

Hear+Beyond

Accelerating Australian Business

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SEASON 1, EPISODE 5 TRANSCRIPT

Dr. Larry Marshall on how science can answer the seemingly impossible

HOST: Rae Johnston, Multi Award-Winning Australian Journalist

GUEST: Dr. Larry Marshall, Chief Executive, CSIRO

Rae: Hi, and welcome to Hear+Beyond, a podcast brought to you by Accenture. This series is a must-listen if, like me, you're curious about the future of Australian business beyond a pandemic. I'm Rae Johnston, and I'm here to ask the hard questions on the topics that really matter. I'll be joined by prominent business leaders who share their thinking around how Australia can accelerate business from here and beyond.

Voice Over: Hear+Beyond. Accelerating Australian business.

Rae: In this episode, I'm joined by Dr. Larry Marshall. Chief Executive of the Commonwealth Scientific and Industrial Research Organisation, otherwise known as CSIRO, as we discuss the need for emerging tech and data science to propel our economy forward. As well as the need for new levels of collaboration in order to overcome some of Australia's biggest challenges. Welcome Larry to Hear+Beyond. Great to have you.

Larry: Great to be here Rae.

Rae: So, what are some of the most surprising, interesting impactful, or even under-appreciated new innovations that you've seen emerge amid COVID?

Larry: It's interesting leading the National Science Agency, which is the premier science and technology group in the country, the CSIRO, or as I like to call it, CSIRO. We've been banging on for years about the need to get innovative, to adopt technology faster, and yet who would have thought that COVID would drive this acceleration for us. And we've seen things that we've tried to do for the last decade happen in the last year. Some of them in the last six months. And I think we've accelerated Australia's digital journey by maybe at least a decade, certainly in telehealth, virtualisation and just the speed at which businesses, large and small, individuals, kids in school have embraced and adopted digital. And that's really not going to slow down. It's going to continue to accelerate.

There's also some really interesting new opportunities, but can I go back a step Rae? When I said we've been banging on for 10 years, we actually used science and technology to try and predict the future for Australia. And it turned out, it had been the first time anywhere in the world that science had been used in that particular way to try and predict the market and the future for a whole country, for a whole economy.

Larry: We called that piece of work, which we did in 2019, the Australian National Outlook. And it actually mapped out a number of scenarios where Australia could go. It had a wonderful bright future if we invest in our innovation, but a very grim and slow decline into the sunset if we stay the same. And for me, you might think that COVID and the pandemic would have thrown all the cards up in the air and that we'd have to do all that work again. But actually, turns out, all that work is even more valid in the COVID environment, particularly in the recovery from the economic downturn. So COVID's changed it, it's accelerated it, but we've actually already done the work to map out the future, we just need to hit the fast forward button to really accelerate that work.

Rae: So, there's a lot of big picture work happening. But are there any smaller, little innovations that have really excited you personally?

Larry: When I first started at CSIRO, we did a program called 'ON', where we reached out to every university, every publicly funded research group in the country, and tried to mine for innovation. Digging for goals, the hidden gems. And we worked with about 500 teams across the country. And we created a whole bunch of start-up opportunities. Either start-ups companies or products and things that could go into existing companies. And what was wonderful about that was the number of opportunities that we surfaced, that we dug up in this way, maybe didn't seem that suitable or applicable at the time we did it. They might've seemed a bit farfetched. So, one of them was CoviU, founded by Sylvia, our second CEO and our second female CEO through ON. In fact, our first three CEOs through ON were females. Not because of any intervention we did, but because when you start to speak the language of growth, innovation drives diversity.

You don't need to tweak it. You don't need to force it. It happens quite naturally, and it was amazing to see Sylvia just emerge from within CSIRO as the natural CEO to drive that company. CoviU today is one of the premiere telehealth companies. If you've been to the doctor, there's more than a 50% chance, if you've gone virtually, you've gone on Sylvia's platform. And yet when we created it, it seemed a bit far-fetched. A bit too visionary. It might be years before it became relevant. But gee COVID changed all that.

The other one was agile manufacturing. So, you may know that Australia was at risk of running out of surgical masks a few weeks into the pandemic. And we were asked to work with the community to figure out how to solve that problem. Now, you couldn't buy the masks overseas, obviously, but you actually couldn't even buy the materials to make the masks from overseas. And we didn't have any factories that could actually make them, even if you could. So, we had to invent a material that was available domestically, invent a manufacturing process. And when I say we, it wasn't just CSIRO, it was a number of other research organisations, universities. And most importantly, manufacturers opened up their factory floors and let me put my scientists and my engineers on their factory floor to work side-by-side with them to solve the problem. In a few weeks, we'd built a completely domestically manufactured and domestically material sourced surgical mask.

A few weeks after that we developed the first National Mask Accreditation facility, and actually those masks, many of them test better than the things that we were buying from overseas. So that ability to go agile in manufacturing, to quickly transition to create things that we urgently need in a crisis, and then that leads to, I think, something you're very familiar with Rae, with your experience in digital. We're in the era of mass customisation. Where you want a product that's made for you, Rae. You don't want something that's mass produced. You want it made specifically for you, with your tastes, your needs, your likes, all embedded in it. Agile manufacturing can do that. It can manufacturer personally for a customer of one, but it can support a market of billions. And that's something that Australia could really lead in, globally, in certain areas.

Larry: And then probably the final one is One Health. When I started at CSIRO a bit more than five years ago, one of the ambitions I had for our strategy and our team was to really drive a true One Health model. 20 years ago, in the US, you're either a doctor or a vet. And they went through a transition in the last decade, where they started to forget about that artificial separation. 70% of the diseases that affect humans come from animals, so it's silly to differentiate or discriminate. So, we drove a very strong strategy. We actually created for the first time in CSIRO a health group, a health business unit as part of our structure. And they've really driven this One Health approach. And you've probably heard the leaders of the One Health Group and the Australian Centre for Disease Preparedness, which we also created in that strategy.

You've probably heard or seen them on national television talking about how they bring together the doctor and the world-class veterinarian- who's also a professor around virology- how they've brought their teams together to really go after COVID in a One Health and a team Australia way. And that's how we're able to accelerate the vaccine testing and see these vaccines get into conditional, even full approval in the UK, in the US and most recently in Australia.

Rae: Incredible work, well done. Now we all now know what flattening the curve means. Everyone in Australia knows this terminology and we're all aware of all the data being shared by all of our health experts. Are you surprised at the intensity at which Australians have really embraced science and data during COVID?

Larry: Surprised and very happy, yes. So, we populate and do the data analytics on the Federal and the State dashboards. They give you all the COVID predictions and COVID data and we do that again in collaboration with every State and the Department of Health and the Federal Government. And it's amazing Rae, when you look at the micro tweaks on the data, the micro movements and use predictive analytics or machine learning, you can actually see things before they happen. And it's a great example of how AI can really help us. But can I pick up on probably three things here, just quickly.

Everyone today because of the pandemic knows what an exponential is. And at first, remember this notion of how could it move so quickly because exponentials move very slowly at first. But when they accelerate, they go so fast that by the time you've noticed them here, they've raced way ahead of you. And I think that's made Australians a bit more aware about other exponential technologies, like artificial intelligence or genetics or intelligent materials or quantum or optical communications and optical computing. They seem a bit far-fetched and far into the future until you wake up one day and they already way past you, and they're already competing with you or your business. So, it's a wakeup call to embrace science and technology, and to be aware of it, even if it does seem a bit far-fetched. Because the more aware of it we are, the more likely it is we can capture it. And rather than it disrupting us, we can actually use it to enhance our quality of life as we've done with COVID.

So, the second point, exponentials never, ever go to zero. They might get very low, but they don't go away. So, we will be living with Coronavirus, just like climate change, we need to adapt to it. And Australia has done a fantastic job of that adaptation and mitigation, frankly. Now every State has embraced that data analytics dashboard and our vaccine work, and the collaboration across Australia has been extraordinary. And that's been so important. It's why Australia has performed so well. Whether it was solving the supply of surgical masks or PPE or getting the vaccines into production. But each State and the Federal Government really embraced a data-driven approach to tackle the exponential. Why? Obviously, because it makes sense. But because exponentials move so fast, if you don't look at the data very early on and make your decisions quickly, it runs out of control very rapidly.

Larry: And so, it's really taught all of us that a data-driven response is the only way to get ahead of exponential technologies. I was so impressed with States like New South Wales, where I live, have really reached out actively to embrace science and technology to do what they do. CSIRO with UQ, developed wastewater testing that's now used across the country and on aircraft and trains to determine whether people in those areas or in those vehicles actually had COVID. New South Wales grabbed hold of that faster than anywhere in the country to actually roll it out to isolate hotspots. Why? Because once you have that technology, you don't need to close State borders. You can actually focus your energy on where the hotspots are and treat the people, take care of them, deal with their safety better. So that was my second point.

My third and final point. What I just said all sounds seemingly impossible. We can keep our borders open, but we can still protect our people. We don't have to hurt our economy, but we can protect our people from COVID. That seems seemingly impossible, but that's what science is for. We can have economic growth; we can be safe. We can make industry partners with the environment, rather than competitors. We can reduce our emissions, but not our profits. Again, all of these things sound impossible, but that's what science does. It solves the seemingly impossible. And we're going to need that to grow our way out of this global recession. And I think at its heart, that's why this support for science and technology will go forward once the crisis is over, because people have realised that this is how we grow a better future for all Australians.

Rae: You and I both know that digital technologies like artificial intelligence and robotics and data science, that they can help us create new sources of wealth generation for the nation. How exactly do you see that they will help shift the dial?

Larry: Yeah, no Rae. So, I love digital and I'm not a digital native, but I really... It's a love affair that's grown over the last 20 years or so. But I try not to get dazzled by digital. And what I mean by that, it is creating massive value and also massive value chain disruption. But again, that's what exponential technologies do. So, I just emphasise digital is important, but don't lose sight of quantum and genetics and communications. Otherwise, they'll sneak up while you're being distracted by digital. Often particularly companies forget that digital only comes to life with the insights of human beings. I've talked to so many CEOs who've tried to go through, go digital, take their company digital, and they haven't realised they already had the value in their own people's unique insights and their own people's knowledge and experience in their particular market. It's only when you put that domain expertise together with really good digital that you get great value creation in my opinion.

So, I think human beings are absolutely critical for this technology to really realise its full potential because it's the humans that create the value. Short summary would be machines can save us money, but human beings actually make us money and create value. But now you've got me started on digital. Manufacturing, Australia's always been burdened by this high cost of labour. And we like that because we like our people to have high wages. But it makes us uncompetitive globally to other countries that have much lower costs of labour. But enter digital and robotics technologies, suddenly you can augment and enhance the abilities of already skilled people using artificial intelligence, robotics, machine learning to actually do truly agile manufacturing and additive manufacturing. Now, these are really high-end aerospace products, space components, communications components.

Things where the buyer actually doesn't want the lowest bidder. They want the highest quality. They don't want the cheapest product. They want the best product. In my opinion, that's where Australia could really play to its strengths. And for that reason, our manufacturing strategy in CSIRO for the last five years has been very much focused on where we think Australia has a global unfair advantage. For example, in biomedical devices that are customised to individual humans. And Rae, you may have read about the titanium sternum we built to save a man's life in New York.

Rae: I did.

Larry: Or saved a man's leg in Victoria. There are a number of those opportunities in medical, where we think Australia could really, really play well.

Rae: Speaking of medical, we're all living longer, and people have high expectations for accessibility to healthcare. What does the future of healthcare in Australia look like?

Larry: Our health strategy has been focused on, sounds obvious, but prevention versus cure. And if you look at it, there are 11 million Australians suffering chronic disease. So, not quite half our population, just a bit more than 40% of our population. So, clearly curing disease isn't necessarily working as well as we would like it to. So, our health strategy, our One Health strategy has been about where can we be smarter to make interventions to prevent people getting these chronic diseases in the first place? And in a sense, it's like mitigation and adaptation in climate change. If you do them together, you'll get a much better outcome for the future. Examples of that are particularly important for one of Australia's biggest markets in agriculture. And that was the other area I think where Australia could really grow its way out of this recession. But we've worked on a lot of work on creating foods with unique nutritional value.

For example, plants that produce higher yield of omega-3 fish oil that enhances your health and your brain capacity, rather than relying on farming fish wild in the ocean. Much more sustainable practice, more profitable practice and lends to Australia's strengths to grow a new market. This notion of individual customisable solutions for people based on their genetics, based on their DNA, to actually target solutions, whether they be implants or medical drugs to help them avoid or mitigate the impacts of disease, I think we'll see a lot more of that. And one of the breakthroughs we had probably in the last two years in that is we actually used machine learning and artificial intelligence, for the first time anywhere, isolate the human gene responsible for immunity. And we did that work in collaboration with a number of Australian uni's.

But it was really the powerhouse of data capability, machine learning capability, ability to crunch massive amounts of data through our supercomputer that enabled us to isolate that gene. And having done that, we can really start to dig deep into how to make people immune to disease. Something that you'd agree Rae, is pretty important right now.

Rae: Absolutely. Do you think that we're in a position as a country to lead in this space?

Larry: So other countries are much bigger than we are. They throw far more capital at these markets, and yet Australia manages to lead already in certain markets, certain parts of agriculture, certain parts of health care, certain parts of mining, particularly around rare earth materials. So, I think Australia can pick its battles. I don't think we can be the leader in health in general, but I think we can be the leader in certain aspects of health, particularly around preventative medicine. See, in the United States, the economics and the financial system doesn't favour prevention. It's a really hard business model for that country to adapt, but Australia's health system is different. Our economics are different, the way we operate are different. And I think that could be a fundamental unfair advantage for us going forward. And there are similar advantages in agriculture that we have, particularly because people in the world already understand Australia as a clean and green source of food.

But I think we can add health to that, and then you've got the trifecta. You can be sustainable; you can be trusted and you can actually, not just be safe, you can actually enhance health. I think that would be a really unique offering for Australian food producers.

Rae: Yeah. And the environment is obviously high on a lot of people's lists of concerns for the future. You've also just released your report, The State of The Climate 2020. How can we balance the need for sustainability with the need for economic progress, because it can be done?

Larry: It, it absolutely can be done, and I mentioned earlier, Rae, about science solving the seemingly impossible. So, one of the other projects we ran through ON, through our National Incubator Accelerator was a thing called Future Feed. And it happened because a number of our scientists, we put them out on cattle properties to try and talk to the cattle industry. And there's a history of fairly vitriolic politics around climate change as we know. Parts of my family grew up on cattle properties and they argue with me about climate change. Is it real? Is it not? It's not that they don't believe in climate change, is that it doesn't matter to them because they suffer far more variability in a given year than we're talking about over the next 10 years, 20 years, 30 years. So, they're already dealing with a really volatile climate. So, it's not that they don't believe in it. It's just that they don't know what to do about it and it doesn't impact them on a short-term basis.

So, we put our climate sciences out to actually learn what they did care about. What were their real issues on properties and not just cattle, but farming more generally? And we created two or three really great breakthrough innovations. Future Feed was one, which actually almost virtually eliminates the emissions from cattle. Cattle if you put them all together as a country would be the world's third largest emitter after China and the United States, it would be cattle. And it's seemingly impossible to eliminate the emissions from cattle and yet Future Feed does that. It's a unique food supplement that you add to cattle. It's grown in Australia; it's produced in Australia. It's been backed by Woolworths and Twiggy Forest most recently. And we're going to build a big company to supply, not just Australia, but the world with this unique Australian product. Trusted, clean, and actually profitable.

The other really unique app. We did a number of them, Grain Cast, Yield Profit, this was a number of climate scientists that we put on to agricultural properties, same thing. How do we help farmers understand what they could do about climate change? Again, the climate models weren't actually helping them make everyday decisions. How bad a year am I going to have? Is it going to be a drought? How much seed should I buy? When should I plant? How much fertiliser should I plan on this year? Our scientists who didn't really... The climate scientists who didn't really understand agriculture quickly learned by working with the farmers directly, living with them in some cases, to understand their problems. And then they created these amazing digital platforms that actually translate all the complex climate science into realistic, usable intelligence that the farmers can use to solve their problems on the ground.

And again, when you talk to the scientists after they've gone through this journey, they're different people. They're no longer theoretical or academic. They're actually out there wanting to understand real customer problems. And for me, it's like talking to entrepreneurs, except they're public good entrepreneurs rather than financial entrepreneurs. But God, it was like I was an entrepreneur again, but I love it.

Rae: CSIRO always talked a lot about how important collaboration will be in propelling Australia forward. What sorts of collaboration do you think will be critical?

Larry: Some of the examples I gave you earlier around collaborating with the research community around the vaccine development, around solving the shortage of surgical masks and other PPE, working with both other scientists and 39 great uni's and working directly with industry people. And of course, the example of putting our own scientists out into cattle properties and agricultural farms to try and figure out how to make their science more useful and more relevant to those communities. I think that's the secret, if you like, of getting more translation, getting more value creation from our science and technology is much deeper collaboration. And we all could do with talking less than listening more because when we listen, especially CEOs, our people know the things that we need to know. We just got to be quiet enough to hear them when they try to tell us. And the example I gave you, the Australian National Outlook that we use to map the future, that worked because we went out to the community, we went out to business leaders and businesses.

Larry: There were almost 50 different groups that work with us and 25 big companies that came in, like the National Australia Bank, to really collaborate with us to make sure we got it right, to make sure it was relevant. And out of that, we came up with, and I think you asked me this question at the beginning, the areas where Australia could be globally competitive. We came up with six national challenges that we thought really made sense for Australia to solve, both for our sustainability and our future success, for us to be a good place to live. But also, for our economic future. And if you like, they're a miniature version of the sustainable development goals for the world. But, because Australia is relatively small, we focused on six, not 17. But they really are unique to Australia in the Australian environment. We're the most arid continent on the planet. So, we have a unique challenge when it comes to climate change and environment.

Our food security, but also our food quality and the ability to impact health benefits through our food that I mentioned before. And of course, our whole health and wellbeing and One Health strategy, our future industries, unique industries like hydrogen, that could create new value for Australia and be globally competitive. And of course, our energy getting it clean and hydrogen is a great way to do that. And finally, the sixth one, our national security. And Australia has some amazing capability, particularly in digital, around security that we think could really be world beating. So, there's six big swim lanes where we think Australia can work and be globally competitive. But they're far bigger than any one organisation could deliver. So, we created a program of missions, and missions live in those swim lanes, but missions are very specific tactical deliverables, like creating a hydrogen industry.

Like cracking the challenge to make environment and industry partners not competitors. Like building a \$10 billion sustainable plant-based protein industry that's additive to meat, not competitive with meat. Like cracking the COVID pandemic. These are very specific deliverables. What's different about missions is that we co-create them. We might think them up originally, but we do it by socialising with many other people and we will never and have never launched a mission by ourselves. We do it in partnership with the broader community and with industry. So, it's a true team Australia approach. And we've locked into at least a third of our budget in CSIRO over the next several years, having science delivered in this way, and that's in a sense, a way we're going to bottle this collaborative and team Australia spirit that COVID has engendered. We're going to bottle that and keep that going for the foreseeable future for the country and I think that's so important because that's how we're going to grow our way out of this pandemic.

Rae: One final question for you, Larry. You are here today talking to me on Hear+Beyond, I want to know what does beyond look like to you? Are you optimistic about our ability to reshape and re-skill and redefine ourselves to remain competitive?

Larry: So, Rae, I'm by nature an optimist and let's face it, I left almost 30 year career in Silicon Valley building companies to come back and run 100 old national science agency because I thought I could turn it into an innovation catalyst for Australia.

Rae: How is that going for you Larry, is that working?

Larry: It's funny Rae, if you look at the economic value we've created and the public good and social value we've created, our equity portfolio has increased in value tenfold. I mean, that's better than the best venture fund. It's hard to find a metric where we haven't actually created great value, both in the public goods space, the environmental space and the economic space that triple bottom line measure. So, I think we've driven a profound shift, but in a very good way. A very collaborative way, not just for individual groups, but for all Australians. And back to the mission's idea, ending plastic waste is an incredibly ambitious mission, but it's one of our missions. Solving anti-microbial resistance so that antibiotics still save lives.

Larry: Actually, trying to, if not drought proof, at least dramatically reduce the impacts of drought on small towns and driving a pathway to zero emissions. These are very ambitious goals. We won't solve them alone. But based on the last five years that we've delivered things that people thought were impossible, like this massive tenfold increase in inequity value. I think we have a huge opportunity to do far more of that, to actually drive some really unique Australian industries. And you're actually starting to see something else that you haven't seen in a long time because Australian companies tend to be very risk averse when it comes to innovation. They haven't actually enjoyed much benefit from science historically, maybe they don't believe it will create the value for them. And yet we're seeing big companies like NAB, like CBA, like FMG, not just lean in to innovation, but actually make big, bold investments on fairly risky science and technology that they think can create whole new markets.

Hydrogen is a huge risk and yet if we actually build it, we will not only create a massive economic value to replace coal and LNG, but we'll actually do something that hasn't really been done anywhere in the world before. Where a fundamentally resources-based economy that would otherwise be really damaged by climate action actually could be benefited by climate action. That's an extraordinary shift and we're already working with companies like FMG to actually build that. We're working in the New South Wales and the Victorian State governments to build that, not just the science, but the actual jobs, the infrastructure to build that industry. So, I'm really excited about that notion. And CSIRO really is delivering on this notion of it being an innovation catalyst for the whole country. I'll just give you one last example. We got a little bit frustrated trying to create an alternative plant-based protein industry.

So, instead of doing it the usual way, we decided to create a company ourselves and we incubated and created this company called V2 Foods. And we pulled in people from the CSIRO Wellbeing Diet work. We pulled in people from manufacturing. We pulled in people from food and agriculture. Pulled in people from digital, had them all work together and then actually built a small-scale manufacturing plant to produce the V2 burger that you can now buy at Hungry Jack's. We actually pulled in Hungry Jack's also to work with us because they understood the market and more recently Woolworths and Twiggy Forrest to actually fund close to 100 million dollars to the company. But it, in less than a year, went from an idea to a functioning company that was approaching break even, even at a small scale. That business could be a billion-dollar business. An Australian company employing Australians to provide unique products to the world that are not reducing our profits from the meat industry, but actually additive to those profits, but far more sustainable. So, far more attractive in many parts of the world, particularly Asia. I think that CSIRO could catalyse at least 10 of those opportunities, 10 unicorns, \$10 billion in value and tens of thousands of jobs for all Australians, and that is in my opinion, what CSIRO is here for.

Rae: Sounds incredible. I'm a big fan of the work that CSIRO does. So, thank you so much for taking the time out of your busy day to join me, to chat on Hear+Beyond, Larry.

Larry: Rae, it was a real pleasure and seriously, I cannot believe how hard you journalists work. And as I mentioned to you at the beginning, I've been in so many studios on Saturdays and Sundays, and you've got your families there and dealing with kids and you're working your butts off. So, thank you for everything that you do for us.

Rae: Oh, well now I love you even more. This isn't fair. Thanks, Larry.

Larry: All right. Take care Rae. Be safe.



Rae: Thank you, you too. You can find out more about the series and the show notes from this episode at [accenture.com/hearandbeyond](https://www.accenture.com/hearandbeyond). Don't miss the next episode of Hear+Beyond, where I'll be joined by Michael Miller from News Corp. As we discuss strategies and his insights for propelling Australia's competitiveness.

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