



THE UNIVERSITY OF
SYDNEY

**PARTNER
WITH US
TO TACKLE
WICKED
PROBLEMS**

We acknowledge the tradition of custodianship and law of the Country on which the University of Sydney campuses stand. We pay our respects to those who have cared and continue to care for Country.

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FROM THE CHANCELLOR AND VICE-CHANCELLOR



Progressive thinking, breaking with convention and improving the world around us are in our DNA and we have a proud track record of doing this for more than 160 years.

We believe that creative solutions to complex problems aren't developed in silos. That's why we bring together diverse expertise – from both within the University community and beyond – to tackle problems from every angle.

We are incredibly proud of our world-leading researchers and students and their impact on society.

A story less frequently told, however, is our history of collaboration with industry, government and civil society. These partnerships have generated many of the

groundbreaking ideas, innovative solutions and critical thought leadership required to address some of the most intractable problems facing our world today.

This publication is a celebration of these partnerships – a tiny snapshot of the research and education partners we collaborate with.

This is also an invitation to start a conversation about your challenges and explore how we can work together to address them.

It's easy to connect with us through our dedicated engagement team, who will help you find the best researchers and students to address your needs from all angles.

We look forward to hearing from you and working together to drive innovation and thought leadership.

Belinda Hutchinson AM
(BEc '76), Chancellor

Dr Michael Spence AC
(BA '85 LLB '87), Vice-Chancellor and Principal



WICKED PROBLEMS DEMAND CREATIVE SOLUTIONS

Whether you're a university, multinational business, startup or not-for-profit, it's no longer enough to rely on traditional approaches to compete and thrive in today's world.

We need to innovate and respond to digital disruption. We must address global threats of climate change and growing inequality while containing costs and securing income. We want to optimise the wellbeing of our employees and communities and invest in leadership for the future. We want to be good global citizens and remain globally relevant and competitive.

At the University of Sydney, we collaborate to innovate, building on more than 160 years of experience in breaking with convention and improving the world around us. We understand that some problems are so complex they require a radically different approach – that's why we work with our partners to understand the needs of people, communities and our environment to tackle issues from all angles.

To collectively thrive in today's world, we must work together. That's why partnerships are at the core of what we do at the University of Sydney.



CREATIVE SOLUTIONS THROUGH PARTNERSHIPS

Deep expertise in a field is essential to world-class teaching and research. But we believe that siloed knowledge isn't enough, especially when grappling with the scale of challenges facing the world today. That's why we have invested in and developed our multidisciplinary research, bringing together the knowledge and expertise of academics and students across diverse disciplines.

On the surface, a philosopher and a physiologist working together might seem like an unusual academic match. We see it differently – our multidisciplinary approach ensures our academics and students are connected to rich intellectual and professional networks where ideas are freely exchanged, assumptions are challenged, and hypotheses refined to create stronger, more robust outcomes. This approach sets us apart from the rest – enabling us to be an active, informed voice in the conversations that industry and the community are engaging in.

Whether we're building the world's first quantum computer, converting plastic waste into fuel, or reforming policy, partnerships are integral for innovative solutions. Explore how we're working with organisations of all sizes to tackle wicked problems and contact us to find out more and start a conversation.

CLIMATE CHANGE

- p6 Reducing the impact of flying – Qantas
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DISRUPTIVE TECHNOLOGIES

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COMBATTING INEQUALITY

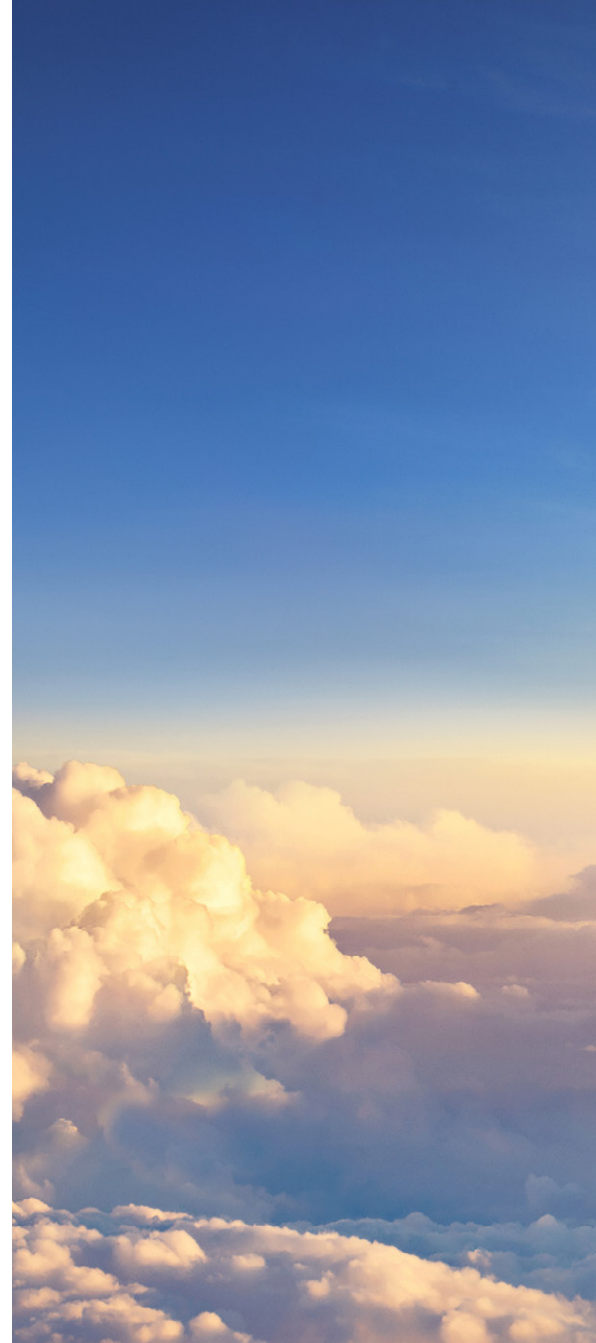
- p14 Tackling food insecurity – City of Sydney, TAFE NSW, FoodLab Detroit
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HEALTH INNOVATION

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The 787 Dreamliner
used on Qantas's non-stop
Perth-London flight.
(Source: Qantas)

REDUCING THE IMPACT OF FLYING



We've been working with Qantas since 2012 to develop an industry-leading flight planning system that is expected to slash its CO2 emissions by 50 million kilograms and its fuel bill by \$40 million each year.

By combining data, expertise and resources from our two organisations, researchers at our Australian Centre for Field Robotics developed the world's most sophisticated flight plan software, which uses advanced machine learning, flight modelling and aviation safety

to compile millions of different data points. Ranging from wind patterns to flight speeds and changing altitudes, these data points form the foundation for a map that identifies the most efficient route for each flight. This not only means that fuel efficiency is improved and therefore carbon emissions are reduced, but that it is now possible to fly the same plane for longer.

Our Charles Perkins Centre is also looking at improving the passenger experience to minimise the impact of

ultra-long-haul flying on the body. The partnership brings together a team of our experts in nutrition, sleep medicine, public health, physical activity, program planning and chronic disease to examine the challenge from multiple angles and new perspectives.

So far, this collaboration has helped to inform everything from cabin lighting and temperature through to transit lounge design, what and when passengers eat and drink and opportunities for movement

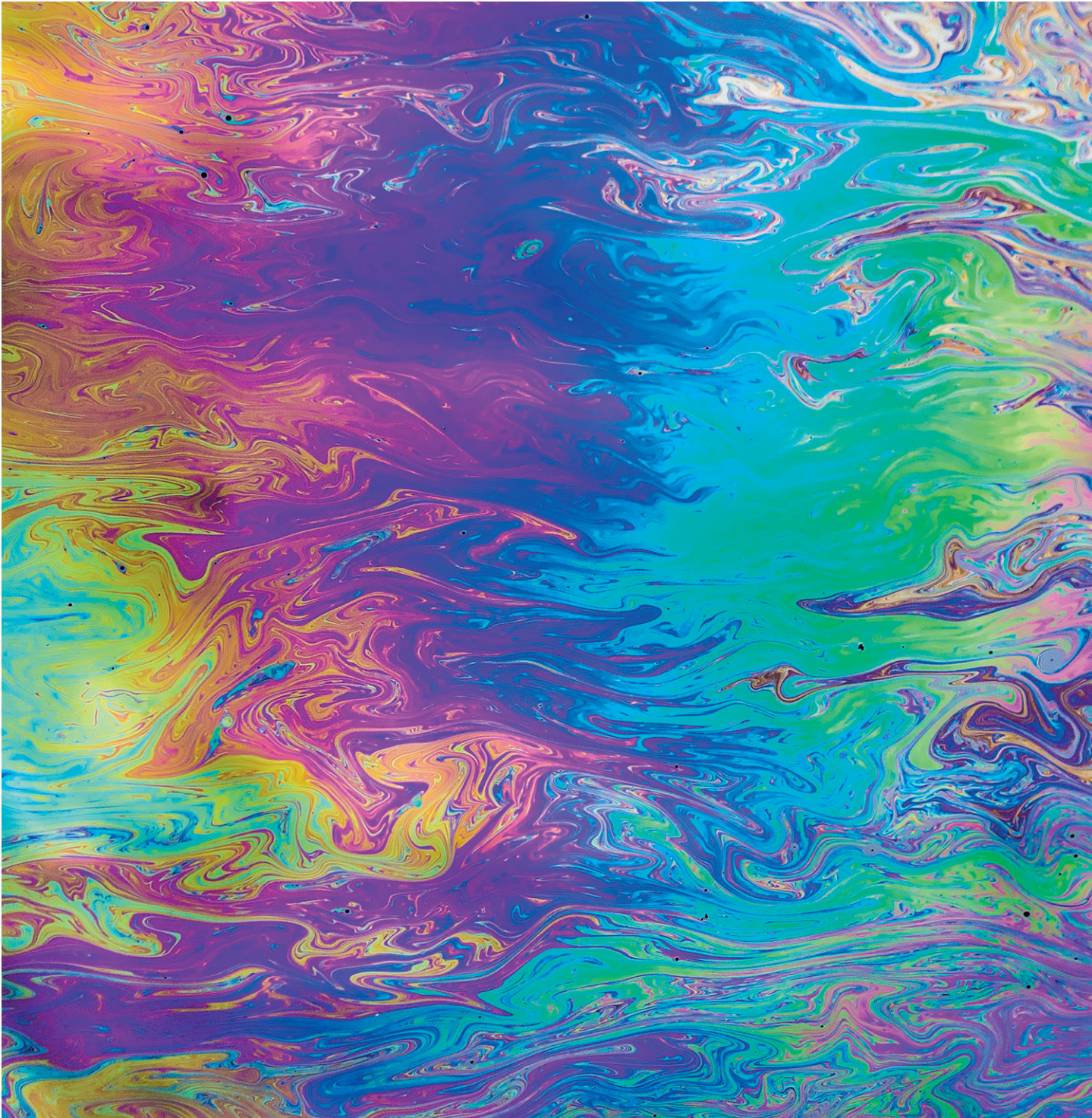


during flight. Inflight trials monitor sleep patterns, food and beverage consumption, lighting, physical movement and inflight entertainment to assess impact on passenger health, wellbeing and body clock. The findings will not only benefit the 50 million people who take Qantas Group flights each year, but support Qantas as an industry leader in long-haul aviation innovations.

“By taking a holistic view of our customers, our partnership will examine everything from reducing the impact of jetlag to health, nutrition, sleep and state of mind through the entire journey experience ...”

Philip Capps, Head of Product Strategy & Development,
Qantas Airways

MONETISING PLASTIC WASTE





Plastic waste is giving rise to a global crisis. So far, the world has looked at it as an unsightly menace to be removed, but Professor Thomas Maschmeyer from our School of Chemistry has moved beyond that view. His groundbreaking research converts plastic waste into an asset that people would actively seek out to recycle – because it can make them money.

“Of course, everyone is concerned about plastic waste, but the reality is, they also need to use plastic as it just has so many advantages. It is cheap, light, durable and excellent in food or health applications,” says Professor Maschmeyer. “Our chemical recycling method reconciles those two realities.”

With his startup Licella, Professor Maschmeyer created the Cat-HTR technology to turn plastic waste into new materials, chemicals or fuel. Finnish multinational and renewables leader, Neste is the first official

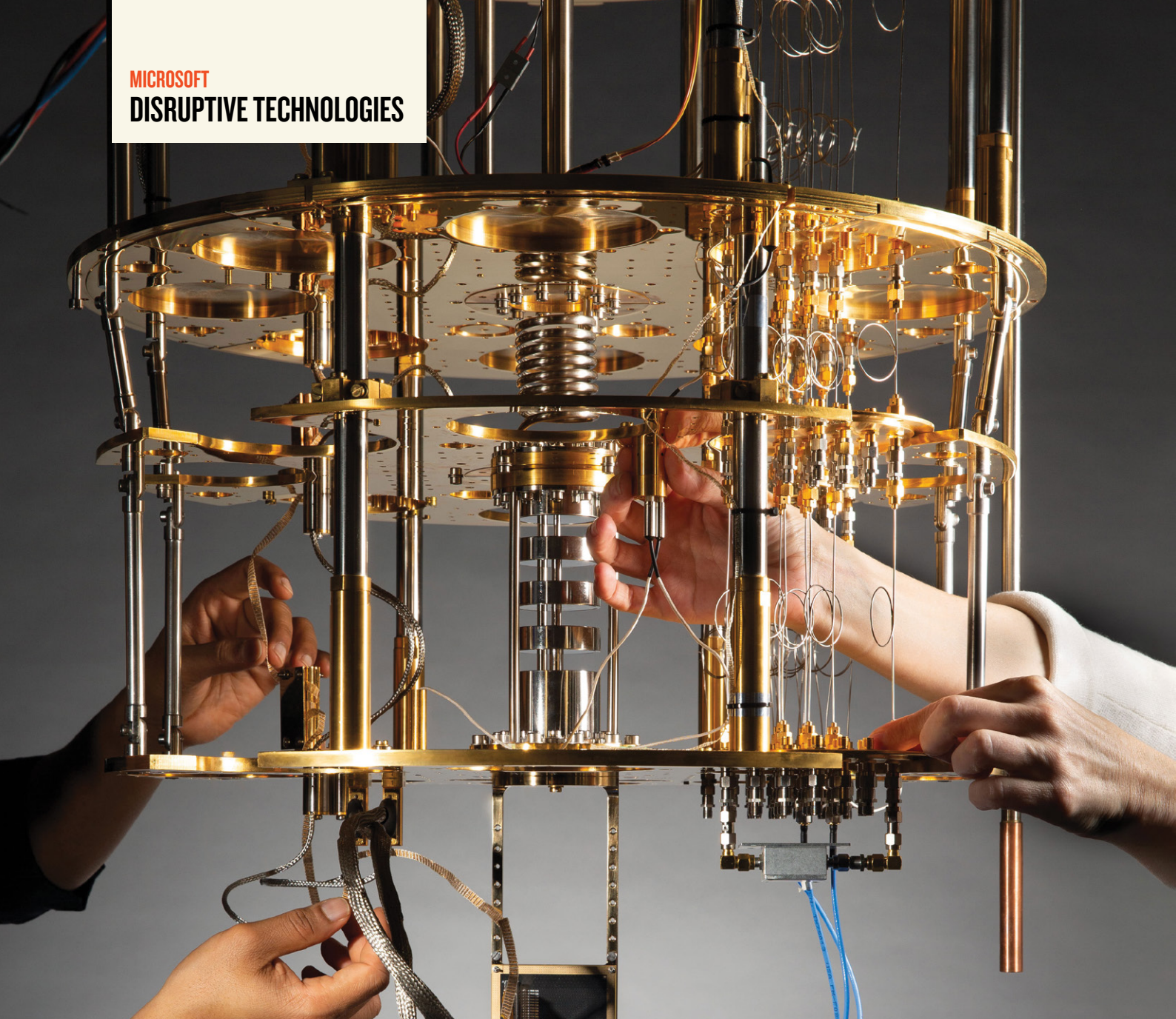
partner, with other partnerships under negotiation for plants around the world.

The technology could soon help Timor-Leste, one of the world’s most plastic-polluted countries per capita, become the first plastic-neutral economy in the world. The Timor-Leste government has entered into an agreement with Licella’s global joint-venture, Mura Technology, to receive the technology licence for free, enabling the charitable development of a \$US40 million chemical recycling plant, funded by the World Bank and other institutions.

Professor Maschmeyer believes that with Licella’s groundbreaking Cat-HTR technology, as few as 30 chemical plastic recycling plants placed across the country could make Australia plastic neutral and would be a key element in paving the way for a carbon-neutral future.

“This is an exciting collaboration for us. Not only will it make a big difference in plastic waste reduction and reduce harm to our cherished marine life, but Timor-Leste can be an example to the rest of the world about what this technology can achieve and the benefits it will have for the planet.”

Demetrio do Amaral de Carvalho, Timor-Leste’s Secretary of State for the Environment

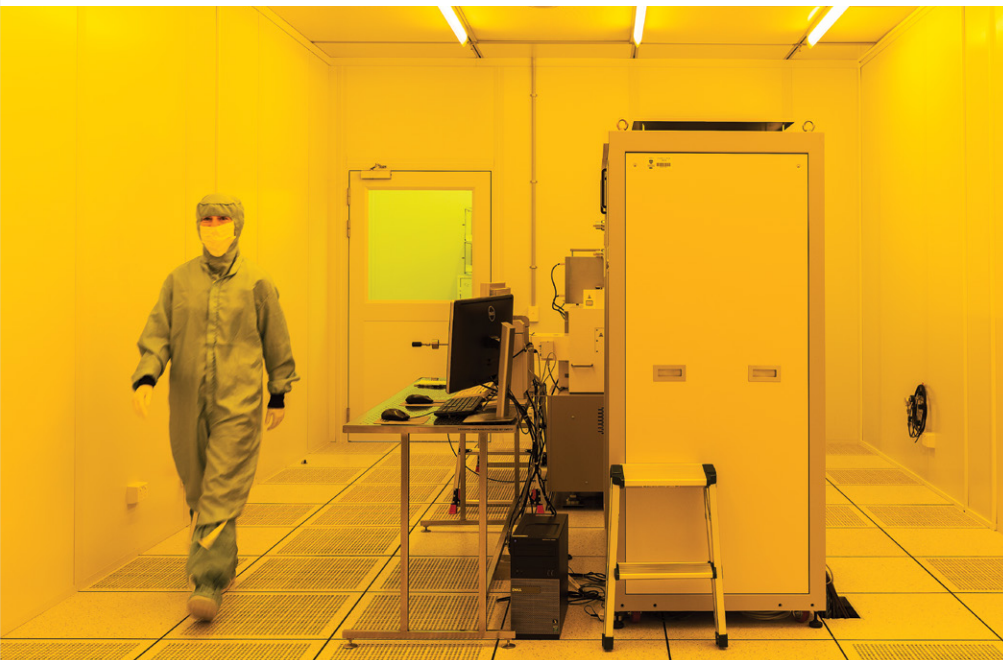


UNLOCKING QUANTUM POTENTIAL



“We sit at the threshold of an age in which quantum properties can revolutionise computing. Microsoft’s approach to building a quantum computer relies on investing in and connecting experts in industry and academia to make quantum computing a reality.”

David Pritchard, Managing Director of Technology Partnerships, Microsoft



By forging a long-term collaborative partnership with Microsoft, our researchers are positioning Australia at the forefront of the quantum revolution. The partnership represents the largest single investment in quantum computing ever made in Australia.

Led by Microsoft Scientific Director and School of Physics Professor David Reilly, the joint quantum computing team is based at the Microsoft Quantum Laboratory within the University of Sydney Nano Institute, one of just five experimental facilities worldwide that Microsoft has invested in. At this facility, University academics and students are working alongside Microsoft personnel to develop the interface between classical and quantum systems, which will be critical for quantum machines to be scaled up to useful devices.

The Microsoft investment is developing leading scientific and engineering talent and state-of-the-art equipment, and assuring Australia’s key role in the emerging quantum economy.

Opposite page:
A dilution refrigerator, capable of creating one of the coldest points in the universe, is used to cool quantum computing chips.

Above:
The Microsoft Quantum Laboratory is co-located within the University of Sydney Nano Institute.



PIONEERING ROBOTICS AGRICULTURE



SwagBot, developed by the ACFR, is an autonomous vehicle designed for use on grazing livestock

By 2050, experts have estimated that global food demand will increase anywhere between 59 and 98 percent. Because of this rapid growth, agricultural and farming sectors are experiencing an unprecedented demand for greater productivity.

Our Australian Centre for Field Robotics (ACFR) is working with industry partners the Grains Research Development Corporation, Meat and Livestock Australia

and Hort Innovation to develop solutions to address this problem. By applying cutting-edge technologies including advanced sensors, intelligent robotics and machine learning, we are helping farmers to create more productive crop yields, improve food security and produce crops that enhance food quality and nutritional content in developing countries.

Inventions have included the world's first cattle station

robot, capable of performing various automated tasks such as weeding, spraying and livestock herding; robots that can undertake mechanical weeding to reduce chemicals, and robots that assist crop farmers with data collection and farm mapping to help guide decisions on spraying and planting to maximise crop yields in vegetable and fruit farms.

TACKLING FOOD INSECURITY

Lack of access to affordable, healthy food has become a national problem. According to the City of Sydney, an estimated 17,000 residents do not have reliable access to nutritious, affordable food, with more than 3.6 million Australians experiencing some kind of food insecurity each year.

To contribute to the creation of inclusive and resilient local food economies, our Sydney Environment Institute has developed the Australia Research Council-funded initiative, FoodLab Sydney, in partnership with the City of Sydney, TAFE NSW and FoodLab Detroit.

Inspired by the highly successful FoodLab Detroit model, FoodLab Sydney's vision is to increase widespread access to healthy and affordable food through participation in a vibrant and sustainable food business ecosystem. Participants in the incubator – accessible to people from all educational backgrounds – receive custom-designed business support on their entrepreneurship journey, including pathways to qualifications, mentorship, and access to the kitchen spaces and skills to package, market and sell their products.

“This project is about bringing more people into the local food system and providing them with the opportunities to create a livelihood in that system,” explains Professor David Schlosberg, Director of the Sydney Environment Institute, who is co-Chief Investigator on the project with Dr Alana Mann, Chair of Media and Communications in the Faculty of Arts and Social Sciences.

The City of Sydney has embraced the project as an innovative way of providing both employment pathways for Sydney residents and economic stimulus in local communities.



“FoodLab Sydney is a fantastic example of how collaboration between academics, businesses and residents can produce new ideas and opportunities.”

Lord Mayor Clover Moore



Participants in the FoodLab Sydney training program.

REFORMING OUT-OF-HOME CARE



In New South Wales, nearly 18,000 children are in out-of-home care, almost a four-fold increase over the last 20 years.

As part of reforms that aim for permanent family care through restoration, guardianship or open adoption, the NSW government funded the Institute of Open Adoption Studies. A joint venture between the University of Sydney and Barnardos Australia, it is the first independent centre of its kind in Australia to be publicly funded and operates with academic independence.

Together with Barnardos Australia and NSW Department of Communities and Justice (DCJ), we are bridging the gap between research, policy and practice to promote permanency for children in out-of-home care.

“The Permanency Support Program is one of the most significant changes made to the NSW child protection and out-of-home care system in decades. I see the relationship with the institute as critical to helping us understand the impacts of some of these changes, and to guide policy and practice to improve the lives of children and families.”

Craig Layton,
Executive Director, Child & Family, DCJ

REVOLUTIONISING MENTAL HEALTH TREATMENT



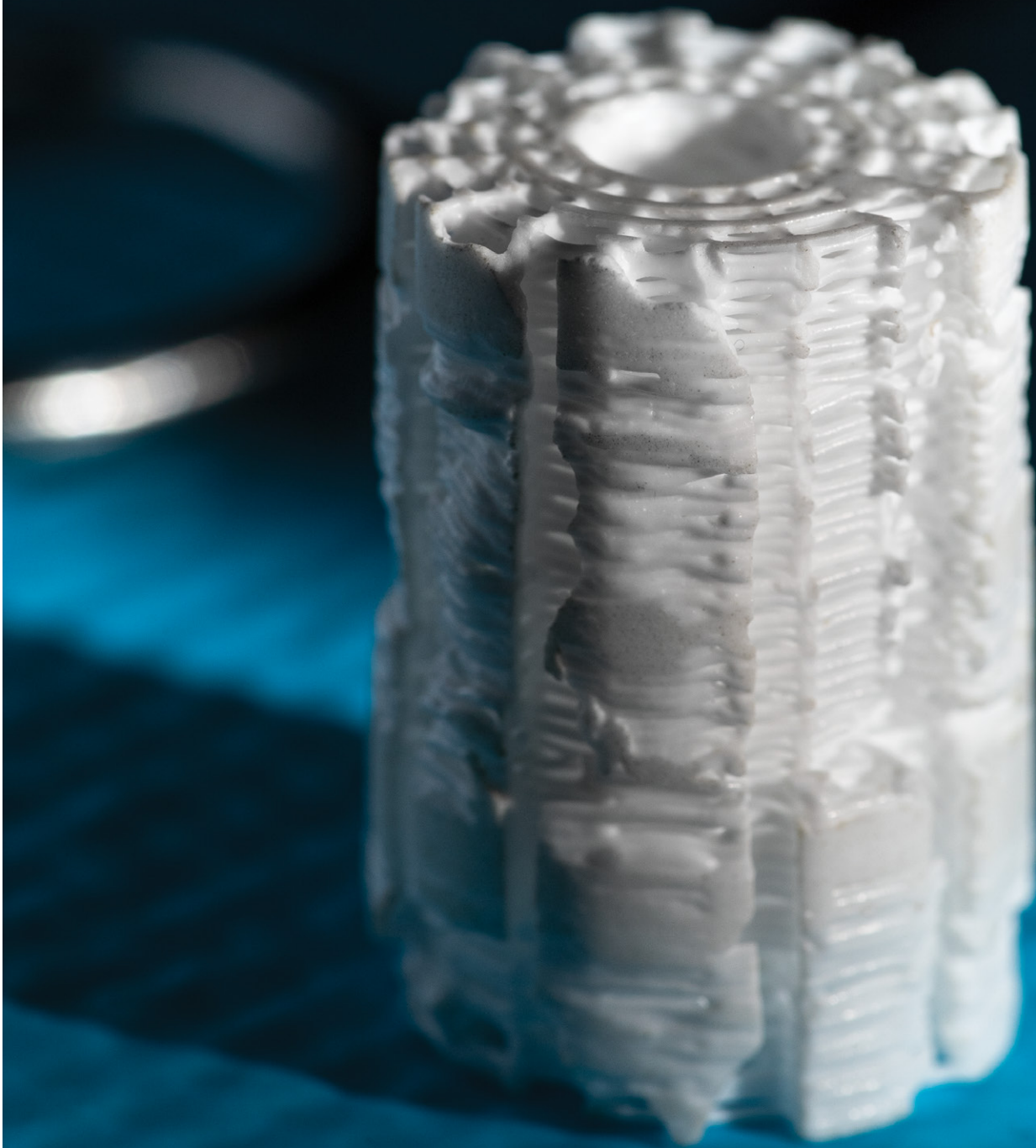
In collaboration with Innowell – a joint venture between the University of Sydney and PricewaterhouseCoopers – researchers from the University’s Brain and Mind Centre are creating a unique online mental health care platform. It is designed to meet the needs of a digitally connected patient base and to reach Australians seeking mental health care in underserved rural and remote regions.

The Innowell Platform provides individuals with real-time feedback to manage their mental health and wellbeing in partnership with service providers. Importantly, the platform matches patient needs to the right level of care at the right time, all from a smartphone, tablet or laptop.

Based on extensive co-design with lived experience, research, clinical expertise and technological development, the platform provides mental health professionals with valuable data about the needs of their patients using a platform to track and evaluate treatment outcomes.

“The platform is a powerful tool, offering an immediate self-assessment and dashboard that delivers a unique, comprehensive and accurate picture of the person presenting for care. In my experience, the more information the person has, and the greater understanding they have about themselves, the better position they are in to take charge of their own care.”

Dr Mitchell Dowling,
headspace health professional



BUILDING BONES THROUGH 3D PRINTING

Millions of people around the world suffer bone loss due to injury, infection, disease or abnormal skeletal development, and treatment often requires the regeneration of new bone. In collaboration with Allegra Orthopaedics, Hala Zreiqat AM, Professor of Biomedical Engineering, Head of our Biomaterials and Tissue Engineering Research Unit and Director of the Australian Research Centre for Innovative BioEngineering, has developed a unique ceramic material using 3D printing that acts as a scaffold for the body to use as it regenerates new bone, which gradually degrades as it is replaced by natural bone.

We have been collaborating with Allegra Orthopaedics, an Australian company, since 2013. In 2018, Allegra Orthopaedics Ltd was awarded a grant of \$891,500 in the Australian Government's BiMedTech Horizons program to contribute directly to commercialisation of one of the many applications of this technology and to Professor Zreiqat's research.

This research has the potential to affect an enormous number of people globally, including reducing the amount of organ rejections and wait times for vital transplants.

By using 3D printing technology, our researchers are creating synthetic scaffolds to stimulate the body's ability to regenerate its own bones, tissues and organs.

“We are very honoured to be one of the successful recipients of this grant. Our project was selected based on the recommendation of a diverse panel of high-calibre experts in the sector with research, clinical and commercialisation expertise. This grant is significant as it will allow Allegra to increase the resources and scale of our product development efforts.”

Jenny Swain,
Allegra Orthopaedics CEO



EDUCATION PARTNERSHIPS

We might still be waiting for the paperless office, but there's no doubt that the world of work is being radically transformed by changes in technology and the skills required to innovate and lead across a variety of industries.

To support this transition, we work closely with our partners to ensure our students are prepared for the ever-shifting contemporary workforce.

Much like our multidisciplinary research, our students don't learn in silos. Our reimagined undergraduate curriculum ensures that students have opportunities to work across fields of knowledge and on authentic projects with our partners.

Together, we're nurturing the next generation of leaders who excel academically and possess the critical thinking, creative problem-solving, cultural competence and resilience to thrive in the most diverse and demanding work environments.

EDUCATION PARTNERSHIPS

- p22 Developing innovative business solutions with remote communities – Remote and Indigenous organisations
- p23 Transforming the future of banking – ANZ Bank

DEVELOPING INNOVATIVE BUSINESS SOLUTIONS WITH REMOTE COMMUNITIES

Students from our Business School are undertaking academically guided action research projects to support the business aspirations of remote communities in Australia and South-East Asia. By tackling complex, real-world problems during their degree, our students are developing essential problem-solving skills to graduate as leaders in their field.

In the Remote and Rural Enterprise (RARE) program, students work on entrepreneurial projects in partnership with communities.

They research best practice, explore innovative ways to leverage local resources and create viable business – a collaboration that can add significant value to resource-strained organisations and entrepreneurs.

“RARE goes far beyond experiential learning,” explains Jared Harrison, RARE Program Manager. “It’s hands on. Students engage with community members to understand and assess problems, explore creative solutions and ensure their recommendations are an appropriate cultural fit.”

RARE has delivered more than 150 projects in Australia and South-East Asia and sent more than 400 students on-country for action research activities. Projects have included strategic business planning for cultural tourism ventures and business modelling for local enterprise hubs to support entrepreneurial activity with the

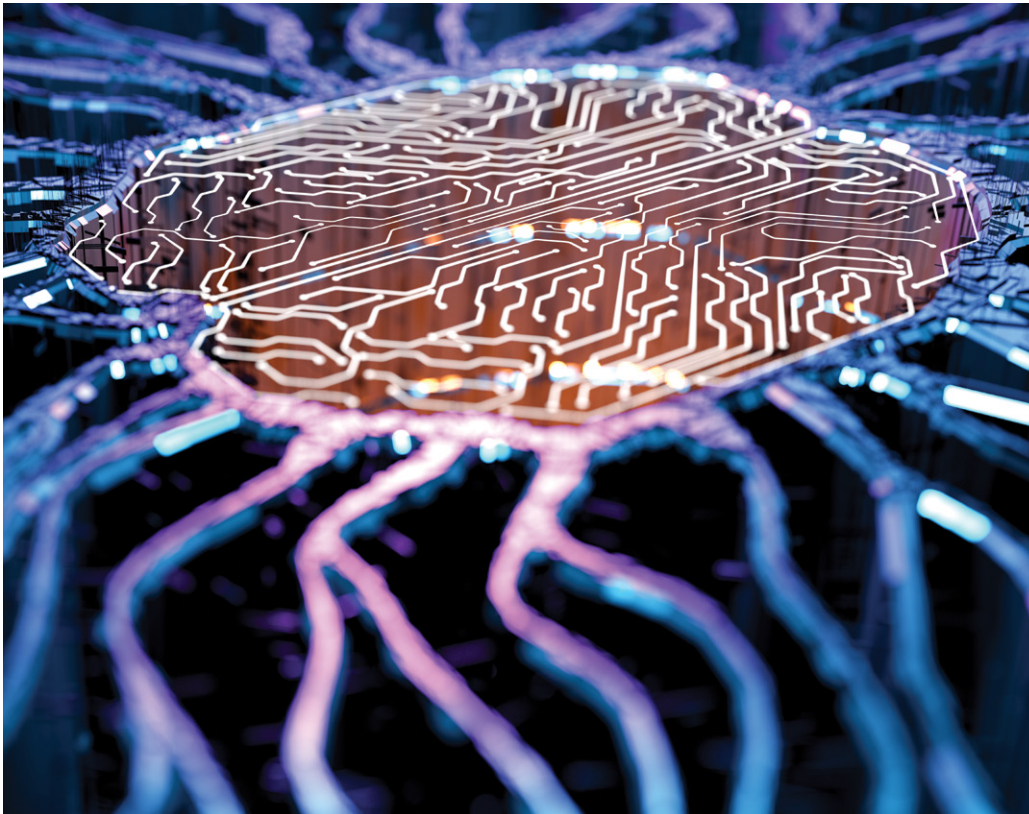


Bawinanga Aboriginal Corporation (BAC) in Maningrida, NT. The impact of the program was recognised in 2018 by the Association for Tertiary Education Management, receiving the esteemed Engagement Australia Excellence in Community Engagement Award.

“The group of RARE students we worked with last year was highly motivated, which brought to Maningrida some innovative thinking.”

Clem Bresson, Enterprise Development Officer,
Bawinanga Aboriginal Corporation

TRANSFORMING THE FUTURE OF BANKING



In partnership with ANZ Bank, our undergraduate students have been envisioning the future of banking.

As part of our Industry and Community Projects Units (ICPU) program, small groups of students from diverse disciplines develop solutions to genuine problems defined by our partners.

With ANZ, each project team explored how disruptive technologies such as artificial intelligence, blockchain technology and the emergence of open banking could affect the way the banking system operates. Instead of a final exam, the students presented their findings to senior stakeholders at ANZ Bank who assessed the originality and commercial viability of their ideas.

INNOVATING SINCE 1850

#1 AUSTRALIA AND #4 IN THE WORLD
for graduate employability¹

TOP 50

One of the world's
top 50 universities²

200+

collaborative
research industry
partners³

4000+

student placement
and internship
partners³

5000+

community of
entrepreneurs⁴

10

multidisciplinary
research centres

#25

in the world for
impact⁵

¹ QS Graduate Employability Rankings 2020

² QS World University Rankings 2020

³ In 2018

⁴ In our Incubate and Genesis startup programs

⁵ Times Higher Education University Impact Rankings 2019



Forest Stewardship Council (FSC®) is a globally recognised certification overseeing all fibre sourcing standards. This provides guarantees for the consumer that products are made of woodchips from well-managed forests and other controlled sources with strict environmental, economical and social standards.

Contact our Engagement Team and
let's start a conversation.

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