



COLLABORATE INNOVATE 2023

ADELAIDE 10-12 JULY 2023

Conference Overview



Cooperative
Research
Australia

Conference overview



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Industry-Research Collaboration for Australian Prosperity and Sustainability

Summary	2
Quotes	3
TUESDAY 11 July	4
Opening Plenary	4
Opening Plenary: Industry-Research Success Stories	4
Disrupting the Disrupters – the Impact of AI	6
Advanced Strategic Capabilities Accelerator Briefing	8
WEDNESDAY 12 July	9
Voices from Across Industry-Research Collaboration	9
Aligning national priorities and capability	11
Transforming Australia: What will it take?	13
Conference Wrap-up	15

Summary

Australia's top innovators from CRCs, NCRIS, Centres of Excellence and other collaborative groups gathered at Collaborate Innovate 2023 to discuss the strengths – and weaknesses – of the collaborative research environment in Australia.

The consensus of the wide range of panellists, participants, and stakeholders was that, while criticism of Australia's failure to translate research into commercial opportunities might be overblown, there was much still to be achieved. In this we can learn from our key allies and competitors, and in particular, about how to support the kind of mobility seen in the US where researchers move freely between academia and business and government as a matter of course. The conference heard that there was much to admire in Australian CRCs, and that the program had enabled engagement of different perspectives. This has enriched the country's world-standard research capabilities and developed many effective and fruitful partnerships.

Continuity and attention to detail emerged as key factors in where successful collaborations had made the most of innovative research. Collaborations take time to build, develop trust and deliver results; and there is opportunity for improving how CRCs are structured. Having room for development over the decade or more of a program's life was considered important, particularly for SMEs, which are the backbone of Australia's business community, but lack the resources of larger corporations.

Of equal importance was the mindset of the collaborators themselves, who need to have very clear ideas about what they want to achieve, and to understand the intellectual capital and potential of their projects.

All this comes down to people. Time and again people were shown to be at least as important as the technology with which they worked. Policy settings should be established, assessed and reassessed to make sure we are doing all we can to utilise the country's enormous bank of talent.

As Professor Roy Green of UTS, who chaired the discussion on how to transform the Australian economy, summed up: "We've got everything here. There are many small countries that had nothing to start with, no resources as we do. Countries like Ireland, Singapore, Israel, and Korea. They all started with policy."

Quotes

“Collaboration is the best and sometimes the only way to deal with the complex problems that we face in society.” – Ian Christensen, iMove CRC.

“The beauty of the CRC program is its longevity. A program must evolve and should continue to be reviewed. But I think we can underestimate the power of relationships that are well developed and trusted.” – Dr Leanna Read, Carina Biotech, Techcyte, and UniSeed.

“Only countries with the values and the trust and the history and the confidence in the future as the three of us [Australia, the UK and the US] could work together in such a way, and work for the global goal of not just our own countries, but for the prosperous future for the Indo-Pacific region.” – Stephen Lysaght, UK Consul General, speaking on AUKUS.

“Innovation must translate into acquisition, and the defence accelerator will address the very real urgent need to turn the emerging technologies into game-changing capabilities.” – Prof Emily Hilder, Defence Science and Technology.

“There has been no time in my almost five years as Chief Defence Scientist, where it's been clearer what we need to do in Defence with regard to shaping our national priorities,” – Chief Defence Scientist, Professor Tanya Monro.

“I'd like to see a more agile way...creating that flexibility so that we can allow these really innovative, agile businesses to engage with us and see the huge benefits of working with the incredible research facilities that we have in Australia.” – Clare Tubolets, Smartcrete.

“There isn't a better placed country than Australia to transform itself into one of the leading knowledge-based economies in the world.” – Professor Roy Green, Special Innovation Advisor at the University of Technology Sydney.

TUESDAY 11 July

Opening Plenary

Keynote Address: Professor Laura Parry, Pro Vice-Chancellor (Research Excellence), University of Adelaide

Professor Parry likened Cooperative Research Centres to bilingual brokers who can speak both the language of university researchers and the language of the industry. Researchers need to learn how to listen to industry's perspective. After that, it's about how people work together with their different skill sets to address really big problems, co-develop ideas, and develop a shared vision. CRCs have been a key element of industry-focused research.

Ministerial Address: Hon Ed Husic MP, Minister for Industry and Science

The CRC program is an excellent example of what's possible when we get collaboration right. The lessons and insights you share at this conference will help keep the program relevant and effective well into the future.

Opening Plenary: Industry-Research Success Stories

This session was aimed at drawing on the extensive experiences of the panel to identify the keys to successful collaboration.

Chair: Ian Christensen, iMove CRC

Ian describes himself as a “tragic for collaboration”. The iMove CRC he leads delivers innovation and development to the transport sector. “Collaboration is the best and sometimes the only way to deal with the complex problems that we face in society.”

We all come to collaboration with our own unique perspective. At the beginning of most collaborations, we see our task as persuading the others in the collaboration that we are right, and they need to follow us. But over time, in any collaboration and across multiple collaborations, we start to learn that others can contribute something that we cannot. “And so begins a journey of discovery that makes collaboration, fun, scary, exciting, and ultimately exceedingly rewarding.”

Dr Leanna Read, Carina Biotech, Techcyte, and UniSeed

Asked what was the most exciting research-industry collaboration with which she had been involved, Leanna highlighted the CRC for Cell Therapy Manufacturing, a key collaborator with Carina Biotech. She showed how the CRC worked in the opposite way to most research enterprises. Instead of discovering something and finding a use for it, it began with a problem and brought people together to solve it.

David Chuter, Innovative Manufacturing CRC (IMCRC)

IMCRC ran from 2016 to 2022 championing innovation across 71 R&D projects.

When you get people to collaborate with a shared ambition and a shared vision of where they want to go, and they respect each other's skills and capabilities, real magic can happen, he said. He sees CRCs not just as vehicles to create new products, processes, or platforms, but as a way to help SMEs in particular to completely “transform their business model, take something substantial to the world and not just a next-generation product to the Australian market”.

Professor Heike Ebendorff-Heidepriem, University of Adelaide

Heike highlighted her collaboration with the Flawless Photonics group to develop ZBLAN optical fibres. The company's vision coincided with Heike's aim to unlock the potential of the next generation of fibre optics. The journey began in 2019 and resulted this year in more than \$6 million in funding. The collaboration has linked Adelaide firmly with a global network. “Their headquarters is in the US, they have an engineering facility in Luxembourg, and they also, thanks to the collaboration, have an office here in South Australia.”

Ian Christensen, iMOVE CRC

iMOVE is a national centre for transport and mobility R&D that treats mobility as a service, he said. Through collaboration and with the contributions of key partners in software, analysis and delivery “we've managed to develop a system that is ultimately Olympic in scale”. Everyone involved had secured a significant return.

Discussion

A key element of the discussion looked at the role government should play in the Australian collaboration ecosystem. Leanna noted that beyond policies that worked and did not impede collaboration, continuity was a big challenge. She cited the fate of Commercialisation Australia which was disbanded when the government changed. “The beauty of the CRC program is its longevity. A program must evolve and should continue to be reviewed. But I think we can underestimate the power of relationships that are well developed and trusted,” she said.

“And that takes time; developing networks and the rest of it doesn't happen overnight.”

Disrupting the Disrupters – the Impact of AI

Dr Paul Dalby, Rozetta Institute

Dr Denis Bauer, CSIRO

Chair: Professor Simon Lucey, Australian Centre for Machine Learning

Simon introduced the session by noting that generative AI has undergone massive growth, with the latest systems now accessing a trillion data points.

However, he says, we must understand its limitations. For all the hype, ChatGPT 4 can't multiply – it's only 59 per cent accurate on three-digit multiplication and entirely fails on five-digit sums.

Perhaps language, its core skill, is a lot simpler than we thought, but we need to define carefully what AI can do.

Dr Denis Bauer, CSIRO

Machine learning is transforming how we understand our genome. Denis considered the apparently daunting problem of discovering how our three billion DNA letters interact in a complex disease such as diabetes.

That's what we use machine learning for, she says. For example, predicting how proteins fold used to be a complex and challenging problem, but with AI, it's become trivial.

The questions we need to ask are: What of the future? Is AI going to rewrite the process of science? Will there be AI-run labs?

Dr Paul Dalby, Rozetta Institute

Paul noted that AI is changing science and becoming a major field in its own right and is also improving scientific process in key areas by an order of magnitude.

In Adelaide we're fast-tracking wheat breeding – predicting yields and reducing the markers we need from 17,000 to just 300. We're designing new materials. We're showing that AI is a useful tool.

We need to be world-leading, to be able to develop and use the technology. Funding isn't keeping up with the growth of the importance of AI in science. To do this, we need to reorganise focusing on how we collect, store and protect data especially in health.

What is the research infrastructure that's needed to ensure all disciplines can access high quality AI? That question could be partially answered by noting that currently we have 100 to 200 PhD students studying AI in Australia. It's far too few to meet the need.

International Approaches and Opportunities

2:00pm-3:15pm Session, Stream 2

Stephen Lysaght, UK Consul General

Kathleen Lively, US Consul General

Chair: Dr Patricia Kelly PSM, CRA Board and Australian SKA Regional Centre Patricia noted the level of investment in R&D as a percentage of GDP has been falling steadily in Australia over 15 years, having peaked in 2008 at about 2.2% of GDP, which was then around the OECD average. Currently, it stands at 1.8% of GDP while the OECD average has risen to 2.7%.

The US represents the gold standard in terms of producing thriving innovation ecosystems, which have nurtured some of the world's most innovative research-based companies. What US lessons are relevant to Australia?

Stephen Lysaght, UK Consul General

The strength of UK-Australian-US collaboration and their shared values can be seen in AUKUS. "Only countries with the values and the trust and the history and the confidence in the future as the three of us could work together in such a way and work for the global goal of not just our own countries, but for the prosperous future for the Indo-Pacific region."

Kathleen Lively, US Consul General

Kathleen's presentation highlighted the bipartisan Chips and Science Act in 2022, passed by the Biden administration. This is a key part of the US national security strategy with a priority on creating a technology ecosystem with governments, companies and universities, united by common interests to ensure that the US, along with its allies and partners, remains at the forefront of technological development.

The Chips Act is part of an industrial strategy to revitalise US domestic manufacturing, strengthening supply chains, and accelerating the industries of the future. "Its passage prompted \$50 billion in additional investment in semiconductor industry by US companies," she noted.

Discussion

A key difference between Australia and the US noted by speakers and audience alike was the ease with which people moved seamlessly between academia, business and government in the US. But "tri-sector careers", common in the States, are quite rare in Australia, where even geographical mobility is less than in the US.

Advanced Strategic Capabilities Accelerator Briefing

Professor Emily Hilder, Defence Science and Technology

Emily provided a first look at Defence's new platform that drives innovation to create capability for the Australian Defence Force. One of the most important focus areas to come out of the Defence strategic review was lifting Australia's capacity to transfer and translate disruptive new technologies rapidly into ADF capability in close partnership with Australian industry.

"Innovation must translate into acquisition, and the defence accelerator will address the very real urgent need to turn the emerging technologies into game-changing capabilities," Emily said. "Enabling technology development and speedy acquisition will also create many more jobs in the Australian Defence Industry. A core part of this is making sure that we can do something that helps to create and sustain a critical industry and vice versa."

WEDNESDAY 12 July

Voices from Across Industry-Research Collaboration

Julia O'Callaghan, Defendtex

Annette Schmiede, Digital Health CRC

Darin Lovett, iLaunch Trailblazer

Chair: Professor Michael Goodsite, University of Adelaide

Michael is Pro-Vice-Chancellor of the University of Adelaide with the portfolio of Energy Futures and has responsibility for university business development and commercialisation. He also directs the University of Adelaide's Institute for Sustainability Energy and Resources. The University of Adelaide is a bid sponsor for two CRCs in Stage Two of the current round – Scaling Green Hydrogen CRC, and Copper for Tomorrow.

Australia, with its vibrant research ecosystem and dynamic industry sectors, is poised to lead the way and foster best practices for industry-research collaboration – “know-how that can and should be anchored locally but leveraged globally”.

Both academia and industry must recognise the value of working together even more than they already do, acknowledging that the whole is greater than the sum of parts. “Rather than seeing each other's separate entities, we should view ourselves as complementary partners, each bringing unique perspectives and expertise to the table.”

Julia O'Callaghan, Defendtex

Julia emphasised her company's strong relationships with its partners. “A partnership that doesn't separate the partners – that's really, really critical,” she said. Relationships form the foundation of an effective collaboration. CRCs can provide a rapid and dynamic project in a very short period, but to commercialise that is quite tricky. Julia would like to see a growth pathway of sequencing of grants to support the R&D pathway over the valley-of-death stage and on to commercialisation. A critical element of her proposed funding sequence is that it must be inclusive of overlap, in order not to lose the knowledge between phases. “Often, we get to a point where we've engaged in a funding mechanism or a project, and we don't get follow-on funding from that, which means that our academic partners are only contracted for a period of time and they need to think about their livelihoods, so then they end up finding an alternative job. We lose knowledge and the project that should receive another round of funding starts all over again.”

Annette Schmiede, Digital Health CRC

Annette highlighted the shortcomings of a culture of working with industry, government, and universities in healthcare, which is not as well developed as in some of the other commercial areas of the economy such as mining, manufacturing, agriculture and defence. The participants are not universally comfortable with a shift to a more commercial focus,

with individual researchers pulling out of projects as a result. A really important part of the CRC program, she said, is building the digital health technology sector in Australia. “It's fairly nascent, but certainly over the last three or four years we've seen, certainly seen, an upswing.”

Darin Lovett, iLaunch Trailblazer

The iLaunch acronym may stand for Innovative Launch Automation, Novel Materials, Communications and Hypersonics, but Darin styles it “the Space Trailblazer”. He praised the Department of Education for its inspirational approach to the Trailblazer Universities Program. He noted that \$50 million from the federal government matched by industry and academia, translates to each Trailblazer having a base of \$150 million plus. The program is focused on cultural change and translating effort from academia, getting IP out of the labs and into commercialisation to help Australia prosper and become wealthier.

Discussion

One overall take-away from this session was that there is no single solution which covers every CRC or Trailblazer. They're all different and it's the responsibility of the leadership to optimise what works best for their partners.

Aligning national priorities and capability

Dr Jill Freyne, CSIRO

Dr Tim Boyle, ANSTO

Professor Tanya Monro AC, Chief Defence Scientist

Chair: Dr Cathy Foley AO, Chief Scientist of Australia

Cathy said we are going through a time of convergence, where advances in science and research are opening the way to new technologies that could accelerate solutions to national and global challenges. Examples include recycling technologies, medical diagnosis and treatment, bio-technologies and digital technologies, including quantum technologies. This makes improving collaboration between industry and research crucially important.

She noted that many countries are competing for the same expertise and skills, so it is important that we focus our attention on collective goals and ensure that we are coming together around areas of strength. “This is the purpose of the science and research priorities,” she said.

Professor Tanya Monro, Chief Defence Scientist

“There has been no time in my almost five years as Chief Defence Scientist, where it's been clearer what we need to do in Defence with regard to shaping our national priorities,” Tanya said. The Defence Strategic Review identified six areas of priority for innovation: hypersonics technologies, trusted autonomy for all domains, automated intelligence and information warfare, directed energy technologies, quantum technologies, and long-range fires.

There is a shift in the Defence space towards having the problems drive the response of the innovation system.

“Our future is not guaranteed,” she said. “But I would argue that it is guaranteed that we will not have the future we want if we allow R&D to sit at the side not driving our future industrial base and our nation's Defence. So, we've embedded it now in the centre, so that it can respond to those priorities of government.”

Dr Jill Freyne, CSIRO

Over the past few years CSIRO has refined its focus on national challenges and picked six key areas for Australia that the agency is well-placed to lead in and to support – health and wellbeing, food security and quality, securing the Australian region, resilience, viable environments, and sustainable energy resources for future industries. And it's no surprise that they overlap with the draft priorities that you've started to circulate.

CSIRO's aim is work with partners, using its unique skills, infrastructure, people, and capabilities to mobilise enough momentum behind some of the programs to deliver change in specific areas with tangible goals.

Dr Tim Boyle, ANSTO

Tim highlighted ANSTO's convergence, collaboration points and international networks thanks to about 5000 international visitors who come to work on its research infrastructure for collaboration and innovation. That makes the agency a globally significant science-based innovation precinct and nuclear medicine supplier.

Discussion

In the general discussion and question time, Tanya said it was vital to make sure that those in the R&D sector genuinely understand the problems that we can solve and to make sure they get the support they need from industry, and that government gets the policy settings right. "It's easy to say, it's much harder to do," she said.

She also noted that Australia's R&D base doesn't reflect the structure of Australian industry very well. The sheer dominance of Australia's health and medical research is not matched by the scale of the country's health and medical industry.

The panel reflected on the different experiences between the government sector and universities. "Just spending some time in a government context, I think can help them [researchers] see how you can play to the strengths you have in a university, which are things like the freedom to pursue areas of curiosity, and the life, that you don't necessarily have in a government context," Tanya said.

Tim believes there are the common objectives and threads between universities and government research, but one of the things that is different in publicly funded research or research organisations is that as science isn't just about research. Science is used in formulating advice to government and is focused on innovation and technology transfer and commercialisation.

Transforming Australia: What will it take?

Dr Leanna Read, Carina Biotech and Techcyte

Dr Alex Cooke, CSIRO

Clare Tubolets, Smartcrete

Chair: Professor Roy Green, UTS

Roy painted a slightly gloomy picture of the situation in Australia despite having nine universities in the global top 100 and a high average income and standard of living. He highlighted productivity and wage stagnation, and that Australia was lagging behind other developed countries in the recovery of productivity after Covid. He pointed to an outdated industrial structure and the country being too heavily reliant on unprocessed raw materials in its export mix.

In response to a question about changing Australia's culture, Leanna said that it runs through almost everything that had been discussed at the conference. "What is it about our system that is preventing us in many cases from making coherent, rational, long-term decisions? And is there something about the culture here? Are we too complacent? Do we react better to adversity?"

She pointed to the 1980s, and the adverse circumstances around the balance of payments that precipitated the reform program of the Hawke-Keating government.

But she was still optimistic, particularly about the next generation coming through which seemed to her much more willing to take a risk and to set up entrepreneurial companies. New research programs also tended to be of a larger scale than in the past, she said.

When asked to name the one reform they would prioritise, the panel responded as follows:

Clare Tubolets, Smartcrete

"I'd love to make a few sweeping reforms to the CRC program itself. We need to change the partnership model. It doesn't make sense for us to engage partners over a 10-year period. Typically, that only attracts big businesses which are not going to adopt the innovation we are creating within the program. If we truly want to accept SMEs into the program and recognise that SMEs contribute the bulk of innovation and agility capability, we need to find a different way to be able to engage with them. And that's not signing them up for multimillion dollar contracts over 5-10 years. I'd like to see a more agile way ... creating that flexibility so that we can allow these really innovative, agile businesses to engage with us and see the huge benefits of working with the incredible research facilities that we have in Australia."

Dr Alex Cooke, CSIRO

“Moving from a focus on programs to thinking about outcomes and looking at the way in which we come up with a nationally coordinated approach to respond to those outcomes which don't have to be captured by any individual agency. We are establishing a process where the key actors focus around how they identify the problems and respond to them as quickly as possible.”

Dr Leanna Read, Carina Biotech and Techcyte

“We should respond to the education challenge so that our next generation is ‘a totally different kettle of fish’. That way it won't be down to the government, it'll be down to individuals. We always think of that example of Israel and the drip irrigation system. Somebody noticed a dripping pipe and that the plants were growing well under it and bingo, that evolved into the biggest irrigation producer. I think that's the mentality.”

Professor Roy Green, UTS

“I'd like system redesign. Not just to emulate other countries, but to devise something ourselves that brings together the enormous talent that we have in this country, and is certainly represented in this room, with entrepreneurial start-ups, innovation ecosystems involving local industry, foreign direct investment companies, and SME supply chains. We've got everything here. There are many small countries that had nothing to start with, no resources as we do. Countries like Ireland, Singapore, Israel and Korea, all started with policy.”

“There isn't a better placed country than Australia to transform itself into one of the leading knowledge-based economies in the world.”

Conference Wrap-up

**Ms Jane O’Dwyer, CEO Cooperative Research Australia and Justin Coombs
CEO, Marine Bioproducts CRC**

Jane and Justin jointly presented a conference take-out of four dot points.

- The development of new enterprises is as much about people as technology. Investing in people warrants just as much effort.
- Engaging with different perspectives helps to develop effective and productive collaborations.
- The importance of getting the practical basics right for collaborations – aligning incentives, working out what you're trying to produce, truly understanding your IP – and then trying to work out the ultimate aim of what you are trying to achieve.
- The value of patents and sustaining collaborations over a long time. One of the key take-outs from listening to many of these stories is that the standard unit of an “overnight success” is about a decade.

Written by Bill Condie, Science in Public