



Science, Technology and Education News from Australia, March 2019

Table of Contents

1.	<i>Science and Technology Developments</i>	1
	<i>Pumped Storage Hydropower a “game-changer”: ANU research</i>	1
	<i>Noble pursuit of ancient water secrets</i>	1
	<i>PM threatens tech execs with jail</i>	2
	<i>Airwallex achieves unicorn status</i>	2
	<i>Sydney gets new quantum academy</i>	2
	<i>ANU research set to shake-up space missions</i>	2
2.	<i>Education and Science Policy</i>	3
	<i>CSIRO’s Data61 expands robotics infrastructure</i>	3
	<i>\$12 million added to SA space push</i>	3
	<i>Academy President urges Australia to join heritable genome editing moratorium</i>	3
	<i>S20 urges measures to tackle marine plastic pollution and other major threats</i>	4

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1. Science and Technology Developments

Pumped Storage Hydropower a “game-changer”: ANU research

A series of Pumped Storage Hydropower (PSH) projects planned across 5 states could triple Australia's electricity storage capacity, according to a new study by a researcher at The Australian National University (ANU). Professor Jamie Pittock says if the projects go ahead, they will accelerate our transition to renewable energy. "We're talking about more than 20 projects being assessed or built. This would put us well on the way to having a national grid that could rely almost entirely on renewables," Professor Pittock says. "It's really a game changer and destroys any argument that solar and wind can't provide the baseload power needed to keep the lights on". PSH works by having two connected reservoirs. When there is excess power, (for example, on especially sunny or windy days) it's used to pump water uphill. During times of greater demand, power can then be generated by releasing water back down to a generator. In South Australia, another project proposes the use of sea water to generate power. This means there's no blanket rule when it comes to sourcing the water needed for PSH.

Click [here](#) to read the article.

Noble pursuit of ancient water secrets

The Noble Gas Facility, facility, designed and built by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) at its Waite campus in Adelaide, will provide new insights into the continent's groundwater systems



and contribute to the sophisticated science being applied to understand the effects to groundwater of further development in regional Australia. As Australia is a very old and flat continent, 'fossil' groundwater can take millions of years to travel through very large aquifer systems. This is one out of fewer than a dozen comparable facilities worldwide and each is uniquely built to suit local groundwater conditions. The Science and Industry Endowment Fund (SIEF) awarded \$550,000 to CSIRO for the acquisition of the noble gas spectrophotometer as part of the Noble Gas Facility.

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PM threatens tech execs with jail

Facebook and other tech giants will face tough new legislation to force them to take down extremist content more quickly, with the attorney-general labeling their arguments for continued self-regulation "thoroughly underwhelming". Prime Minister Scott Morrison convened a summit with senior executives from Facebook, Twitter and Google on Tuesday afternoon to discuss the efforts to stop the spread of violent, extremist content on their platforms in the wake of the terror attack in Christchurch. Communications Minister Mitch Fifield, Attorney-General Christian Porter and Home Affairs Minister Peter Dutton also attended the meeting, bringing with them the threat that the government is developing legislation that would make it a criminal offence to fail to remove extremist content as soon as possible. Under the laws, Australian-based executives of the tech companies could be personally liable and face jail time.

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Airwallex achieves unicorn status

Melbourne-based cross border payments platform Airwallex has just earned unicorn status, following a successful Series C fundraising round of US\$100 million. The fintech startup, which is now valued at over US\$1 billion, will use the investment to support its global expansion in the US, UK, and Southeast Asia. The company already has offices in Hong Kong, San Francisco and London. The Series C round was led by new investor DST Global and was joined by returning equity backers including Sequoia Capital China, Tencent, Hillhouse Capital, Gobi Partners, Horizons Ventures and Square Peg Capital. DST global has previously backed companies including internet giants Facebook, Airbnb, and Spotify. Since the company launched three years ago, Airwallex has raised US\$202 million in capital and created a client base of internet giants including JD.com, Tencent and Ctrip, and large financial service companies including MasterCard.

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Sydney gets new quantum academy

News of a breakthrough in silicon-based quantum computing through a collaboration between UNSW and University of Sydney puts a spotlight on the NSW Government investment in a new Sydney Quantum Academy initiative. The news announced in Nature Nanotechnology, saw previous work by quantum scientists at UNSW and University of Sydney combined to produce a demonstration that suggests silicon-based quantum computing continues to overcome hurdles that have slowed its potential to achieve scalable quantum computing performance. Last week the NSW Government announced \$15.4 million in funding to take advantage of that critical mass and create the Sydney Quantum Academy (SQA). The body is based on a partnership between University of Sydney, UNSW, Macquarie University, and UTS. "We want NSW to be a leader in quantum computing and this investment will see universities collaborate and continue the leading work that is already underway here in NSW. Sydney already has one of the largest cohorts of quantum research students – and we want to keep them here," said NSW Chief Scientist & Engineering Professor Hugh Durrant-Whyte.

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ANU research set to shake-up space missions

A new study from The Australian National University (ANU) has found a number of 2D materials can not only withstand being sent into space, but potentially thrive in the harsh conditions. It could influence the type of materials used



to build everything from satellite electronics to solar cells and batteries - making future space missions more accessible, and cheaper to launch. The ANU team carried out a number of simulations to model space environments for potential orbits. This was used to expose 2D materials to the expected radiation levels. They found one material actually improved when subjected to intense gamma radiation. Among the tested devices were atomically thin transistors. Transistors are a crucial component for every electronic circuit. The study also tested quantum light sources, which could be used to form the "backbone" of the future quantum internet.

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2. Education and Science Policy

CSIRO's Data61 expands robotics infrastructure

The Commonwealth Scientific and Industrial Research Organisation's Data61 announced the opening of its new Robotics Innovation Centre in Queensland, a purpose-built research facility for robotics and autonomous systems, an industry set to be worth \$23 billion by 2025. Data61 is one of the global leaders in the field, with capabilities ranging from legged robots and 3D mapping through to unmanned aerial vehicles (UAVs) and unmanned ground vehicles (UGVs). One project being spearheaded by the centre is the testing of technology to rapidly map, navigate, and search underground environments as part of a three-year Subterranean Challenge funded by the US Defense Advanced Research Projects Agency (DARPA). Data61's infrastructure is open for industry use and collaborative projects. This includes dedicated mechanical and electronics engineering labs, several high-end rapid prototyping machines, sheds for indoors systems testing, an open-air UAV flying area and outdoor testing areas including a forest and creek.

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\$12 million added to SA space push

The federal government has pledged an additional \$12 million to the local space sector, with a new mission control centre and education facility to be established in Adelaide. Industry minister Karen Andrews announced that the government will commit \$6 million each to a Mission Control Centre in Adelaide and a Space Discovery Centre. The \$12 million in funding is on top of the \$26 million over four years allocated for the establishment of the Australian Space Agency in last year's budget, and \$15 million over three years for global partnerships. It comes after the government announced late last year that the headquarters of the new space agency will be located at Lot Fourteen in Adelaide. The new Mission Control Centre will serve as a "focal point" for space missions in the country, and provide facilities to control the small satellite missions that have become popular in recent years. The Space Discovery Centre will provide "STEM education, engagement and inspiration" for young Australians, and provide activities such as mission simulation.

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Academy President urges Australia to join heritable genome editing moratorium

The President of the Australian Academy of Science Professor John Shine has welcomed calls for a global moratorium on all clinical uses of genetic editing of heritable human DNA. The proposal was made by a group of eminent scientists in the journal Nature as a way of ensuring controlled development of new gene editing technology. Germline editing of human DNA has the potential to deliver revolutionary new treatments for a number of genetic diseases. However, it has not been tested in humans or shown to be safe. Germline editing of human embryos for reproductive purposes is prohibited in Australia. "We urge the National Health and Medical Research Council, to implement a moratorium on considering legislative change to allow heritable human gene editing for reproductive purposes in Australian Universities, Institutes, clinics and hospitals," Professor Shine said. To begin this consultative process, the Academy will convene a meeting of relevant stakeholders to begin discussions on the implications of possible uses of human germline gene editing and to discuss implementation of a moratorium in Australia.

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S20 urges measures to tackle marine plastic pollution and other major threats

The world's leading science academies have sent a strong message to the world that science has a crucial role in protecting coastal and marine ecosystems from very serious current and future threats. The national academies of the world's wealthiest countries, known as the S20, produced a statement at a gathering in Japan recently outlining the greatest dangers to marine environments: plastic debris and other pollution, damaging fishing practices, and global warming, ocean acidification and ocean deoxygenation. The statement emphasised the importance of expert research, innovation and evidence-based approaches toward resolving undesirable impacts on marine environments and ocean health that are directly linked to ecosystems and human wellbeing. Academy Fellow Emeritus Professor Cheryl Praeger represented the Australian Academy of Science at the event, and coral reef expert Academy Fellow Professor Terry Hughes provided advice to the statement. The 2020 S20 and G20 meetings will take place in Saudi Arabia.

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