



**Australian Government**

**Chief Scientist**

**DR CATHY FOLEY AO PSM**

**ADC FORUM AUSTRALIAN LEADERSHIP RETREAT**

***Science for advanced economic development***

**Friday 24 March 2023  
Brisbane, QLD**

Thank you for inviting me today.

I'd first like to acknowledge the Turrbal and the Jagera peoples, the traditional custodians of the lands on which we meet today. I'm honoured to be here with such a great and varied audience of leaders across many sectors. I'm looking forward to this being a two-way exchange, so I can benefit from the knowledge and ideas in this room. And thank you for your focus on science.

It won't have escaped your attention that, as far as I'm concerned, science and research are quite simply fundamental to Australia's future. They are the drivers of our future prosperity. They are the drivers of innovation and employment. They are key to revitalising our regions, reshaping our cities and protecting what's unique in the environment around us. Science is humanity's superpower, and we're here because we've been able to use that superpower to create the modern world.

DNA analysis here in Australia tells us that the natural lifespan of humans may be just 38 years. So if you've tipped 40, you're here because of science. If you arrived by air, if you or your family took medication this morning, or you checked the weather forecast, listened to the radio, checked your bank account – it's because of science. All of us benefit from science at this day-to-day level. We understand almost intuitively where science has impacted our lives for the better. We trust in its power.

Now, we need to back it in at a much bigger scale – understand that the transformations and benefits that science has brought to all of our lives are transformations it can also bring to the life of our nation.

Addressing climate change will drive innovation, jobs and prosperity, and unlock new technological capabilities. The same can be said for new ways of protecting against and responding to wildfires and weather extremes, for new forms of protein, new techniques for medical diagnosis, and more finely tuned personalised medicine.

These things will happen, and they will happen regardless of you and me, but our aim here in Australia is not simply to wait for the trickle down. Our aim is to be ambitious – to reap the benefits of this moment to transform our economy. If we can successfully focus our efforts, there's a great future on offer: a future where Australia is a central part of high-tech supply chains, including in semi-conductors and batteries; where we are an exporter of clean hydrogen, in no small part due to the work of my predecessor, Alan Finkel; where Australia not only mines but processes the critical minerals that are in such high demand; where we

grow our capability in high-tech manufacturing including pharmaceuticals.

Today, I want to tell you about some of the work I have underway in pursuit of this agenda.

Also, I want to hear from you about how to make the most of the opportunities in front of us – but first, let's take a step back.

As you know, I'm in the middle of a national conversation on behalf of the government to develop a new set of national science and research priorities. Since I began this conversation three weeks ago, I've held 22 roundtables with peak bodies, industry groups, science and research sectors, and community groups. I've travelled to regional NSW, Western Australia, Victoria, and now I'm in Queensland – and very happy to be here. Yesterday, I was in Townsville, and I have a number of meetings here in Brisbane, before Darwin on Monday.

So it's quite the tour! And you might be wondering why. Why am I criss-crossing the country to meet with so many Australians when many things about the science agenda are already clear?

The answer is that the Government wants to engage people across the sector, from the research community to leaders such as yourselves, to build a community view about what we can work on together. The Minister has made it clear that he wants to back Australian ideas, so they can grow here.

And for all good projects, you start with a plan.

Before I became Australia's Chief Scientist, I worked at the interface between research and commercialisation at the CSIRO – identifying commercial opportunities, and leading projects along that road from lab to application. I learned that the first step is to strip it all back and understand your problem – what do we want to achieve?

This is why, as I tour the country to hear from people such as yourselves, the questions I'm asking on behalf of the Government are:

- What are the big challenges that science can help address?
- What are the opportunities and where are our strengths?

Because once we better understand the answers to those questions, we're in a better position to chart the steps forward and come together to concentrate our efforts.

You probably heard the UN Secretary General refer this week to the need for climate action on all fronts – “everything, everywhere, all at

once". As he says, efforts to tackle climate change must encompass all of our energy needs, across all aspects of the economy, and across all countries. But here in Australia, we need to bring that broad ambition to an approach that is targeted and strategic. A scattergun approach will fail – because we simply don't have the scale in our economy or in our workforce to do everything.

This is why the Government wants to develop national science priorities that are both ambitious and purpose-driven. This is not about a popularity contest – most votes wins. We don't want to end up with Boaty McBoatface. Nor is it about covering every aspect of Australian research or research funding. That's not the aim.

The aim is a coherent, focused set of priorities. A set of priorities that will send a clear signal to industry and investors, to our international partners, and to the research community, to say: these are the areas where Australia needs a collective focus, where we need to double down to be the nation we aspire to be; these are the science priorities that will help shape a prosperous and sustainable economy and a healthy community.

One of the things that's clear as we develop the priorities is that many of the challenges we face have cascading impacts on each other. And likewise, the solutions are integrated and multidisciplinary. The clean energy agenda is inseparable from high-tech manufacturing – for example, to manufacture green steel, or process critical minerals further up the value chain for use in batteries or electric vehicles.

The advances in robotics, artificial intelligence, and quantum technologies are inseparable from Australia's strategic imperatives – the submarine project and also to our supply chain ambitions in areas such as semiconductor design.

These same advances in digital capabilities will transform medicine and climate modelling. There are great synergies in technology across these sectors – and those great synergies create a great responsibility on all of us to show up to the party. None of us can do it alone.

We need to work across sectors and across disciplines. We need to work beyond the traditional STEM subjects to the social sciences, and beyond research to the industrial frontline.

The critical minerals opportunity is a good example of the need for focused and collaborative effort. Australia is richly endowed, as you know. We have significant deposits of many of the critical minerals for the energy transition, including one of the world's biggest lithium

reserves, needed for advanced batteries. This is matched by huge projected global demand.

The Future Battery Industries CRC calculated this week that battery manufacture could be worth \$17 billion to the economy by the end of the decade. Abundant mineral deposits, on the one hand, and huge demand on the other is a great place to be. But of course, a lot has to happen in the middle. In the middle is extraction and processing, and this is where that unified, strategic approach is required.

As those of you in this sector will know, critical minerals processing is a challenge for Australia. We have good science, but we strike trouble when it comes to critical mass and IP. We're spread too thin. And very little of the intellectual property is held here in Australia.

These are challenges that can only be overcome with that integrated, multidisciplinary approach: deciding which of the critical minerals opportunities we're best placed to pursue; where we can value-add to best effect, and how we can scale up; developing new business models that are clear-eyed about the context we're operating in – the energy transition and our supply chain ambitions with partner countries; business models that focus on low emissions extraction and build in recycling and reuse – that take account of the entire lifecycle of the minerals.

Of course, this doesn't apply only to critical minerals. Matching strengths to opportunities, and scaling up in a coordinated way across science, industry and government, is a task across the economy. It's a task that requires buy-in from all sectors. So the Government wants to see a collaborative, strategic focus.

I have another personal perspective I want to share with you today. It is about the nature of research – because I think this is where the interface between business and science, and between government and science, can sometimes become unstuck.

The important thing to understand about research is that it takes patient investment over the long term. It's not 'fill the kettle, flick the switch and 20 seconds later you have steam'. In the process of discovery, not every idea will lead to a successful outcome. For some ideas, the pay-off will be unexpected, or even in a different field altogether. Not every flick of the switch will create steam.

This is part and parcel of finding new solutions. For business, it means willingness to invest in research – understanding that your investment will increase knowledge and expertise; it will open the door to new

solutions and new business opportunities. But it's not always about a pay-off in the short term, or from every project. The reality is that the business spend on research and development is too low in Australia, and we need to find ways to lift it. So it's partly about understanding that the pay-offs from research are long term goals, and it's also about engaging with risk. I say this is where the interface between business and science can come unstuck because business – and also government – tends to be risk averse: don't ask a question you don't have an answer to.

In science, we're always asking questions to which we don't have answers. And with the emergence of quantum science, we will be able to take another big conceptual leap and ask entirely new questions – questions that we simply don't ask now because we don't have the tools to answer them.

You've probably had the benefit of a loose quantum education via Marvel studios, and many of you may have started asking the question about what quantum can offer in your sector or your research. The answer is that quantum technologies will be part of the lives of all of us in this room, just as the current generation of digital technologies is inseparable from everything we do.

Anyone in business, in agriculture, health or the financial sector, in education or research, anyone who judges that these emerging digital technologies are not relevant to their work, is not preparing for the way the world will look in a few short years. We will make the most of disruptive technologies like quantum if we meet them with imagination.

I want to finish by urging you to take this idea of discovery and disruption to heart. I am cautious by nature and stepwise in my science. I tend to follow the rules. I'm not unusual in this regard. We rank highly on measures of compliance in Australia and – don't get me wrong – this can be a good attribute, and it stood us in very good stead early in the pandemic.

But to innovate, you also need to hustle. This is not a time to watch and wait, to see how it shakes out in other parts of the world. This is a time to be a little bit bolshie, to think of a new question to ask – and test a new answer.

I heard Minister Husic speaking at the National Press Club this week, where he referred to the need to back our own science, rather than preferring ideas that come from somewhere else. Too often we make the discovery and the scale-up and commercialisation happen elsewhere –

and the cervical cancer vaccine is the standout example. As he said, we can and should have the ambition to build on Australian ideas here.

And so, as Australia steps up to its place in the Pacific region, and to our responsibility to support our neighbours as they face the challenges of climate change and digital disruption; as we embark on the task of building nuclear submarines, a task with far reaching implications across many sectors of our economy; and as we make the transformative shift to clean energy – I urge all Australians with the power to make a difference to recognise that when we're confronted with complex, interconnected challenges, the solutions will be equally interconnected.

Recognise that science and research are deeply embedded in each of these endeavours. Invest in them, and approach them boldly, with imagination, foresight, and the best that science can offer.

Thank you very much.

I encourage you all to go online and make a submission to the science priorities refresh, and I look forward now to hearing from you.