe AO, Janean Richards, Tony Cook PSM, Patricia Kelly PSM and Jane O'Dwyer.

the problem in the hope that you can engage much more talent than our own in thinking about what the possibilities might be to solve some of these welfare and other challenges for government and communities."

Mr Cook concurred, "We all of us don't have the answers, obviously. And so we need to work on how we can actually make the system more agile to enable those answers to be provided much quicker than we currently do."

SECRETARIES AND POLICY MAKERS PANEL

Moderator: Ms Patricia Kelly

Ms Janean Richards

Mr Tony Cook

Mr Andrew Metcalfe

Patricia Kelly PSM

Patricia Kelly is a Director of Cooperative Research Australia. She also chairs the Australian Research Integrity Committee (a joint NHMRC/ARC committee). Patricia is a member of the Council of the University of Canberra and a Director of DMTC Ltd, a not-for-profit company facilitating research and collaboration between Defence, defence industry and the research sector.

Janean Richards

Janeane Richards is Acting Deputy Secretary of the Department of Industry, Science and Resources (DISR). She joined DISR in 2018 as Chief Operating Officer before taking over the Science and Commercialisation Division in November 2020. She is committed to the delivery of citizen-centred public services and led an Australian Public Service (APS) wide review of mental health capability. She has more than 15 years' experience in senior executive positions in the APS.

Tony Cook PSM

Tony Cook is the Deputy Secretary of the Higher Education, Research and International Group. Before joining the department, Tony was the Director-General of the Department of Education, Queensland. He previously held the position of Associate Secretary for Schools and Youth in the former Australian Government Department of Education and Training and has held senior executive positions within the Victorian Public Service.

Andrew Metcalfe AO

Andrew Metcalfe has been the Secretary of the Department of Agriculture, Fisheries and Forestry since it was created on 1 July 2022, following Machinery of Government changes. Prior to this, Andrew was Secretary of the Department of Agriculture, Water and the Environment. He was appointed as an Officer of the Order of Australia in 2012. He is a Fellow of the Institute of Public Administration Australia.

PARTICIPANTS

Mr Petr Adamek
CEO, Canberra Innovation Network

Mr Basil Ahyick
Acting CEO, National Sea Simulator/Australian Institue of Marine Science (SeaSim) (AIMS)

Professor Mathew Aitchison
CEO, Building 4.0 CRC

Professor Myriam Amielh
Dean, Australian Catholic University

Mr Ricky Archer
CEO, NAILSMA / Indigenous Advisory Group - CSIRO

Ms Katrina Avery
Director of Partnerships, Macquarie University

Senator Timothy Ayres
Assistant Minister for Trade; Assistant Minister for Manufacturing Australian Government

Professor Richard Baker
Slatyer Family

Ms Alethia Barceinas
Policy and Advocacy Manager, Cooperative Research Australia

Ms Sarah Battenally
Director / Co-founder, me-innovations

Mr Cameron Begley
Managing Director, Spiegare

Distinguished Professor Genevieve Bell
Director, School of Cybernetics, Australian National University

Professor Andrea Bishop
Pro Vice Chancellor (Research), Griffith University

Ms Tanya Blight
Office of Industry, Innovation and Science, Department of Industry, Science and Resources

Dr Abby Bloom
Chair, SoMAC CRC

Mr James Bowie
Senior Advisor, Asia Natural Gas and Energy Association

Mr Michael Bromley
CEO, Stone and Chalk

Ms Alexandra Butcherine
Policy and Program Officer, Department of Education

Mr Angus Cadman
Scribe, Department of Education

Professor Julie Cairney
CEO, Microscopy Australia (MAU)

Professor Tom Calma AO
2022 Ralph Slatyer Address on Science and Society

Professor Andrew Campbell
CEO, Australian Centre for International Agriculture Research

Mr Nathan Cera
Head of Corporate Affairs, DUG

Dr Isa Chan
Assistant Director, Department of Education

Mr Quin Chang
Chair, Knowledge Commercialisation Australia

Ms Natalie Chapman
Managing Director, Gemaker

Mr Ian Christensen
CEO, iMove CRC

Mr David Chuter
CEO, Innovative Manufacturing CRC

Dr Alex Cooke
General Manager - Missions at CSIRO, CSIRO

Ms Jacqueline Cooke
Acting General Manager Research and Collaboration Branch,
Department of Industry, Science & Resources

Dr Justin Coombs
CEO, Marine Bioproducts CRC

Mr Paul Cooper
Chair, Advanced Manufacturing Growth Centre (AMGC)

Dr Michael Crawford
CEO, CRC for High Performance Soils

Ms Siobhan Curran
Assistant Director, University of Newcastle

Professor Mahananda Dasgupta
Director, Heavy Ion Accelerator Facility, Heavy Ion Accelerators

Mr Andrew Davis
CEO, Autism CRC

Dr Marcus Dawe
CEO, Mineral Carbonation

Dr Michael Dobbie
Chief Executive Officer, Phenomics Australia (PA)

Professor Calum Drummond
Deputy Vice-Chancellor Research & Innovation & Vice-President, RMIT University

Ms Jillian D'Urso
External Relations and Impact Director, CRC for Transformations in Mining Economies

Ms Tahni Dwyer
Scribe, Department of Industry, Science & Resources

Mr Anthony Dyer
CEO, Wound Innovations

Ms Lisa Emerson
Commissioner, NSW Modern Manufacturing

PARTICIPANTS

Dr Bronwyn Evans
Chair, Building 4.0 CRC

Dr Scott Farrell
Partner, KWM Industry, Innovation and Science Board

Dr Cathy Foley AO
Australia's Chief Scientist

Professor Bronwyn Fox
Chief Scientist, CSIRO

Emeritus Professor Roy Green
Special Innovation Advisor, University of Technology Sydney

Professor Paul Greenfield AO
Chair, CRC for High Performance Soils

Professor YuanTong Gu
Centre Director, ARC Industrial Transformation Training Centre
for Joint Biomechanics

Mr Rob Guest
Scribe, Department of Industry, Science and Resources

Ms Mary Hackett
Chair, Future Energy Exports CRC

Ms Kate Hayes
Associate Director Research Innovation and Translation, University of Melbourne

Professor Ian Henderson
Director, UQ Institute for Molecular Bioscience

Dr Patrick Hone
Managing Director, FRDC

Dr John Howard
Managing Director, Howard Partners

Mr Tim Hristovski
Manager, Department of Industry, Science and Resources

Professor Elanor Huntington
Senior Executive, Digital National Facilities & Collections, CSIRO

Hon. Mr Ed Husic
Minister for Industry and Science

Professor Mark Hutchinson
President, Science and Technology Australia (STA)

Mr Shaun Jenkinson
CEO, ANSTO

Professor Lucy Johnston
Acting Deputy Vice-Chancellor (Research & Enterprise), University of Canberra

Ms Patricia Kelly PSM
Director, Cooperative Research Australia

Professor Abid Khan
Deputy Vice-Chancellor Research and Enterprise, Australian Catholic University

Ms Liz Killen
Assistant Manager, Policy, Office of the Chief Scientist

Ms Anne-Marie Lansdown
Director, Cooperative Research Australia

Dr Steven Lapidge
CEO, Fight Food Waste CRC

Associate Professor Sophie Leterme
Centre Director, ARC Training Centre for ARC Training Centre for Biofilm Research and Innovation

Ms Vandana LilaJayan
Scribe, Department of Education

Ms Catherine Livingstone
Chancellor, University of Technology Sydney

Mr Alex Lloyd
CEO, CRC Safe

Ms Felicity Lloyd
CEO, Heavy Industry Low-carbon Transition CRC

Mr Bryce Logan
Director - Stakeholder Relations, Department of Education

Hon. Kate Lundy
Chair, Cyber Security CRC

Ms Sue MacLeman
Chair, MTP Connect

Ms Alison Malmberg
Admin and Events Officer, Cooperative Research Australia

Mr David Martin
Chief Strategic Partnerships Officer, Australian National Fabrication Facility

Professor Eric May
CEO, Future Energy Exports CRC

Ms Jodie McAlister
General Manager, Policy and Stakeholder Groups, IP Australia

Mr Anthony McGregor
Head of Division, Department of Industry, Science and Resources

Professor Eileen McLaughlin
Executive Dean Faculty Science, Medicine and Health University of Wollongong

Mr Nick McNaughton
Founder and CEO, Campus +

Prof Hon. John McVeigh
Hub Director, SQNNSW Innovation Hub

Professor Laurence Meagher
Centre Director ARC Training Centre for Cell and Tissue Engineering Technologies

PARTICIPANTS

Mr Andrew Metcalfe AO
Secretary Department of Agriculture, Fisheries and Forestry

Mr Mark Micirie
Head of Technology Development Woodside

Professor Anton Middelberg
Deputy Vice-Chancellor (Research), University of Adelaide

Dr Branwen Morgan
Mission Lead / Research Director, CSIRO

Dr John Morrison
Director, Australian National Fabrication Facility

Dr Dean Moss
CEO, University of Queensland

Ms Justine Murphy
Scribe, Department of Industry, Science and Resources

Professor Kashem Muttaqi
Centre Director, ARC Training Centre in Energy Technologies for Future Grids

Dr Stuart Newman
Chief Executive Officer, Therapeutic Innovation Australia (TIA)

Dr Kerstin Oberprieler
MC

Ms Jane O'Dwyer
CEO, Cooperative Research Australia

Ms Peta Olesen
Director - Net Zero innovation, Department of Climate Change, Energy, the Environment and Water

Mr Shannon O'Rourke
CEO, Future Battery Industries CRC

Professor Andrew Parfitt
Vice Chancellor, University of Technology Sydney

Dr Chris Pigram AM
Chair, MinEx CRC

Ms Kate Pounder
CEO, TechCouncil Australia

Ms Luisa Powell
Scribe, Department of Industry, Science and Resources

Senator Louise Pratt
Deputy Government Whip in the Senate, Australian Government

Dr Mirjana Prica
CEO, Food Innovation Australia LTD (FIAL)

Dr Leanna Read
Chair, TekCyte

Mr Martin Redhead
Business Innovation, Northern Territory, Department of Industry, Tourism and Trade

Ms Louise Reid
Marketing and Communications Manager, Cooperative Research Australia

Ms Janean Richards
Acting Deputy Secretary, Department of Industry, Science and Resources

Mr Sam Ringwaldt
CEO, Conry Tech

Ms Belinda Robinson
Chair, Cooperative Research Australia

Dr Doron Samuell
CEO, Behaviour, Industry, Innovation and Science Board

Mr Mick Schaefer
COO, Food Agility CRC

Associate Professor Annette Schmiede
CEO, Digital Health CRC

Ms Misha Schubert
CEO, Science and Technology Australia

Dr Vikram Sharma
CEO and Founder, QuinetessenceLabs

Ms Jacyl Shaw
Head of Development, Skafold Global

Mr Tanvir Singh
Policy Officer, Cooperative Research Australia

Mr Anthony Slatyer
Slatyer Family

Professor John Spoehr
Pro Vice-Chancellor (Research Impact), Flinders University

Ms Lauren Stafford
Scribe, Industry, Innovation and Science Board

Professor Mike Stewardson
CEO, One Basin CRC

Associate Professor Cori Stewart
CEO, ARM Hub

Mr Laurence Street
Director Commercial, CSIRO

Ms Anne Stunzner
CEO, CRC for Developing Northern Australia

Ms Miranda Taylor
CEO, National Energy Resources Australia

Emeritus Professor Elizabeth Taylor AO
Independent Chair, SmartCrete CRC

Ms Lubina Thattamveedu Kasim
Scribe, Department of Education

Mr David Thodey AO
Forum Patron

Dr Les Trudzik
Chairman, Bioplatforms Australia

Ms Ayla Truscott-Jones
Scribe, Department of Industry, Science and Resources

Ms Clare Tubolets
CEO, SmartCrete CRC

Ms Sally Vardy
CFO, Cooperative Research Australia

Ms Hannah Vardy
Scribe, Cooperative Research Australia

Mr Rafael Villadiego
Scribe, Department of Industry, Science and Resources

Mr Tom Walker
Chair, iMove CRC

Mr Peter Derbyshire
Director Policy and Government Relations, Academy of Technology and Engineering

Professor Nicole Webb
Chief Scientist, Australian Antarctic Division

The Hon. Trish White
Managing Director, SlingsbyTaylor

Ms Sally-Ann Williams
CEO, Cicada Innovations

Dr Jo Wisdom
Innovation Manager, South-West WA Drought Resilience Adoption and Innovation Hub

Dr Beth Woods
Chairman, National Sea Simulator/Australian Institue of Marine Science (SeaSim) (AIMS)

Dr Katherine Woodthrope AO
Chair, Natural Hazards Research Australia

Mr Don Wright
Director, Innovation and Entrepreneurship, Western Sydney University

Ms Riana Yeates
Manager, Department of Industry, Science and Resources

Dr Lisa Yen
COO, Microscopy Australia (MAU)

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Tony Schreiber, General Manager
Orrcon Steel, ARM Hub Member

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