

# THE LIST

**A HIGH-TECH  
REWRITE FOR  
HEALTH**

**BLUE SKY  
THINKING**  
*The next big thing*

**GOING GLOBAL**  
*Daniel Petre on  
making the jump*

**MOTOR SKILLS**  
*Stephen Corby  
rates the future car*



**TOP 100  
INNOVATORS  
2024: THE NEXT WAVE**

Will Jeremijenko and  
Ruby Jones, Aquila



**H**istorians say that the word “innovation” dates back to the 16th century, but in truth it really became widely used after World War II. These days it’s in danger of losing its pull, given how often it is applied to any vaguely different human development. Still, it remains the best word to explain that wonderful process combining skill and imagination that drives change.

A few years back, for a moment there, innovation became a dangerous word in Australian politics when it was seen as synonymous with the disruption that would throw people out of work in a whirlwind of unmanageable change.

Thankfully that social and cultural anxiety has disappeared and Australians appear more open to the notion that we should aspire to be a true Innovation Nation. And why wouldn’t they? Innovation, building on the explosion of digital development in the past 30 years, continues to transform our lives – from work, to home, to leisure times. You’d be hard pressed to name an area of our lives that has been untouched by technology.

This annual magazine celebrates, explains and analyses the impact of innovation on our society – and looks forward to what we might see in the future with the explosion of generative AI and its application to so many sectors of the economy. As is clear from our opening essay, The AI Era is Upon Us, if you thought the pace of innovation wasn’t quite dizzy enough, stand by, it’s about to get wilder.

One of the most exciting sectors – health and medicine – gets special treatment from us this year, such is the almost unimaginable change coming our way thanks to the use of AI and genetics in the diagnosis and treatment of disease and the underpinning research. The Australian’s health editor, Natasha Robinson, details this new world of healthcare bringing extraordinary news of what lies in store for us.

Once again, we have selected a list of 100 innovators we consider are doing interesting work across a range of sectors from energy to e-commerce. It doesn’t pretend to be a definitive list of the brilliant and committed Australians who get up every day, determined to turn their idea into a reality. But our Top 100 Innovators List spotlights the talented men and women who, one way and another, are changing the way we live.

Also in these pages are the views of several leading Australians – they include Nobel Prize winner Professor Brian Schmidt, Professor Kathryn North, who runs the Murdoch Children’s Research Institute, and one of the country’s best known tech leaders, Daniel Petre – about the challenges and opportunities facing Australian entrepreneurs today.

And in our section, The Update, we look at key sectors to see how they are adopting technology and adjusting to the realities of doing new things at a time of economic uncertainty.

We hope you enjoy this special annual magazine celebrating Australian ingenuity, innovation and commitment.

*Helen Trinca, editor    Jared Lynch, technology editor*



**COVER**

William Jeremijenko and Ruby Jones of Aquila  
 Photographed by Nick Cubbin  
 Styled by Liat Swartz  
 Make-up by Monique Jones  
 Hair by Gavin Anesbury  
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NICK CUBBIN, STEVE PANOZZO

THE AUSTRALIAN\*

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Brian Schmidt has a Nobel Prize in Physics and an outstanding CV, including eight years as vice-chancellor of the Australian National University. He spoke to Helen Trinca about how innovative we are in this country.



### READ THE LIST

Scan the QR code to read the Top 100 Innovators List in detail.

## EDITORIAL

*Helen Trinca*  
EDITOR

*Chi Lam*  
ART DIRECTOR

*Julie Lee*  
DEPUTY EDITOR

*Jared Lynch*  
TECHNOLOGY EDITOR

*Mollie Dixon*  
EDITORIAL PRODUCER

*Steve Colquhoun, Carrie Hutchinson*  
COPY EDITORS

*Marilia Ogayar*  
PICTURE EDITOR

## CONTRIBUTORS

*Michelle Bateman, Joseph Carbone, Stephen Corby, Nick Cubbin, Cameron England, Camilo Huinca, Damian Kassabgi, Richard Kirkman, Joseph Lam, Chris Niesche, Kathryn North, Steve Panozzo, Daniel Petre, Natasha Robinson, Mackenzie Scott, Reggie Townsend*

*Michelle Gunn*  
EDITOR-IN-CHIEF, THE AUSTRALIAN

*Edwina McCann*  
PUBLISHER, NEWS PRESTIGE; EDITORIAL DIRECTOR, THE AUSTRALIAN PRESTIGE TITLES

*Louise Bryant*  
MANAGING EDITOR, THE AUSTRALIAN PRESTIGE, AND CONDE NAST TITLES

*Nicholas Gray*  
MANAGING DIRECTOR AND PUBLISHER, THE AUSTRALIAN AND PRESTIGE MASTHEADS

## PRODUCT AND PARTNERSHIPS

*Sophie Raptis*  
GENERAL MANAGER, COMMERICAL, THE AUSTRALIAN AND PRESTIGE

*Alex Wilson*  
DIRECTOR DIGITAL PRODUCT AND PARTNERSHIPS THE AUSTRALIAN AND PRESTIGE BRANDS  
[alex.wilson@news.com.au](mailto:alex.wilson@news.com.au)





Innoo

# THE Innovators THE 2024 LIST

It's not easy to select the nation's best inventors and entrepreneurs, but it's a task worth doing as we commit to encouraging innovation across the Australian economy. Here, judges Scott Farquhar, Roy Green, Romilly Madew, Damian Kassabgi and Andy Jane bring their experiences in the public and private sectors to the job, identifying the most exciting ideas emerging across the country. Our list includes several people who also featured on the 2023 list: these individuals and companies have kept their spot thanks to their continued ambition to turn vision and dreams into sustainable businesses. The List ranges across industries, from space to cyber security, travel to fashion, energy to infrastructure. Plus, we've opted for a special focus on health this year. It's a sector that draws on the deep historical well of medical research in Australia, and is proving fertile ground for a new generation of scientists and clinicians.

**PHOTOGRAPHY BY NICK CUBBIN**

# MEDICINE AND HEALTHCARE

## *Kavita Nadan*

CO-FOUNDER, LOCUMATE

Kavita Nadan was simply trying to find a locum for her own pharmacy when she decided to create Locumate at her kitchen table four years ago. The frustrating task prompted her to ask her friend and Locumate co-founder Surge Singh how she could automate the process. The result is a platform that bypasses costly agency fees by allowing pharmacies and other professions that rely on locums and casual replacements to create their own hiring pool. Singh says Melbourne-based Locumate has saved pharmacies \$1.3m in agency fees since January 2022, and has filled more than 4500 locum shifts. In April it partnered with the Californian and American Pharmacist Associations to expand to the US.

## *Farzaneh Ahmadi*

FOUNDER, LARONIX

Laronix founder Dr Farzaneh Ahmadi first encountered the field of voice cloning while completing her PhD, but felt frustrated at having to turn away patients who came to her group seeking practical solutions rather than research. The result is Laronix, a bionic voice box that Ahmadi says presents a solution for patients who have exhausted all other options to regain their voice after their larynx has been removed due to laryngeal cancer, the second-most common form of head and neck cancer, with nearly 185,000 people globally diagnosed in 2020. The Laronix Bionic Voice is a wearable, non-invasive system integrating hardware and software to generate true voice

using AI-based voice-cloning technology, similar to how “deep fakes” are created. Brisbane-based Laronix now has offices in New York and has so far raised \$4 million from government grants and investors.

## *Mark Waller and Jingjing Guo*

CO-FOUNDERS, PENDING AI

Founded in 2018 and with offices in Sydney and the US city of Massachusetts, Pending AI uses artificial intelligence technology to augment the cognitive abilities of scientists and research teams, helping them to more efficiently design, produce and test drugs to treat diseases. Co-founders Mark Waller and Jingjing Guo say the technology helps researchers discover novel and efficient drug synthesis routes, based on computational chemistry models enhanced with artificial intelligence. The platform offers evidence-based solutions by drawing on datasets including information from one billion compounds, 146,000 proteins and 21 million reactions, helping researchers make better-informed decisions.

## *Daniel Timms*

INVENTOR, BIVACOR

The Australian-designed BiVACOR Total Artificial Heart could become the world's first permanent artificial heart replacement after being developed by Brisbane biomedical engineer Dr Daniel Timms and his father Gary, who was dying of heart failure. In a successful trial conducted in Texas in early July, the

650g titanium pump was implanted for eight days in a patient. The BiVACOR promises to last longer than other artificial hearts because it uses a single spinning disc to push blood around the body. The disc is magnetically levitated within its chamber, minimising wear and tear. The project aims to produce an off-the-shelf alternative to organ donation. It received \$50m in funding from the Australian government this year, while the Medical Research Future Fund has backed a trial in Australian patients.

## *Tom Oxley and Nicholas Opie*

CO-FOUNDERS, SYNCHRON

Synchron is an engineered neural interface inserted into the brain to provide direct communication between that organ's electrical activity and an external device, such as a computer or a robotic limb. For people with neural diseases, such as motor neurone disease (MND), that result in paralysis, it may offer a transformative means of communicating. “What this device does is an incredibly powerful restoration of autonomy,” says Professor Tom Oxley, a vascular and interventional neurologist at the University of Melbourne. “This technology changes the conversation we're having with people who have no hope.” Co-founder Professor Nicholas Opie is a biomedical engineer and world expert in neural interfaces. The company has raised \$US145m (\$217m) from investors, including \$US75m (\$110m) at the end of 2022, with contributions from the private foundations of Jeff Bezos and Bill Gates.

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## *Alison Todd and Elisa Mokany*

CO-FOUNDERS, SPEEDX

Dr Alison Todd says the hardest thing about being an innovator in Australia is that your breakthroughs are always ahead of the pack and it's tough to convince people to back you. But the former industrial scientist-turned-entrepreneur has continued to jump that hurdle.

In 2009, after Johnson & Johnson (J&J) closed down in Australia, she and colleague Dr Elisa Mokany found themselves out of jobs, but with a great invention on their hands: a radical diagnostic tool for pathologists.

Together they talked J&J into assigning the IP they had developed to their own company. J&J took a slice, but later sold out as venture capitalists bought in. Since then, SpeedX has shipped more than 10 million tests to about 20 countries and helped countless medicos prescribe more accurate treatment to patients.

SpeedX employs more than 50 people at its headquarters in the Everleigh industrial precinct in inner Sydney, where it undertakes R&D and manufacturing while coordinating commercial activities globally. The company now holds another 200 patents for related medical methods and processes invented by the team led by Todd, the chief scientific officer, and Mokany, the chief technology officer.

It was during their time at J&J the scientists developed the pathology test that uses DNA to detect disease in blood, tissue and other samples and allows doctors to more precisely determine treatment.

Says Mokany: “Our technology has a unique way of identifying different DNA sequences. Whereas a lot of other companies in our field use targeted reporting mechanisms and only provide a result specific to one target, our product can analyse several gene sequences in the same reaction and provide multiple results from the same

sampling action. We're aiming to provide tests that have almost all the information in there that you could need, so the patient gets the right diagnosis the first time.”

The test can help guide doctors in choosing the best antibiotic to use, a technique that is particularly successful with treatment of sexually transmitted infections. Todd says the decision by J&J during the Global Financial Crisis to shut down most research outside the US had been a blow to many, but in the end it “just opened the whole world to us”.

As co-founders of a small company, they do everything from invention to “verification, validation and regulatory approval”. “We manufacture, we put it in a box, we have a sales team that goes out there and markets it,” Todd says. “It's a hard slog, but so rewarding to see the tests benefiting patients.”

A key advantage of SpeedX is its agility. “The big guys are often stuck in this one pathway, and that takes years for change,” says Todd. “So I think we bring fresh air. We work a lot with the big companies as well, and really drive change in those companies. They see us as a tool for them to use.”

On the downside, many customers still feel happier dealing with big medical supply companies rather than a relatively small Australian outfit. Todd, whose PhD work 35 years ago replaced a radioactive method of testing with a molecular one, says she has always been obsessed with methodology, and at SpeedX is developing a portfolio of testing products for infectious diseases.

She says it's tricky to navigate the various regulatory frameworks they must work with around the globe, but the team has adapted to the necessary changes in Australia and Europe, and is preparing to take its products to the US. – HELEN TRINCA



Arutha Kulasinghe,  
Kirsty Short and John  
Fraser (left to right) are  
using tissue collected  
during the Spanish flu  
to research cancers'  
response to treatments



NICK CUBBIN, HAIR AND MAKE UP: CHRIS COONROD



*Arutha Kulasinghe, Kirsty Short and John Fraser*  
PROJECT LEADS, UNIVERSITY OF QUEENSLAND

A Brisbane research project that began during the Covid-19 pandemic based on century-old human tissue has expanded into world-leading research on how to manage the treatment of cancers. The “back to the future” project, led by Professor John Fraser, Dr Arutha Kulasinghe and Associate Professor Kirsty Short, works on extracting data from tissue samples collected during the 1918 Spanish flu pandemic.

The goal of better understanding future pandemics is still a key part of the research at the University of Queensland’s school of chemistry and molecular bioscience, but the cancer work is now an important development. The goal is for advanced mapping technology to help doctors understand how each patient’s disease is progressing and responding to treatments.

“We’ve effectively shown we can mine tissues or go back and look at our sort of ancestral tissues that are over 105 years old,” says Kulasinghe. “This is important globally, because in hospitals and in biobanks they throw away cancer tissues. What we’ve shown is that there is so much information in them. We should be creating biobanks around them.”

Short, a virologist at the school, says: “We’re going back in history to inform preparedness for the future. That probably doesn’t sound that innovative, but actually, as humans, we are rubbish at learning from the past.”

Working on slivers of century-old lung samples from people who succumbed to the Spanish flu, the team used spatial mapping to create a “Google Maps-like” framework of individual cells to show how they interacted with each other. They hoped to understand why younger people had been more likely to experience worse outcomes from Covid-19, which has been labelled as causing the most lethal pandemic of modern times.

Each sample slide is run through the PhenoCycler-Fusion system machine – the only one of its kind in the country – which creates about 10 terabytes of data, the equivalent of almost 300 days of video.

Fraser, who is also the director of intensive care at St Andrew’s War Memorial Hospital and the critical care research group at Prince Charles Hospital in Brisbane, calls the research “razzle-dazzle medicine”.

“Imagine a fruit salad,” he says. “The way we [test samples] at the moment is we take the bit of tissue, we mush it up, and we look at the general stuff that’s there. It’s like a smoothie. Whereas, with this technique, you can see each grape, each black currant, each kiwifruit, each orange, and also understand how they interact with one another.”

It wasn’t easy to obtain the essential 1918 tissue samples they needed, says Kulasinghe. The researchers wrote to about 60 international museums and scientific labs for assistance but only two responded.

“No one thought that experiment was possible,” he says. “Then one decided to help us get some tissues. We’ve been able to show that the signal is preserved – we can actually see molecular signs of infection and the changes that are underway in the lungs. It’s been this revolutionary story about new technology, team science, and also having this really collaborative space to understand it.”

The Wesley Research Institute funded the project and established the Queensland Spatial Biology Centre to continue the vital research in collaboration with scientists worldwide. Short believes more pandemics are inevitable as humans increasingly move into new regions and high-intensity live farming grows. She dreams of testing different organs of 1918 flu victims to see if they were affected similarly to patients who experienced long Covid-19.

The three researchers are also interested in seeing how far they can go back in time. “What if we could go back to some of the Egyptian mummies who died of things like smallpox and start looking at what was going on in those individuals?” Short says. “It would just be phenomenal. The idea that this technology could work on such old and ultimately poorly preserved samples opens up a whole new area.” – MACKENZIE SCOTT