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Uniview

THE MAGAZINE OF THE UNIVERSITY OF WESTERN AUSTRALIA

Into the future

THE UNIVERSITY OF WESTERN AUSTRALIA

Message from **the Editor**

This winter edition of *Uniview* takes us into the future.

Heading into the future is always testing. However, it's a dimension where as a University, we shine. At the heart of our mission we are charged with responding to uncertainty with innovation, accepting the opportunities to shape the future in our ever-changing world.

This edition features stories that speak to our enterprising spirit and response to current challenges while preparing for a future shaped by big data and accelerated advances in science.

We are pushing the frontiers of space research and leading the charge in harnessing the power of data to find solutions to complex problems facing humanity. In the post-pandemic era, technologies and automation are not only challenging our human capabilities but are also welcome disruptors of the new age.

We introduce you to our Grand Challenges champions – alumni, researchers and students tackling climate change and seeking a sustainable, just and equitable world for all.

Solving challenges requires fresh thinking, new knowledge and new connections. We are proud to be a place that brings together and empowers generations of learners through a creative and specialised curriculum and vibrant research capability.

We hope you enjoy reading this edition and find inspiration in the stories we've shared.

Alison Batcheler
Associate Director, Corporate Communications

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The University of Western Australia acknowledges that its campuses are situated on Noongar land, and that Noongar people remain the spiritual and cultural custodians of their land, and continue to practise their values, languages, beliefs and knowledge.

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Empowering the next generation of learners

Editor: Alison Batcheler
Uniview Coordinators: Milka Bukilic, Emily Glover
Editorial: Corporate Communications, The University of Western Australia, Perth, WA 6009
Telephone: +61 8 6488 4206
Design: Nicole Halliday, UWA Digital and Creative Services
Printer: UniPrint, The University of Western Australia
Address changes: +61 8 6488 8000
Email: uniview@uwa.edu.au

The University of Western Australia – UWA
UWAnews
UWA website: uwa.edu.au/news

Front cover: One of 256 tiles of the Murchison Widefield Array radio telescope—a precursor instrument to the Square Kilometre Array. Credit: Pete Wheeler, ICRAR

Professor Amit Chakma, Vice-Chancellor
The University of Western Australia

From the **Vice-Chancellery**

Future **Learning**

Challenges are uncomfortable, but they bring out the best in us. In 2020, one of the most challenging years ever faced by universities, we saw the community of The University of Western Australia at its best. We proved to ourselves that we are active learners who can change and adapt; moving swiftly and effectively to online teaching.

We all have to come to terms with the fact that the future cannot be predicted with certainty. We deal in probabilities and possibilities, but some things remain constant.

Students are the heart and soul of universities, which have survived for centuries because of the desire to learn; to seek wisdom.

If we are to defend the great value of universities to the community, we must test and challenge commonly held assumptions about the future of learning. Because circumstances can change very rapidly, we have to act boldly and be able to move quickly.

We have to develop and assess likely scenarios, so that we can consider how we might adapt to them in a way that serves our fundamental mission: the fostering of learning and the creation of new knowledge.

The UWA 2030 vision promises to prepare our students to be globally relevant and responsible leaders. We want them to be well-rounded and ready to face an ever-changing world; eager to embrace challenge and opportunity; open to new ideas; and able to work in complex environments with people from different backgrounds.

Our curriculum and the way we teach should produce enthusiastic and highly skilled learners, with the intellectual capacity to learn, un-learn and re-learn all their lives.

Lifelong learning has never been more important. We must understand the needs of students of all ages and very different backgrounds and life experiences.

We are committed to driving innovation in our curriculum and to positive transformation of the student experience.

Success depends, as it always has for our species, on our ability to adjust.

Professor Amit Chakma, Vice-Chancellor
The University of Western Australia

First human trials under way for scarless wound healing cream

UWA researchers have partnered with industry to conduct a world-first study to investigate a new product that has the potential to prevent or reduce scars forming following trauma and burn injury.

Dr Kylie Sandy-Hodgetts, Dr Mark Fear and Professor Fiona Wood, from the Medical School and the Skin Integrity Research Institute UWA, are working with pharmaceutical company Pharmaxis Ltd, clinical trials facility Linear Clinical, Burn Injury Research Unit and the Burns Service at Fiona Stanley Hospital.

Dr Sandy-Hodgetts said skin scars placed a substantial physical and psychological burden on patients.

"Current treatments aim to rectify the scar in the acute phase such as during wound healing and scar maturation through options such as compression therapy, silicone gel sheeting or when the scar is established by cryotherapy, scar revision or laser with limited outcomes at times," Dr Sandy-Hodgetts said.

"This new compound may potentially avoid the need for invasive procedures such as further surgery or laser procedures."

The world-first human trial, led by Professor Wood and Dr Sandy-Hodgetts, aims to determine the safety and tolerability of the product in healthy volunteers, which will lead to trials in burns and surgical patients.

"Scar formation following surgery has a huge impact on patient wellbeing and how they feel about themselves," Dr Sandy-Hodgetts said.

"We're hoping this new cream may have the potential to improve scar outcomes in patients following surgery."

Professor Wood said it was exciting for the research team to explore a novel path to reduce scarring and to be moving closer to that goal.

Black swan DNA could help us understand human response to bird flu

Associate Professor Parwinder Kaur

In a world-first, UWA scientists have assembled the entire DNA of the black swan, which could offer insight into how the bird, and even humans, respond to bird flu and other pandemics in the same family of viruses.

The black swan, native to WA, is particularly vulnerable to bird flu compared with other birds. Humans who contract the virus are also very vulnerable, with high fatality rates.

The mapping of black swan DNA was carried out through DNA Zoo, a global initiative that analyses DNA from different species of animals to help researchers, leaders and policy-makers better understand species. Associate Professor Parwinder Kaur, from UWA's School of Agriculture and Environment, said although bird flu had only affected 862 people worldwide since 2003, more than half of those who contracted the virus did not survive.

"Understanding how black swan DNA is structured and regulated at gene level will help us understand why this bird is so vulnerable to bird flu," Associate Professor Kaur said.

"Because viruses such as bird flu can spill over into humans, and pandemics are only predicted to increase in the future, research into animal and human responses to them has never been more important."

Associate Professor Kaur said understanding immune genes in the black swan and comparing them to genes in closely related species would help build a better understanding of the deadly bird flu and its effects.

No more digging – a new environmentally friendly way of mining

Researchers from UWA, Australia's national science agency CSIRO, the Technical University of Denmark and the University of Exeter have developed a new mining technique that uses electric fields to extract metals from hard rock ore.

The technique could replace the traditional method of digging which results in significant costs to the environment.

Digging methods are currently used in 99 per cent of mining activity, often resulting in significant environmental degradation and huge quantities of solid waste.

Global estimates of waste are of the order of 100 gigatonnes per year, significantly larger than any other form of waste generated by humans.

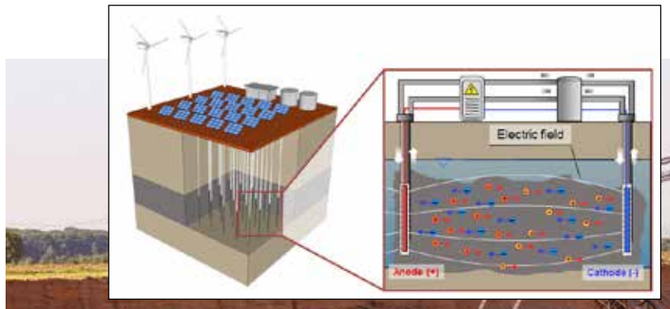
The new technique, published in *Science Advances,* is now being further developed and refined with support from the Minerals Research Institute of Western Australia.

Professor Henning Prommer from UWA's School of Earth Sciences and CSIRO said the technique worked by installing electrodes within the ore body and applying electric currents that could induce the transport of electrically charged metals through rocks by a process called electromigration.

"The metals are extracted within the ore body, instead of the traditional means of having to dig them out and milling huge amounts of material," Professor Prommer said.

"Traditional methods of excavating ore material result in a large amount of solid waste brought to the Earth's surface which needs to be disposed of, whereas this new method dramatically decreases wastage."

After successfully extracting copper from some very tight rock samples they are confident the idea will also work in the field for a wide range of other metals.



Electromigration: Finding better options

'Ribbons of Growth' design

City benches redesigned for COVID-19 times

Four UWA Master of Architecture students have placed second in an international design competition with their model for COVID-safe outdoor seating.

The competition, *Reconnect: Reimagining Furniture for Public Spaces,* asked university students to design street furniture for public spaces in the context of the pandemic.

Nurul Hud Azman, Lyana Ibrahim O Mahat, Thanh Thao Pham and David Morgan Carr's 'Ribbons of Growth' design is intended to support increased physical distancing and meet the varying needs of individuals.

Dr Rosangela Tenorio, who supervised the students, is co-founder of the Bio-Based Materials Design Lab at UWA. Dr Tenorio said the students' design reflected the concepts of regrowth and circular design.

"In Western Australia, bushfires are a common occurrence and part of the cycle of regrowth for natural flora," she said.

"This design reflects nature's continuity through the metaphor of a continuous ribbon. Additionally, the charred wood material references re-growth after a bushfire, as do the principles of circular design."

Co-supervisor Dr Jairo da Costa Junior said the design catered to a wide range of users.

"The furniture includes different modules to cater to adults, children, wheelchair users and prams," he said.

WA coastal flooding risk rising rapidly, study reveals

UWA scientists have analysed WA coastal data from the last 50 years and found extreme sea levels leading to coastal flooding are rapidly increasing.

The study, published in *Earth's Future,* shows that a combination of sea level rise and climate cycle factors unique to WA will likely accelerate coastal flooding risks in the future.

Lead researcher Professor Ryan Lowe from the UWA Oceans Graduate School said while sea levels had been rising steadily at 3–5 mm per year in recent decades, on par with global averages, sea levels along the WA coastline were also strongly affected by El Nino and La Nina conditions.

"During La Nina, sea levels dramatically rise north of Australia and are then carried southward along the WA coast by the Leeuwin Current," Professor Lowe said.

"At this time, sea levels can be elevated by up to 30 cm, which is nearly double the total sea level rise that has occurred over the past 50 years in WA.

"The south west of WA is particularly vulnerable to sea level extremes. Because of the usually smaller tidal fluctuations, coastal populations and infrastructure in these locations are generally not as well prepared for large sea level variations.

"We must develop and implement new solutions for large-scale coastal protection, as our reliance on conventional ways of protecting the coastline such as sea walls and breakwaters may become increasingly unsustainable to address the scale of the problem."

The research also involved UWA's Dr Michael Cuttler and Dr Jeff Hansen.

Port Beach after the ex-Cyclone Mangga storm in May 2020, Fremantle

Year 12 students on a visit to UWA

Leadership program inspires Indigenous youth

Inspiring the pursuit of tertiary education among Indigenous Year 12 students from across Western Australia was the focus of a leadership seminar held at UWA in April.

Thirty-three students from Albany, Australind, Broome, Derby, Esperance, Kalgoorlie, Katanning, Mandurah, Narrogin, Newman, Northam, Port Hedland and the Perth metropolitan area attended the seminar organised by UWA's School of Indigenous Studies.

Brendon DeGois, from UWA's School of Indigenous Studies, said the seminar gave students an opportunity to build networks and friendships with other participants while meeting current Indigenous students studying at the University.

"During the five-day trip, students visited some of UWA's schools on campus and participated in activities that helped them learn about their future study options and opportunities," Mr DeGois said.

Year 12 student Leila, from Hedland Senior High School in the Pilbara region, said it was difficult to pursue opportunities for tertiary study when living in communities in the State's north.

"This experience has given me an idea of what I can do with my future, and because of the doors it has opened, I'll be the first person in my family to consider university study."

Year 12 student Kaleb, from Ellenbrook Secondary College, said the highlight of the trip was meeting people and developing connections with the university community. "This leadership seminar has opened up my eyes to all the possibilities that University has to offer," he said.

Since 1988, UWA's School of Indigenous Studies has supported more than 500 Indigenous students to graduate in a wide variety of fields.

UNTANGLING THE BIG BANG

As big data changes the way we live our lives, UWA is leading the way in 'finding the signals in all of the noise'.

By Liz McGrath

It's estimated that last year, humans produced an astonishing 2.5 quintillion bytes of data every day. Every second, all over the world, there are 127 new devices connected to the internet. Google records over 3.5 billion searches daily. WhatsApp users exchange up to 65 billion messages every 24 hours. All adding to the almost incomprehensible digital data pile.

The challenge comes in tagging and analysing that phenomenal amount of data. As the power of analytical tools increases, the ability to identify crucial patterns is becoming faster and more accurate, so that hunches are replaced with insight; trends spotted before they pass by; and action taken to resolve questions that have hardly been formed.

From helping to control famine, to climate analytics, mental health and suicidal ideation, resource distribution and bioinformatics, advancements in data science are helping decision-making in fields such as healthcare, manufacturing, energy efficiency, environmental sustainability, education and job training, transportation and R&D.

With world-leading capabilities and expertise in data intensive discovery across the areas of analytics, infrastructure and applications, UWA's ability to apply a multidisciplinary approach to harnessing and mining big data is paying dividends and leading to new partnerships across every sector of our community.

Here are just some of the ways the University is helping to untangle the data explosion.

Fighting against disease

Professor Michael Small
CSIRO-UWA Chair of Complex Engineering Systems
UWA School of Mathematics and Statistics

It's not a link you'd perhaps automatically make: mapping big data sets to understand and help prevent the spread of infectious and often catastrophic diseases, but big data analytics has become a crucial component for the modelling of the COVID-19 virus transmission – aiding in infection control and the emergency response both locally and internationally.

For UWA's Complex Systems Group, made up of world-class mathematicians, statisticians, computer scientists and engineers who apply a wide range of mathematical and computational modelling techniques to unlock the patterns in large and complex data sets, predicting the spread of disease is not new.

While their work has never been more relevant than today as the world grapples with a global pandemic, it

Professor Michael Small

was in modelling SARS, another deadly coronavirus that originated in China and is genetically near-identical to COVID-19, that gave Professor Michael Small and his team their first chance to study global super-spreading events.

"In SARS, as well as with COVID-19, the agent of infection is often less important than the nature of the network it travels on," Professor Small said. "Data-intensive science allows us to map that interaction across entire communities, using data from mobile phones, location, demographic and travel apps, social media, medical and health records – all a rich source of information."

Work by the UWA team led to new insights into the spread and management of SARS, putting them "about 18 years ahead of the curve" (and a 2006 study by Michael Small on the front page of the *Wall Street Journal*). It has seen some in the team focus this year on how to protect vulnerable remote Western Australian communities from COVID-19.

"We're specifically looking at the potential for transmission in Indigenous communities in the Kimberley – there is a naïve impression that remote means safe but our work shows that the significant movement that occurs between these communities and regional and urban centres allows for infection to spread quickly," Professor Small said.

As one of Australia's most published mathematicians who's spent his life developing and applying modern mathematical techniques to real-life problems, particularly those traditionally considered 'too hard' to solve, the UWA alumnus says the potential is endless when it comes to harnessing the power of big data.

"The information we get now at an individual level and advances in computational resources have led to marvellously detailed experiments during lockdowns. By measuring the full scale of what happens when people stop moving, we're able to accurately forecast the likely spread of diseases like COVID-19 in the community," he said.

Reaching for the stars

Professor Peter Quinn
Executive Director, International Centre for Radio Astronomy Research

It's been described as radio astronomy on steroids. As Western Australia gets ready to host the Square Kilometre Array (SKA), one of the most important space projects on the planet, scientists are preparing for a data tsunami.

Not only will the world's largest radio telescope allow astronomers to probe the beginnings of the universe some 13.7 billion years ago, the SKA is set to be the largest public data project ever seen.

Co-located primarily in WA and South Africa, the multibillion-dollar international project will include hundreds of thousands of radio antennas with a vast combined collecting area equivalent to one million square metres, or one square kilometre.

Once connected via fibre-optic networks to work as a single virtual telescope, the SKA will be able to survey galaxies 10,000 times faster than any other telescope in existence.

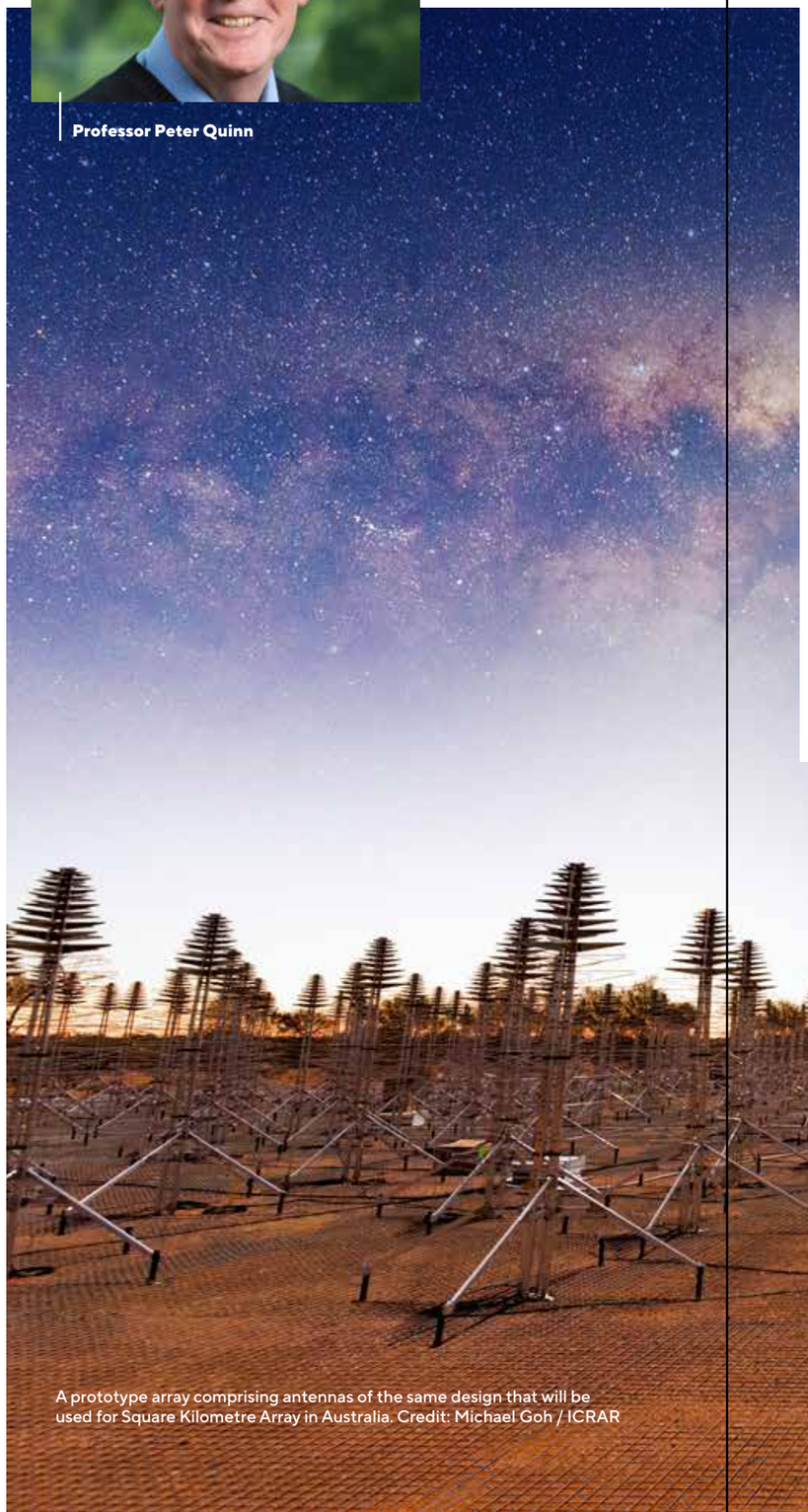
Executive Director of the International Centre for Radio Astronomy Research (ICRAR) in Perth, UWA's Professor Peter Quinn, says 'the unparalleled feat of human scientific endeavour' will open the floodgates to a torrent of data roughly 100,000 times faster than the average home broadband speed.

Some will be analysed in a new $64.4m data centre in Perth, the Australian Square Kilometre Array Regional Centre (AusSRC), a collaboration between ICRAR, CSIRO and the Pawsey Supercomputing Centre, part of an international network of SKA regional centres designed to support the global flow of data and processing needed.

"We've never done anything on this scale before – no one human being, or stadium full of students, can deal with data of the scale that will come from the SKA," according to Professor Quinn, a world-renowned astrophysicist.

"We're talking about supercomputing facilities with one trillion times the computing power that landed men on the moon. It means we'll be able to give scientists from all over the world access to data that may answer profound questions in astrophysics, cosmology and fundamental physics." Perhaps, even, is there anybody out there?

Professor Peter Quinn



A prototype array comprising antennas of the same design that will be used for Square Kilometre Array in Australia. Credit: Michael Goh / ICRAR

Improving human health and well-being

Associate Professor Rebecca Glauert
Scientific Director, The Raine Study (UWA)

Emerging big data technologies have also meant big changes in healthcare as data, including hospital, medical and prescription records, are consolidated and analysed to discover trends, better treat patients and make more accurate predictions.

The landmark Western Australian-based The Raine Study has been tracking almost 3,000 children, their parents, grandparents and now their own children, for the past 30 years and is one of the largest successful cohort studies of pregnancy, childhood and adulthood in the world.

Established in Perth in 1989 to investigate how early-life factors during fetal development impact on child and adult health, it's led to a phenotypic dataset containing more than 70,000 measures and over 20 million genetic variants on each participant, as well as biological samples and genome-wide genotyping data for children and their mothers.

As a result, it's become an invaluable source for researchers, with the environmental, developmental and health research using its data published in more than 600 academic journals and contributing to the understanding of many aspects of public health, says the study's new Scientific Director, Associate Professor Rebecca Glauert.

An internationally recognised expert in data linkage, she's enthusiastic about the opportunity to connect more than 30 years of the Raine Study's big data with publicly held datasets from across Australia, including school and hospital records.

Associate Professor Rebecca Glauert

"We're at an exciting point, with four generations now in the study," Associate Professor Glauert said. "Our babies who were in utero when recruited by their mums and dads are now having their own kids – it's amazing to have such a huge amount of biological information.

"While traditionally health data has been siloed, we're hoping that by linking all of the data we have with other areas like justice and education, we'll have a remarkable base of knowledge. This means we'll continue to explore how environment and events from the womb onwards impact health outcomes not only in childhood, adolescence and early adulthood, but increasingly into mid-life and elderly life stages."■

The Raine Study team

When the SKY is *not* the limit

By Liz McGrath

Associate Professor Danail Obreschkow, ISC Head

How UWA is pushing the frontiers of space research

History changed in April 1961 when Russia launched Vostok 1 and its sole occupant Yuri Gagarin became the first human to journey into outer space. He completed only one orbit of the Earth in his 2.3 m diameter space capsule in a flight of only 108 minutes and had to parachute to the ground, after ejecting from the capsule at an altitude of 7 km. But humanity had entered the space age.

While UWA has been actively involved in space research for more than half a century, Vice-Chancellor Professor Amit Chakma says the University's new International Space Centre (ISC) will pursue this in a more impactful way by "bringing people together who can fire each other's imaginations".

Involving a multidisciplinary team with 24 research nodes organised into 12 themes, 150 researchers and 20 PhD students, the centre will combine leading space science, research and teaching capabilities to advance space frontiers and develop innovative technologies needed to enhance and sustain life on Earth and beyond.

ISC Head Associate Professor Danail Obreschkow says that Australians already rely on space technology to power their everyday lives. "The ISC will maximise the return of existing research and teaching capabilities at UWA and create new partnerships with industry, other space industries and international partners, to address pivotal space challenges of the 21st century," he said.

> "Who isn't interested in space? Who doesn't look into the sky and think, that's pretty amazing, can we go there? Science is about discovery and as scientists this really is a new frontier for us."

Researchers will collaborate across areas ranging from optical communications, astrophysics, health, agriculture, engineering, information technology and social studies, in a world where humans living and working in the harsh environment of space is already a reality, thanks to the International Space Centre.

Plant protein biochemist Professor Harvey Millar, who along with Professor Ryan Lister, leads the ISC's Plants in Space research node, puts it like this: "Who isn't interested in space? Who doesn't look into the sky and think, that's pretty amazing, can we go there? Science is about discovery and as scientists this really is a new frontier for us."

Associate Professor Obreschkow, an astrophysicist, says harvesting the 'inspiration' of space is key to the ISC. "The inspiration of space can benefit our society in unforeseeable ways," he said. "As Neil deGrasse Tyson so thoughtfully pointed out, Bill Gates and Steve Jobs were 13 and 14 when we first set foot on the moon. Did they become astronauts? No, but they had learned that human innovation knows no boundaries. My vision is our scientists apply their knowledge to continue to inspire the Australian public in this spirit."

Space-ready plants

Plants will be critical to support a long-term presence in deep space says Professor Millar, National Director for the ARC Centre of Excellence in Plant Energy Biology at UWA, and an award-winning leader in plant science research.

"Yes, the capability for human space travel is leaping forward but the technology for critical life support systems is lagging far behind," he explained. "Human beings rely on plants for food, oxygen and psychological wellbeing and it is the same in space."

The plant scientist, who has a record of growing plants that can adapt to hostile conditions, says food to sustain long-term missions will be one of the biggest challenges as the limits of human endurance are tested.

While NASA has already grown plants on the International Space Station as part of its Vegetable Production System (with astronauts enjoying a fresh meal of leafy greens) large-scale gardening in zero or micro-gravity is tricky, says Professor Millar.

"Imagine all the food you'd need to feed astronauts on a mission to Mars that takes years – the volume and weight makes it too expensive to transport, it's not going to happen. We need to find a way to provide food without bringing it along," he said.

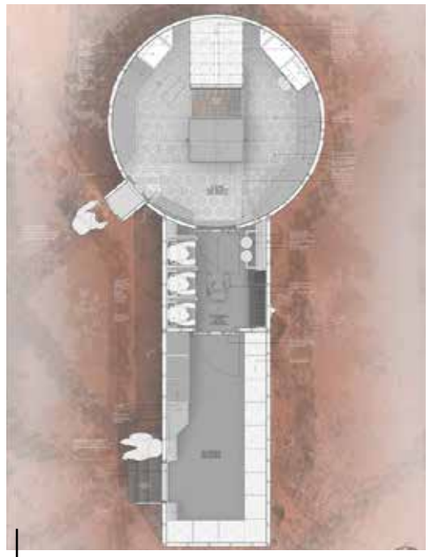
"It's a harsh and odd environment so you need plants that are going to be unbelievably efficient, that are nutritionally balanced to support human life, can make oxygen and remove CO^2 faster to support human life; basically we're talking about the perfect plant."

Professor Millar says the work being done at UWA on a range of plants that has opened up new opportunities in crop improvement to WA industries is very relevant to what needs to be done in space.

"Even when we're looking for advances in agriculture on Earth, these new approaches and thinking outside the box and the normal paradigm, could provide solutions in this new frontier," he said.

Professor Harvey Millar, Director, ARC Centre of Excellence in Plant Energy Biology

Dr Sascha Schediwy, Research Fellow, ICRAR, (winner of *Academic of the Year* and the *Excellence* award in the 2021 Australian Space Awards)



Plan view of design for Mars surface architecture by UWA School of Design Master of Architecture student Nik Cutten, 2018

Laser-based communications in space

A new optical ground station capable of receiving high-speed data transmissions from space being built at UWA has the potential to support groundbreaking space projects, including a NASA mission to land the first woman and next man on the Moon by 2024.

A joint initiative of the ISC's Astrophotonics Group, part of the International Centre for Radio Astronomy Research (ICRAR), as well as the ARC Centre of Excellence for Engineered Quantum Systems and UK industry partner Goonhilly Earth Station, the centre is being built on the roof of the UWA Physics building.

At its core is a 70 cm diameter robotic telescope donated to ICRAR by local astronomer Colin Eldridge. Astrophotonics Group leader, Dr Sascha Schediwy, says the telescope will be the first 'on-sky' optical communications ground station in the southern hemisphere and a prime example of fundamental research delivering real-world outcomes.

"Optical communications via laser links is an emerging technology expected to revolutionise data transfer from space, with several advantages over currently used radio signals, including significantly faster data rates and hack-proof data transfer," he said.

"Unlike standard optical fibre networks that carry the bulk of the world's internet traffic, data rates over free-space optical communication laser links are limited by the destructive impact of atmospheric turbulence on the transmitted optical signals.

"Our team will investigate a unique combination of atmospheric turbulence mitigation technologies to correct these and there'll be many practical returns for society, with the fundamental physics applications realised by this technology extending to precision earth science and resource geophysics."

Dr Lies Notebaert, Senior Lecturer, School of Psychological Science

Living and thriving in space

While Yuri Gagarin's voyage around Earth proved humans could survive in space, actually living and working in such a remote and dangerous environment is another matter.

The complex question of how societies will function beyond Earth is being studied in the ISC node coordinated by Dr Lies Notebaert and extends across a range of social science disciplines including governance, law, policy, cultural studies, ethics, management, psychology, philosophy and others.

Dr Laura Fruhen from UWA's School of Psychological Science is one of the researchers and says while space might be the final frontier, living or working above the planet, away from friends and family in an isolated and challenging environment, raises big and important questions.

"We're looking at what we know and at how what we're already studying here on Earth can be applied to those new and emerging environments if we research things in a slightly different way," Dr Fruhen said. "Not only the physical environment but questions like what does the work cycle look like? Would people have weekends? What do societal structures look like? What are the legal frameworks that we might need?

"There's already been decades of research and testing by organisations like NASA on the problems of being in confined spaces with a bunch of people for a long time but there's still so much to discover on developing effective working and living environments that will protect people's mental health and wellbeing," she said.

Bright star guides aspiring space engineers

Enrico Palermo, Head of the Australian Space Agency

UWA engineering and science students learned about the future of careers in space from the Head of the Australian Space Agency and UWA graduate, Enrico Palermo, during a recent visit to campus.

"What an amazing bunch of students," he said. "It's been great to see the passion and excitement among them, and how many diverse opportunities they now have access to, even more so than when I was a student."

After completing a Bachelor of Engineering and Bachelor of Science at UWA, Mr Palermo became the Chief Operating Officer of Virgin Galactic, before taking the helm at Australia's space agency earlier this year.

UWA student and aspiring aerospace engineer, James Dingley, said Mr Palermo's visit helped him and his peers gain a deeper understanding about the agency, which many of them aspire to join after graduating.

"In 2017, I attended the International Astronautical Congress where the agency was announced. At the time, I asked government officials how students could get involved," James said.

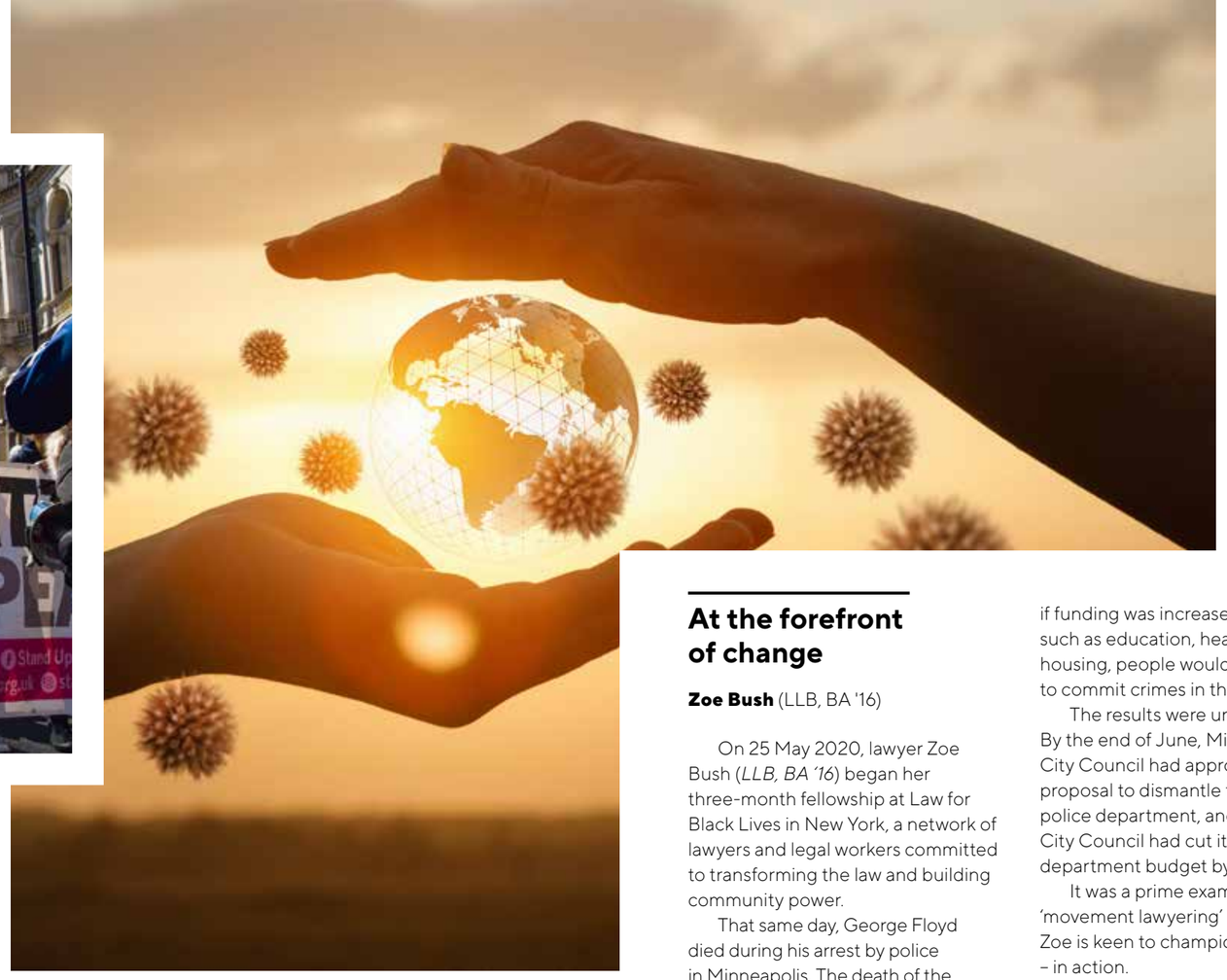
"I never suspected that four years later, I'd directly ask the head of the agency myself."

According to Mr Palermo, there is no set formula for success in space.

"Follow your passions and say yes to every opportunity to develop your skills," he said. "This all comes together to build a skillset that enables students to lead and do amazing things in space." ■

Deployment site of the Western Australian Optical Ground Station at UWA

Black Lives Matter protest in the US



TACKLING THE WORLD'S **BIGGEST CHALLENGES**

By Verity Chia

UWA recently embarked on an ambitious program to address the most important and complex problems facing humanity.

The Grand Challenges program brings together the University's researchers, alumni and students – some of the world's very best minds – to engage in fresh thinking that will benefit local, regional and global communities.

This year, two inaugural Grand Challenges have been chosen: a more just and equitable world post COVID-19, and climate change.

Here, *Uniview* meets three of our Grand Challenges champions.

Zoe Bush speaking at the Blackstone Society Dinner Debate 2020

At the forefront of change

Zoe Bush (LLB, BA '16)

On 25 May 2020, lawyer Zoe Bush (*LLB, BA '16*) began her three-month fellowship at Law for Black Lives in New York, a network of lawyers and legal workers committed to transforming the law and building community power.

That same day, George Floyd died during his arrest by police in Minneapolis. The death of the 46-year-old African-American triggered Black Lives Matter protests across all 50 states in the United States – and then globally.

Straight away, Zoe's skills were put to use. She'd arrived at Law for Black Lives after completing her Master of Laws (she won a John Monash Scholarship to study at Columbia Law School), where she'd worked on the #SayHerName campaign – highlighting police brutality against black women and girls – with leading race and gender scholar Professor Kimberlé Crenshaw.

As news headlines detailed increasing police brutality, Zoe was working behind the scenes to get demonstrators out of detention and bring claims of assault against police.

At the same time, she worked on campaigns to redirect money away from police departments and towards communities that had been harmed. Campaigners argued that if funding was increased for services such as education, health and housing, people would be less likely to commit crimes in the first place.

The results were unprecedented. By the end of June, Minneapolis City Council had approved a proposal to dismantle the city's police department, and New York City Council had cut its police department budget by US$1 billion.

It was a prime example of 'movement lawyering' – a concept Zoe is keen to champion in Australia – in action.

"Movement lawyering is about lawyers being led by communities or movements, rather than setting the agenda themselves," she said.

"It combines defensive work – protecting communities from harm – with offensive work, which is focused on helping communities achieve the visions they have for the world."

Zoe's keen awareness of systemic racial discrimination dates back to her time at the UWA Law School, where she worked with Indigenous communities in the Kimberley. In 2016, her proposal to end the indefinite detention of First Nations people with Fetal Alcohol Spectrum Disorders – many of whom had never been convicted of a crime – was adopted by a standing committee of the Australian Senate and Amnesty International.

Now, she's focused on another frontier. Since last August, she has been working on Australia's first wave of corporate climate litigation as a solicitor in the Environmental Defenders Office's Safe Climate team, where her job description doubles as a mission: to use the law to protect and defend Australia's wildlife, people and places.

Corporate climate change litigation is still new in Australia, but Zoe expects there will soon be big cases around misleading and deceptive conduct (companies pretending to be 'greener' than they really are), climate disclosure (the disclosure of climate risks to the market) and directors' duties (in particular, the management of climate risk).

She says this new form of litigation has the potential to change entire industries and markets, and predicts fossil fuel companies will encounter similar legal challenges to those faced by tobacco companies in the 1990s.

Alongside her advocacy, Zoe teaches at the UWA Law School. She's particularly excited about the recent Indigenisation of the Juris Doctor, which will result in every law graduate understanding how various aspects of the law affect Indigenous people.

"I hope students walk out of the Law School with an appreciation that law isn't neutral; that it underpins colonialism in Australia and can be used as a tool for good and bad," she said.

"Every law graduate should know they have a choice in how they are going to use the law when they go forward and practise."

L-R: **Dr Caitlin Wyrwoll** and **Dr Demelza Ireland**

We can effect real change for women

Dr Demelza Ireland,
School of Biomedical Sciences

Dr Demelza Ireland wants her students to know they can effect real change in the world.

The senior lecturer in women's health – who in 2019 won a prestigious Australian Award for University Teaching (Early Career) – says this year has been critical for gender equality.

As stories around consent, domestic violence and sexual assault dominated news headlines in the first half of the year, Dr Ireland encouraged her students to lobby politicians with their own ideas and solutions.

"I really do feel like we are at a pivotal point where these conversations are now part of our everyday language," she said.

"This is about valuing women and it's about hearing their voices. The bigger picture here is social determinants of health – education, finances and the environments in which we live."

Globally, social determinants are the primary cause of the gender gap in health outcomes. One result of this is that every day, 810 women around the world die from preventable causes related to pregnancy and childbirth.

Along with Dr Caitlin Wyrwoll, Dr Ireland has introduced an initiative that supports UWA students to assemble birthing kits, with basic supplies such as soap, for women in under-resourced countries. The clean birth kits have been proven to reduce the rates of maternal and newborn infections and death, especially when paired with skilled birth attendants.

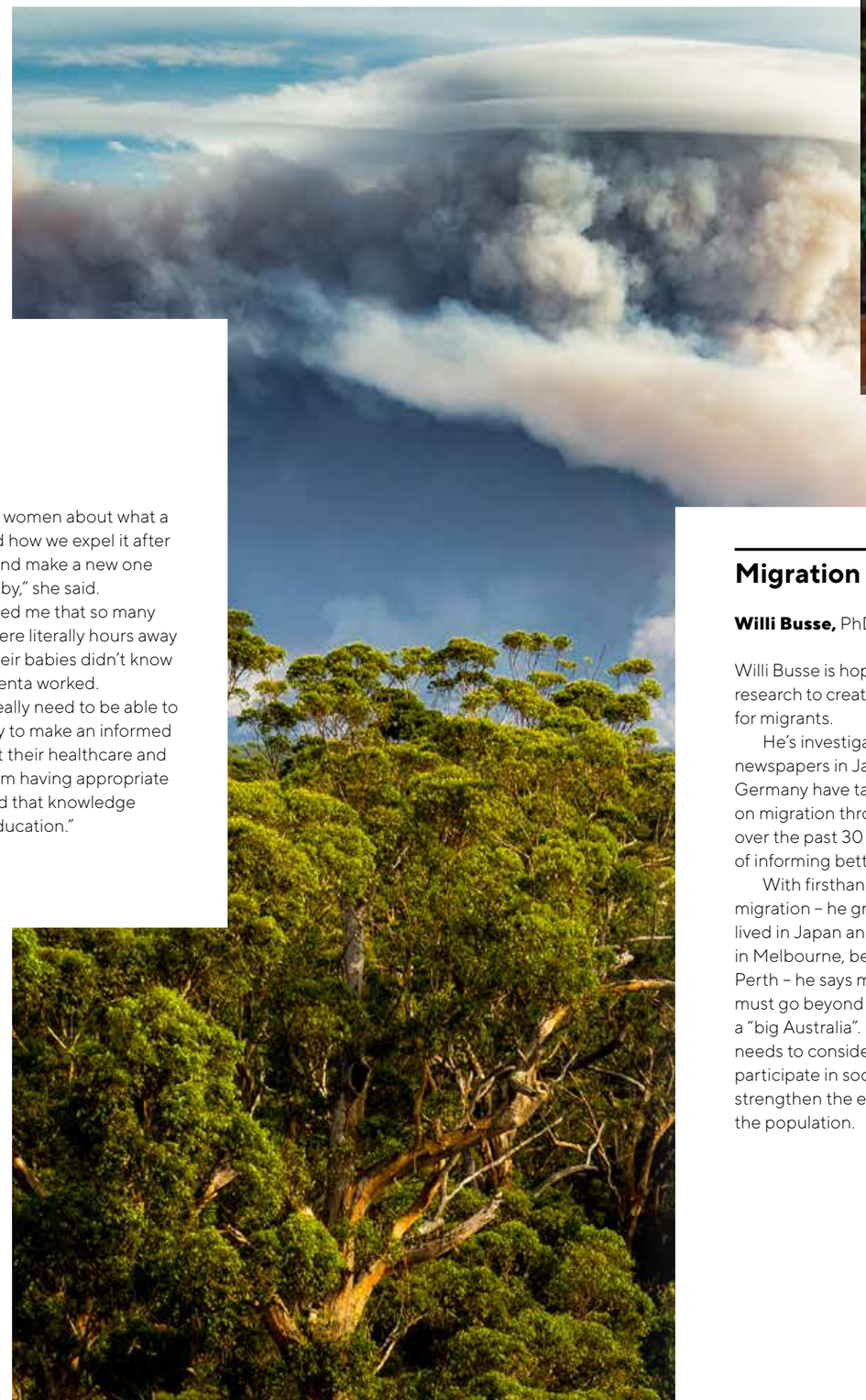
> "I really do feel like we are at a pivotal point where these conversations are now part of our everyday language."

Dr Ireland's passion for education stems from her early days of pregnancy research, when she was surprised by how little many women knew about their own health. At King Edward Memorial Hospital she'd ask women if she could collect their placenta for research, and was often met with the response "but I want another baby".

"I'd spend a significant amount of time talking to women about what a placenta is and how we expel it after we give birth and make a new one for the next baby," she said.

"It astounded me that so many women who were literally hours away from having their babies didn't know how their placenta worked.

"Women really need to be able to have the ability to make an informed decision about their healthcare and that comes from having appropriate knowledge and that knowledge comes from education."



Willi Busse

Migration is the defining issue of our time

Willi Busse, PhD student

Willi Busse is hoping to use his research to create positive change for migrants.

He's investigating how leading newspapers in Japan, Australia and Germany have taken various stances on migration through their editorials over the past 30 years, with the aim of informing better policy making.

With firsthand experience of migration – he grew up in Germany, lived in Japan and spent a gap year in Melbourne, before settling in Perth – he says migration debates must go beyond whether we want a "big Australia". Instead, discussion needs to consider how migrants can participate in society, and not just strengthen the economy or increase the population.

"Migration in its many forms is the defining issue of our time, here in Australia and around the globe. It is strongly intertwined with all the major crises, such as the climate emergency, inequality and poverty," he said.

Willi has spent time volunteering as a local history library clerk and recently completed the Global Citizenship micro-credential, through UWA and Common Purpose.

"Going beyond my research and being a migrant myself, I want to drive change and empower migrant and Indigenous communities, and promote more diversity in our society," he said.■

Learn about Grand Challenges and meet more academics, alumni and students making a difference at **uwa.edu.au/grand-challenges**

EMPOWERING

THE NEXT GENERATION OF LEARNERS

By Verity Chia

UWA Plus micro-credentials set to encourage lifelong learning

Micro-credentials may be the newest buzzword in higher education, but the philosophy behind UWA's new offering goes back to a longstanding mission: to provide world-class education for our communities.

With a new suite of micro-credentials – ranging from medical technology and professional writing, to tackling plastic pollution, UWA's Pro Vice-Chancellor (Academic), Professor Graham Brown, expects students from all walks of life to sign up to this newest way of learning.

"Micro-credentials generally require between 50 and 150 hours of study and many are offered online, intensively or through blended delivery modes," Professor Brown said.

"This is a 'low commitment' way to study at UWA – and while micro-credentials can be used for professional development points, advanced standing or credit into full length degrees, they're also perfect for busy professionals looking to upskill or learn something new."

Badged under the UWA Plus brand, the micro-credentials will not have any admission requirements (although more specialised subjects may have recommended prior learning), and aim to foster lifelong learning – a key pillar of UWA's Education Strategy 2020-25.

"We want UWA to be a place that students can return to over their lifetime, constantly learning new skills, creating new connections and seeking new opportunities," Professor Brown said.

One new micro-credential is assisting students to quantify the benefits and costs of projects and policies.

Delivered by economist Professor David Pannell, Applied Benefit: Cost Analysis is aimed at management practitioners, business consultants, researchers and policymakers.

The Benefit: Cost Analysis approach can be used to evaluate a wide range of projects, and there's no requirement for students to have a background in economics (although economists are welcome too).

"Governments have used this approach to assess policy responses to COVID-19 and climate change, construction of desalination plants, and the conversion of storm drains into natural streams," Professor Pannell said.

"This course is particularly valuable as it gives students the opportunity to conduct their own Benefit: Cost Analysis on a complex project, and an understanding of how to explain the results to stakeholders."

In the health space, History and Basic Characteristics of FASD (Fetal Alcohol Spectrum Disorders) is being delivered by psychologists Dr Kirsten Panton and Associate Professor Carmela Pestell.

> "We want UWA to be a place that students can return to over their lifetime, constantly learning new skills, creating new connections and seeking new opportunities."

The course aims to assist people who come into regular contact with FASD individuals, including school teachers, police, lawyers, family members, support staff and justice workers.

"FASD is a hidden disability that is underdiagnosed," Dr Panton and Associate Professor Pestell said. "Even though FASD affects people from all backgrounds, it's difficult for people to see because not all individuals will have dysmorphic facial features, and the condition is often hidden from the public eye.

"This course equips students with up-to-date, evidence-based information so that clients and families affected by FASD can be better supported at school, at work and in the general community."

Students who successfully complete the course may gain credit towards the Graduate Certificate in the Diagnosis and Assessment of Fetal Alcohol Spectrum Disorders.

For a full list of micro-credentials, visit
uwa.edu.au/study/uwa-plus

UWA students take action on UN Sustainable Development Goals

Nearly 400 students from across UWA have created action plans to address the United Nations Sustainable Development Goals (SDG) as part of a co-curricular course.

The three-week Global Citizenship program asked students to choose one SDG on which to focus, then research the goal and create an action plan that would allow them to personally make a difference.

Some of the plans included: assisting student clubs to become more responsible in their consumption habits; promoting wellbeing within their workplace; and working towards making their business carbon neutral by 2030.

The goals varied widely, with participants coming from a range of undergraduate and postgraduate courses, including science, arts and commerce.

Director of Student Life Chris Massey said the course gave students the tools to create positive change in the world.

"Our students are passionate about improving the world," he said.

"A large number of students already complete internships at not-for-profit organisations, volunteer their time and start their own social enterprises.

"The Global Citizenship course not only provided students with insight into the SDGs, but also gave them practice in collaborating with people from different backgrounds, evaluating their own values and confidently challenging preconceptions.

"All of these soft skills make our students more employable in the workplace."

The most common SDGs addressed by course participants were quality education, climate action, decent work and economic growth and, good health and well-being. Course content included discussion from senior leaders of organisations such as Google, EY and the United Nations.

> "It's always great to have a check in the mirror to remind ourselves of where we stand and whether we're still aligned with our beliefs."

Almost all students said they would use the skills learned in the course in the future.

Bachelor of Commerce student Jung-An Ho said she had enjoyed interacting with her peers.

"It's always great to have a check in the mirror to remind ourselves of where we stand and whether we're still aligned with our beliefs," she said.

UWA welcomes hundreds of new international students

More than 1,100 international students began their studies at UWA in Semester 1 this year.

The students, from countries including China, India, Singapore and Indonesia, are joining classes online until Australia's borders reopen.

Deputy Vice-Chancellor (Education) Professor David Sadler said the commencement numbers were a much better result than anticipated, with only an 18 per cent decrease in international commencements compared with 2019.

"In Semester 1 we had 560 new international undergraduate enrolments and 548 new international postgraduate enrolments. There's no doubt the COVID-19 pandemic has impacted our international student recruitment forecast; however, we are pleased to report these results," he said.

Several courses, including the Bachelor of Arts, Master of Commerce and newly created Master of Business Analytics, saw international student enrolments increase significantly.

Professor Sadler attributes the strong result to the University's comprehensive support for international students, along with flexible study options and innovative marketing initiatives.

"Our Student Life, Admissions and Future Students teams were in constant communication with our current and commencing international students as soon as COVID-19 began to affect them," he said.

"We were able to offer assistance with studying online or deferring commencement, issue new Certificates of Enrolment for visa purposes, and provide welfare and accommodation support, among other services.

"Additionally, we were fortunate to have support from the Student Guild's International Students' Department, which helped ensure our students received clear and practical information."

Opening day of the UWA Study Centre at Soochow University, Suzhou, China

UWA's Global Engagement Office and Brand, Marketing and Recruitment continue to find new ways to connect prospective international students with the University.

Now heading into the third semester of operations, UWA has partnered with several Chinese universities to provide UWA Learning Centres in China.

The centres commenced operations in Semester 2, 2020 based at Southwest University in Chongqing, Nanjing University of Aeronautics and Astronautics in Tianmuhu and Northeast Forestry University in Harbin. In 2021 UWA expanded student choice to include the UWA Learning Centres at Soochow University in Suzhou and Zhejiang University in Hangzhou.

> "While there's still a great deal of uncertainty, we've been able to show that providing strong academic and welfare support, can have a really positive effect on the numbers of students continuing to choose UWA."

The UWA Learning Support Centres are also available in Guangdong for students on international academic pathway programs from partner universities which include: The South China University of Technology, Guangdong University of Finance and Economics and the Guangdong University of Finance.

While it's still unclear when international students will again be able to travel to Perth, Professor Sadler is confident UWA will continue attracting new international students.

"When the Australian borders first closed, a lot of universities were unsure whether international students would be open to studying online at Australian universities," he said.

"While there's still a great deal of uncertainty, we've been able to show that providing strong academic and welfare support, can have a really positive effect on the numbers of students continuing to choose UWA.■

Frank Liu, Senior Lecturer of UWA Business School, visits the UWA Study Centre at Soochow University, Suzhou, China

LIVING AND WORKING alongside AI

By Dr Sanjit K. Roy, UWA Business School

New technologies such as Artificial Intelligence (AI), robots, machine learning and blockchain are rapidly transforming the nature of services, consumer experiences and dynamics between service providers, their frontline employees and customers.

Such technologies are both persuasive and invasive; they create opportunities and challenges for users, facilitators and beneficiaries. One area predicted to have a significant impact on service experience is the integration of artificial intelligence and service robots. Research suggests that robots will effectively engage customers and have the potential to offer an immersive service experience. Service providers, specifically in healthcare, aged care, hospitality and the banking sector have realised the value of AI and are increasingly deploying robots for delivering services. Currently, applications of AI across these sectors see the rise of robots operating in lieu of waiters, medical surgeries assistants, caregivers and bank tellers.

Being *in-service* of others (e.g. consumers) is an inherently social process where meaningful frontline employee-consumer interactions are a hallmark of service quality. However, the COVID-19 pandemic brings the need to practise social distancing, challenging traditional ideals of service provision to achieve service value. The pandemic is leading both companies and consumers to develop coping mechanisms and resilience to handle vulnerable situations and reinvent themselves to achieve wellbeing. In the post-pandemic era, a need for social distancing and futureproofing for crisis will drive more industries such as healthcare and hospitality to invest in robotics to achieve effective contactless service delivery, altering the role of organisational frontlines. Employees will be expected to accept service robots as part of their workplace, enabling the safe delivery of service.

Aged care providers are currently experimenting with the deployment of robotics in service delivery; yet, the pace of adopting it in healthcare and hospitality is slow. This is partly due to costs and fear of employee and consumer readiness. However, the COVID-19 crisis is driving businesses to hasten robotic adoption to equip their frontline workers for the new post-pandemic norms. More research is needed to help us understand organisational perceptions of service robots better and the role they play in successful service design models and their impacts on the psychological safety of consumers and employees.

Dr Sanjit K. Roy, UWA Business School

> “In the post-pandemic era it is not going be a race against machines, it would be a race with the machines. It would be about extending and augmenting human capabilities and healing the world with the help of new age technologies.”

One of the most fascinating effects of COVID-19 pandemic has been a technological revolution unlike anything we have seen before. There has been an increase in the use of robots to eliminate human-to-human contact in service delivery. However, against this rapid development, there is a debate among practitioners and academics about how humans and machines can create value for firms and society. We argue that in the post-pandemic era it is not going be a race against machines, it would be a race with the machines. It would be about extending and augmenting human capabilities and healing the world with the help of new technologies.

Our research indicates that service firms can create opportunities for frontline service employees and service robots to co-work based on interactions. What this means is that these man-machine-made interactions have the potential to achieve important post-pandemic outcomes for contactless delivery, psychological safety and value creation.

Understanding the critical role of AI and service robots in sustaining an appropriate balance between service efficiency and service customisation can help service firms to reduce job stress and enable safe working service environments in post-pandemic times. Effectively, this understanding should translate into positive organisational outcomes such as improved performance, reduced turnover of service employees, enhanced brand reputation and better short- and long-term preparedness for crisis management.

CONNECTING ART WITH STUDENTS

This past year student engagement at Lawrence Wilson Art Gallery (LWAG), now part of the Education portfolio, has grown and expanded in exciting new ways as the Gallery continues to develop new opportunities for students.

The LWAG Student Advisory Committee, a leadership position for UWA students, is now in its second year. Tasked with advising LWAG staff on its student engagement, Committee members gain intimate knowledge about the running of a gallery and work collaboratively with gallery staff to develop new initiatives and public programs aimed at making the Gallery a welcoming, dynamic and integral space for students.

[Left to right]: Sky Edwards, Isabella Rossaro, Julie Robyn Ziegenhardt, Amy Neville, Debbie Gilchrist, Annique Cockerill and Lee Kinsella in *Paper Cut: Students in Residence* at the 2021 Season 1 Opening Night at LWAG. Image: Ilkka K Photography

A highlight of the recent programs developed by the Committee was *The Art of Composition*, an event organised with the UWA Music Students' Society that invited students studying music composition to create new pieces in response to artwork with the final compositions performed live at the close of semester.

Music student Moses Kington-Walberg said that participating as a composer in the event proved to be invaluable in the formation of the music, and in the expansion of his capacity as a composer.

"Participating in this project has resulted in a second ongoing collaboration between myself and the artist, as well as inspired me to assist in continuing and developing projects like this as a member of the Student Advisory Committee here at the Gallery."

Students also gained invaluable experience curating and exhibiting artwork at LWAG.

From February to March 2021, artists Annique Cockerill, Sky Edwards, Debbie Gilchrist, Isabella Rossaro and Julie Robyn Ziegenhardt exhibited their work and participated in a series of lively artist talks as part of a residency project organised as part of the *Paper Cut* exhibition.

Curated by art history student Amy Neville, *Paper Cut: Students in Residence* was part of a research-based internship Amy undertook at the Gallery under the mentorship of the Curator of the Cruthers Collection of Women's Art, Lee Kinsella.

LWAG Student Advisory Committee event *Culture Club*: *PRIDE Art Party*, LWAG, 2020. Image: Ilkka K Photography.

"The *Students in Residence* program gave us a space to express ourselves and to tell our stories as art students to the public," Amy explained.

"Working with the gallery allowed me the opportunity to connect the art community with UWA students and to finish my degree with the experience of curating a professional exhibition."

The Gallery has also been the site for curriculum engagement and cross-disciplinary enquiry. Students in Dr Ionat Zurr's Curatorial Practices (ARTF2000) spent the semester learning about exhibition-making within the Gallery, while students in Dr Chantal Bourgault Du Coudray's Beyond 'Gender Wars' (GEND1901) used their visit to the LWAG exhibitions as a source of inspiration for their coursework.

For student Emma Cain, the visit gave "our whole group great ideas" and "helped a lot and was so calming during such a stressful period of the semester."

[Left]: Visitors in *Paper Cut: Students in Residence*, LWAG, 2021. Image: Ilkka K Photography.

Rocketing to success

Naomi Altman (BSc & BE '13) is the Head of Electrical Engineering and Head of Test Engineering at Zipline, a tech company that aims to provide every human with instant access to vital medical supplies by building the world's fastest and most reliable delivery drone and the largest autonomous logistics network.

Zipline is the first autonomous drone company operating at a national scale, delivering life-saving blood supplies to 22 million people in Ghana and Rwanda. Earlier this year, Zipline signed a deal with Nigeria's Kaduna State allowing the drone delivery of COVID-19 vaccines, with end-to-end cold chain distribution capability. In the United States, Zipline's drones have been conducting contactless distribution of personal protective equipment and critical medical supplies to frontline medical teams.

Before Zipline, Naomi led the Avionics team at Rocket Lab, a satellite launch service and the first private company in the southern hemisphere to reach space.

Naomi Altman, Head of Electrical and Test Engineering at Zipline

Tell us about your journey from UWA student to working in the space industry.

My career choices weren't a linear series of events. When I graduated from UWA, I knew I wanted to work as an engineer but in a creative capacity. I didn't know what industry or what job, just that I wanted to develop new technologies. I found Rocket Lab (a satellite launch service created in New Zealand) when it was small and they took a chance on me. I didn't seek out space or aerospace. In general, I have always just made the decisions that were right for me at the time.

What attracted you to Zipline?

Zipline's goal is to transform healthcare systems by providing instant access to vital medical supplies to every human on Earth. Zipline is known for delivering blood supplies, especially in emergencies, but we also deliver vaccines and medicines, and do re-supply runs to hospitals and clinics. When I had a chance to visit the health clinics that are served by Zipline, I was able to see first-hand how transformative it was for them to have access to the medical products they needed to do their job.

Naomi at Rocket Lab's facilities in New Zealand

Visiting Zipline's operations in Ghana

Zipline's operations in Ghana

What does a typical day look like for you?

I lead electrical engineering, test engineering, and powertrain engineering. Every day looks different – I might go deep on an electrical circuit issue, talk about a strategic roadmap for a new hardware product or coach a team member through a decision. One of the highlights is when I get to help someone achieve something they previously didn't think they could do.

What have you learned about leadership?

I've learned the most through people challenges: collective problem solving is hard. You can take the 10 smartest people in the world and that doesn't mean they're going to work well as a team and produce better outputs. As a people manager, I try to make sure that my entire team is able to keep adapting to new challenges. I've learned that an important part of my job is to explicitly communicate expectations, especially if they've changed or increased. I try to get to know the people on my team well enough to know how to help them adapt to changes so they can still perform at their best.

Why do you love engineering?

I love when complex problems are answered through simple solutions, which can often be a low-tech solution. In engineering, it's easy to make a complex solution but an elegant simple solution is what differentiates good from great.

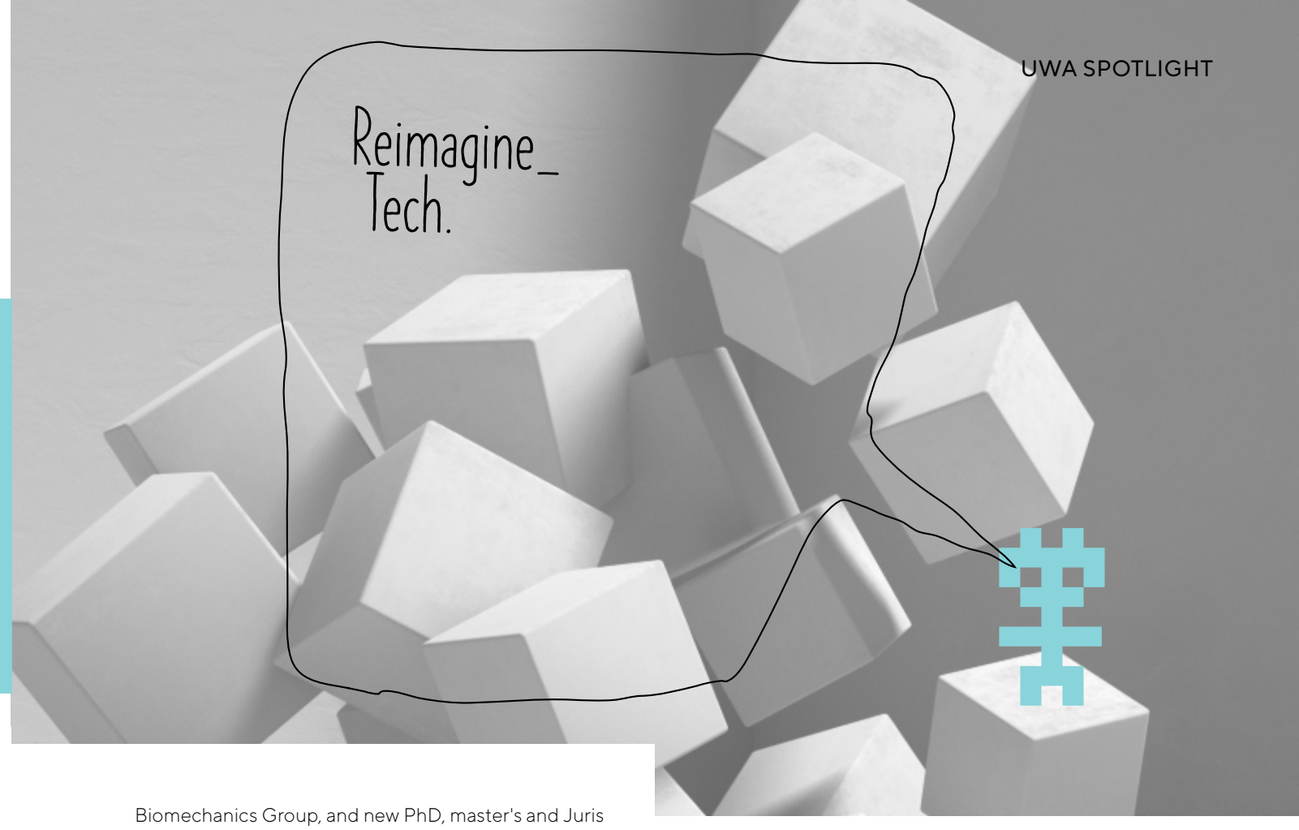
I also love failure analysis. At Rocket Lab, when something broke you would sometimes have limited flight data, so it would take detective work to put the pieces together and figure out what went wrong. You have to keep looking at the data from different lenses until you crack it – when everything fits together it explains all the different things you observed.

My proudest technical accomplishment was at Rocket Lab. Last year, we had a launch anomaly where we lost the rocket and didn't know why. I led the technical investigation. It was extremely hard because we had very little data to go on, but we were able to work out what had happened and were even able to re-create the issue. Two months later, we successfully re-launched the mission.

You moved to San Francisco in September last year. What has it been like living in the United States during the COVID-19 pandemic?

On a personal level, I'm really proud that I left a comfortable existence in New Zealand and came here with a lot of unknowns – how I would translate to a new culture, working in a new industry, and building a lot of relationships from the ground up.

COVID-19 has left deep scars for the US, but there have also been some very special moments. During the pandemic, you have to be selective about who you spend time with because each interaction brings risk. This means you end up spending time with people who you really want to see. Since moving to San Francisco I've found my A-Team.



UWA SPOTLIGHT

Associate Professor Julia Powles, Director, Minderoo Tech & Policy Lab

Tackling worldwide **challenges in digital technology**

At the heart of UWA's campus, bordered by a traditional Japanese garden, a corridor of plane trees and the sun-flecked sprawl of carpark No 3, a vibrant interdisciplinary research institute has been taking shape.

The Minderoo Tech & Policy Lab at UWA Law School brings together legal and policy researchers with technologists, engineers and scientists. The Lab's mission, in partnership with sister centres at the University of Cambridge, University of California Los Angeles and New York University, is to tackle lawlessness in the tech ecosystem, empower workers and reimagine technology in the public interest.

The key to unlocking the Lab lies in the combined expertise of its Co-Directors: Associate Professor of Law and Technology Julia Powles and Associate Professor of Biomechanics Jacqueline Alderson.

Associate Professor Powles joined UWA in 2019 after more than a decade in Europe and the United States, most recently at New York University and Cornell Tech, as the Law School's inaugural *Be Inspired* appointment. Her expertise is in privacy, intellectual property, internet governance and the law and politics of data, automation and artificial intelligence. After arriving at UWA, she established a Technology and Public Interest Research Group; a move that led professional colleagues in law and science to insist on one essential introduction: to Associate Professor Alderson. From that first conversation, on resisting the overtures of today's biggest companies and building alternative futures, the Lab has grown.

For more than two decades, Associate Professor Alderson has been a research leader in one of UWA's most distinguished research domains – biomechanics – where she drives national and international sport and health-focused research teams in pro-public applications of motion capture, wearable technologies and machine learning. Associate Professor Alderson also established the world's first and largest sports biomechanics motion capture repository, a coveted resource for tech companies.

Uniting cutting-edge work at the intersection of technology and humanity, with an insistence on effective governance, the Tech & Policy Lab is now a team of 16 and growing rapidly. It comprises research fellows, professional staff, PhD students from the Alderson Biomechanics Group, and new PhD, master's and Juris Doctor researchers in law and political economy.

Since launching in September 2020, the Lab has been prolific across a number of work streams in law, policy and technology. Among these are two flagship projects that interrogate the promises and pitfalls of data and automation through a strikingly original lens: sport.

> "We need rules for our technological tools, not rule by our tools."

In partnership with the Australian Academy of Science, the Lab has driven an examination of human monitoring and surveillance across Australia's major professional sports, from the four football codes to netball, cricket and basketball, which will culminate mid-2021 in a national discussion, *Getting Ahead of the Game*. The discussion aims to draw attention to the workplace of professional sport, and the urgent need for better governance practices in this data-saturated environment.

The Lab has also secured a historic partnership with the Australian Institute of Sport and affiliated state and territory Institutes, to catapult these quasi-governmental agencies to a world-leading position on the governance of technologies informed by human monitoring.

Spearheading these two projects and related work are Research Fellow Jason Weber, one of Australia's most experienced high-performance managers, with a 25-year career across international rugby union, soccer and the Australian Football League; Research Fellow Tomas Fitzgerald, who joined UWA from Notre Dame's School of Law and brings extensive practical experience with governance and regulatory regimes; and Research Fellow Dr Marion Mundt, an award-winning graduate of the German Sport University Cologne who specialises in the application of machine learning to wearable technologies and motion analysis.

The Lab has already made significant contributions to policy debates nationally, identifying the distinct opportunities presented by federal and state privacy reform; cautioning about the immense risks that accompany 'sharing' of government-held citizen information; and offering democratic-led alternatives to unworkable proposals that deputise platforms such as Facebook and Twitter as their own patrollers when it comes to online cyber-abuse.

One of the major early successes of the Lab has been its contribution to national drone policy, where it successfully motivated a wholesale pivot, from the Commonwealth's initial focus on industry promotion, into a role where the Commonwealth will coordinate national, State and local rules for the protection of amenity, security, safety and privacy.

It is a clear example of the Lab's ongoing focus: we need rules for our technological tools, not rule by our tools.

Alumni supported project: Student placements in remote Aboriginal Art Centres in 2014

20 YEARS OF EMPOWERING THE ALUMNI COMMUNITY

UWA launched its Alumni Giving Program in 2001, to empower our community to provide an endowed scholarship fund and support cultural projects.

Twenty years later, with hundreds of scholarships awarded, 800-plus disadvantaged Year 12 students supported via the UWA Fairway program, 95 student-led projects funded and over $7 million raised, the UWA Alumni Fund has successfully established a culture of community giving and helped the brightest students achieve their dreams of a university education.

"Being the first in my family to go to university, and living most of my life in rural Northern Territory, I was grateful to receive the accommodation scholarship", says Yone Ansell, Master of Professional Engineering graduate (2019), and 2014 recipient of the UWA Alumni Fund University Hall Scholarship. "Not only did it allow me to focus on my studies without financial worry, I also met so many new friends at Uni Hall from different cultures and ways of life."

Fairway UWA students at Summer School in 2015

As you walk through the UWA campus today, you can see the evidence of alumni generosity. From the Business School building, to the iconic McGillivray Organ in Winthrop Hall, over to the community garden beds on the Nedlands campus; the footprint of community giving is truly embedded in UWA's history.

And in times of crisis – when affected students required financial relief and assistance during the pandemic; when Winthrop Hall's leadlight windows were damaged in the 'great Perth hailstorm of 2010' – this community spirit and generosity rose to the challenge.

With student support at its heart, it's fitting that the annual campaign is delivered largely by a team of students who engage with our community and introduce them to the potential of philanthropy.

"It's a real privilege to be able to speak directly to our community", explains Euan Gleeson-Brown, current Business Law student. "On any given night I can be talking with a doctor, a retired teacher or a business leader. It is always an inspiring conversation and their generosity is truly astonishing."

With ongoing support needed for new initiatives like The Living Room, a mental well-being 'safe space', the life-changing kindness and generosity of our graduates, staff and friends continues to enrich the fabric of UWA.

Student team member, and UWA Philosophy and Business Psychology graduate, **Simon Thujis**

alumnifund.uwa.edu.au

Katarina Doughty, PhD student. Image: Nicholas Smith

Food waste **helps secure future fish**

Human food scraps could be used to create high-quality food for farmed fish, leading to a more sustainable global fish economy, according to a team of researchers at The University of Western Australia.

PhD student Katarina Doughty, from UWA's Oceans Institute and School of Biological Sciences, said the global dependence on fish products – both farmed and wild-caught – was rising, with roughly three billion people relying on seafood as a primary source of protein.

"The population is expected to exceed 9.6 billion by 2050, and the seafood sector is under great pressure to maximise production, while remaining within sustainable planetary boundaries," Ms Doughty said.

The research, funded by the Fisheries Research and Development Corporation, found organic food waste destined for landfill could be repurposed and used to raise black soldier fly larvae, which could then be fed to farmed fish to achieve better fish growth and performance.

The insect larvae – which are high in vitamins, minerals and essential amino acids – contain about 40 per cent protein and 30 per cent fat, making them a promising food to use in aquaculture environments.

Aquaculture, a practice that involves cultivating aquatic animal populations such as freshwater and saltwater fish under controlled conditions, is becoming an important source of human food.

"Globally, we are harvesting wild fish at their maximum levels, which makes further reliance on wild-caught fish unsustainable," Ms Doughty said.

She said further development was needed before aquaculture facilities could deliver long-term sustainable food production.

"Aquaculture can fill the gap between wild harvesting limits and consumer demand, but only if we develop sustainable feed alternatives that maintain fish growth, performance and health," Ms Doughty said.

"Cultivating fish populations in aquaculture facilities often relies on wild-caught fish or agricultural sources, like poultry and soybean, which could be used directly by humans rather than as a feed source for high-value fish."

Ms Doughty is researching the use of black soldier fly as a feed source for rainbow trout, a globally important aquaculture species that is grown in 75 countries and almost every continent.

> "Globally, we are harvesting wild fish at their maximum levels, which makes further reliance on wild-caught fish unsustainable."

The work is supported by the Fisheries Research and Development Corporation in collaboration with WA's Department of Primary Industries and Regional Development, Future Green Solutions Ltd, Ridley Agriproducts Pty Ltd, GEA, and ChemCentre.

Adjunct Professor Dr Brett Davies and **Clinical Professor Lesley Cala**

From the Warden of Convocation

Clinical Professor Lesley Cala

I feel very humble to have been re-elected Warden for another year together with Deputy Warden, Adjunct Professor Dr Brett Davies. Dr Davies was also successful in being elected to one of two places on Senate reserved for Convocation. The following candidates successfully elected as members of Convocation Council were: Ms Devon Cuneo, Mr Simon Dawkins, Emeritus Professor Jenny Gregory AM, Dr Raj Kurup, Dr Moira Maley, Dr Fran Pesich, including two new members Dr Estie Kruger and Ms Rosalind Moore.

Convocation Council was able to hold all committee and monthly Council meetings digitally via Zoom during the past year. Our successful Autumn Ordinary Meeting held in March was broadcast from the UWA EZONE building and engaged graduates from 13 countries: Australia, Chile, Ghana, Indonesia, Malaysia, Mozambique, People's Republic of China, Saudi Arabia, Singapore, South Africa, United Arab Emirates, United Kingdom and the United States of America.

Graduation Ceremonies

While the 2020 July and December graduation ceremonies were postponed due to COVID-19, graduands were given the opportunity in December to have a photograph taken in their academic regalia. In March, we were pleased to hold nine graduation ceremonies in Winthrop Hall with three ceremonies held each day. The Deputy Warden and I shared the privilege of extending a welcome to our newest graduates. It has been the custom in recent years for each graduate to receive a message stick from a Convocation ambassador; however, this year's ceremonies observed social distancing including COVID-safe measures, meaning each graduate received their message stick on their seat.

I am pleased to report the Convocation Flag was flying throughout the ceremonies!

Convocation Awards

Unfortunately, COVID-19 affected the ability of students to travel, despite having been successful in obtaining a Convocation Postgraduate Research Travel Award (PGRTA) in 2020. While the Award was entered on students' academic record, the unused money had to be reinvested towards future awards.

Many thanks go to the Postgraduate Students' Association which had generously donated $6,000 to provide two awards. The applications and judging were carried out online.

Congratulations to the TEDxUWA group on winning the 2020 Bryant Stokes Matilda Award for Cultural Excellence in the category of Public Speaking.

In conclusion, I thank all members of Convocation who have worked with the University to achieve some normality during these difficult times.

Key **Dates**

Convocation Annual Elections 2022

UWA graduates are encouraged to nominate for the annual Convocation elections.

Nominations are called for one Member of Senate (three-year term), the Warden and Deputy Warden (one-year term) and six Members of the Council for three-year terms. Nominations open on Wednesday 3 November 2021 and close at noon on Wednesday 1 December 2021.

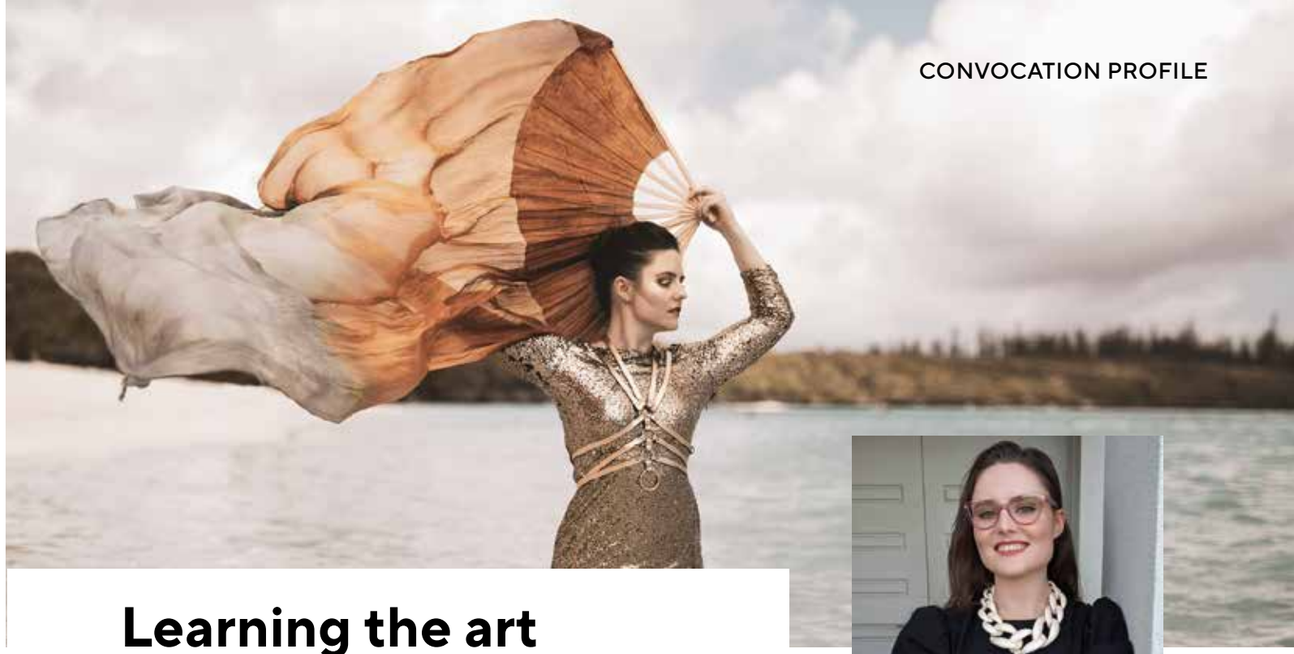
Graduates wishing to vote in the elections have to have lodged a current email or postal address by noon Wednesday 1 December 2021 to be included on the electoral roll.

50th Reunion Lunch

The reunion lunch for the graduates of 1971 is booked for 20 November 2021 in the Banquet Hall of the University Club of Western Australia. We are hoping to see graduates and their friends attend the event.

Spring Ordinary Meeting

The Spring Ordinary meeting will be held on **17 September 2021** via Zoom. All graduates are encouraged to register their contact details, especially an email address, with the Convocation Office at **Convocation@uwa.edu.au**



Ms Anna Burchfield, Content Coordinator at APM

Learning the art of resilience

Since graduating with a Master of Arts in International Relations in 2014, life has been and is more interesting than ever for Anna Burchfield.

Her work in marketing has taken her into the 'tech cloud', health, transport, websites and digital marketing – even through the doors of the Western Australian Parliament.

However, the lure of the arts and the thrill of performing saw her return to the Perth and national cabaret scene in 2017. The three years which followed would be both the most testing and rewarding period of her life.

They included two redundancies, five contract roles, multiple performances across Perth, interstate and on cruise ships, a Certificate in Fashion Styling, topped off with spending five months unemployed during lockdown in 2020.

"During July 2020 I started in a new role as a Content Coordinator for APM, Australia's largest provider of Disability Employment Services. Over the last year, I've really had my eyes and mind opened to the realities and challenges of living with an injury, illness or disability," Anna said.

> "In the face of personal, even global upheavals, I feel profoundly resilient. I look back on the last couple of years proudly. All the change, all the tears. All of it."

"When your university degrees give you a thirst for knowledge and great research skills, I've found a great space to apply it all and see the finer details and the bigger picture.

"I know improving the lives of others, acquiring a little more knowledge on accessibility, diversity and inclusion for everyone is a powerful thing. It can be as simple as thinking how accessible the entrance to your premises are, or which voices we can add to our conversations.

"Greater still, in my current role, it is deeply satisfying to have found a specialisation in my field. I have very much leaned into life as a 'Word Nerd'!"

Since scoring a job at APM, Anna's life has been awash with a lot of laughter, the click of keyboard keys, emcee-ing and performing at Perth Fringe, and publishing multiple editorials in *The West Australian*, including the release of one giant confetti popper when she passed her probation.

The contrast between her life of leisure and her work has become highly fulfilling.

"My 'stage persona' and I coexist quite wonderfully, whether behind a keyboard or a microphone, under office lights or stage lights," Anna proudly admits.

"In the face of personal, even global upheavals, I feel profoundly resilient. I look back on the last couple of years proudly. All the change, all the tears. All of it.

"When I think about my recent past, my present and even think about the future – the arts has always been part of it.

"And we need only look to the arts for great resilience, not simply to survive, but to thrive."

Second from right in back row: David McCulloch in Kobe, Japan, with WA Premier Mark McGowan and Governor Ido of Hyōgo Prefecture, meeting in regard to the Sister State relationship.

Building on strong foundations for an international career

As Mr David McCulloch steps down from his role as international business manager at the WA Department of Jobs, Tourism, Science and Innovation, the MBA graduate reflects on the foundations UWA provided many years earlier.

A first-class honours arts degree majoring in history put Mr McCulloch on the road to a lifetime career working in international markets. Regularly moving between the public and private sector, he invariably found himself working across the spectrum of trade, investment, industry development and international business. These included roles with law firm Corrs, precious metal producer Gold Corporation and the 'liquid gold' that the Wine Industry Association of WA (as CEO) represented.

More recently, the class of 1978 graduate has represented the Government of Western Australia as Commissioner for India based in Mumbai during 2016, and Commissioner for Japan based in Tokyo from October 2018 to December 2020, although the last nine months was as 'Commissioner-in-exile' during the pandemic period. In recent months, that role has been extended to Dubai, in the United Arab Emirates.

> "As many business people have learnt, particularly across Asia, achieving successful commercial outcomes are often predicated on developing personal relationships with their counterparts in the target market. This is no more evident than in the two markets where I spent some time – Japan and India."

An arts degree provided Mr McCulloch with the foundations to operate in a variety of markets, giving him social, cultural and economic skills to work with business people from many nations. A subsequent MBA reinforced many of the business skills he had acquired assisting WA companies and industries in markets from the UK and EU, North America, Middle East, India, Southeast Asia to North Asia.

"As many business people have learnt, particularly across Asia, achieving successful commercial outcomes are often predicated on developing personal relationships with their counterparts in the target market. This is no more evident than in the two markets where I spent some time – Japan and India," Mr McCulloch said.

Mr McCulloch married his partner Lee in the University's Sunken Gardens back in 1988. So not only did the University equip him to pursue a long career in international business, but also provided the starting point for a marriage that remains strong 33 years later.

Navigating the industry sector

After a short stint studying agricultural science at UWA, Stuart Smith shifted focus to graduate in economics in 1988. These studies led Mr Smith toward a career in industry development and regulation with the Australian and WA public services and his current role as Chief Executive Officer of the National Petroleum Safety and Environmental Management Authority (NOPSEMA), Australia's offshore energy regulator.

Mr Stuart Smith, CEO, National Petroleum Safety and Environmental Management Authority

As CEO of NOPSEMA Mr Smith aims to protect lives and the environment.

"The stakes are high if something goes wrong on an offshore facility. People can be seriously injured or die and the environmental impacts can be disastrous," Mr Smith said.

"My job is to make sure the industry is well regulated and everything is being done to prevent a major incident."

Since being appointed CEO in 2014, the role has evolved with new technologies like floating LNG entering the market, older assets moving into the decommissioning phase and additional responsibilities for the regulation of offshore activities like renewables.

The performance of industry has always piqued Mr Smith's career interests, whether pursuing policies to support industry development or measures to regulate the behaviour of companies.

Following graduation, Mr Smith moved to Canberra and joined the Bureau of Industry Economics within the Department of Industry, Tourism and Commerce before working with agencies such as the Anti-Dumping Authority and the Australian Competition and Consumer Commission.

> "Studying economics at UWA gave me an understanding of how markets work, what drives industry, what leads to market failures and when regulation can improve outcomes."

His career path saw him return to Perth to take up the role of Deputy Director General with the WA Department of Industry and Resources, leading the department's regulatory group as the State moved into a sustained resources boom.

Mr Smith moved to the Department of Fisheries as Director General in 2008 to deal with a new set of regulatory and industry development challenges associated with commercial and recreational fishing, marine reserves, biosecurity and aquaculture, an experience which proved vital when he returned to resources sector regulation with his current role at NOPSEMA.

Mr Smith has maintained a close connection with UWA and credits his degree for providing a strong foundation throughout his illustrious career.

He has served on UWA-related industry advisory committees for the WA Energy Research Alliance, the WA Marine Science Institute, the UWA Oceans Graduate School Industry Advisory Panel and the Management Committee that established UWA's Indian Ocean Marine Research Centre.

"Studying economics at UWA gave me an understanding of how markets work, what drives industry, what leads to market failures and when regulation can improve outcomes," Mr Smith said.

"These insights have stayed with me throughout my career and I've applied them in diverse industry roles.

"My daughter is currently in her second year of a Bachelor of Commerce at UWA and I am hoping her degree too will help shape her future professional opportunities."

In the **frame**

Connected: our alumni, staff and students snapped at UWA events this year.
Stay in touch or update your details at:
alumni-update@uwa.edu.au

GRADUATION **HIGHLIGHTS**

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