UTS

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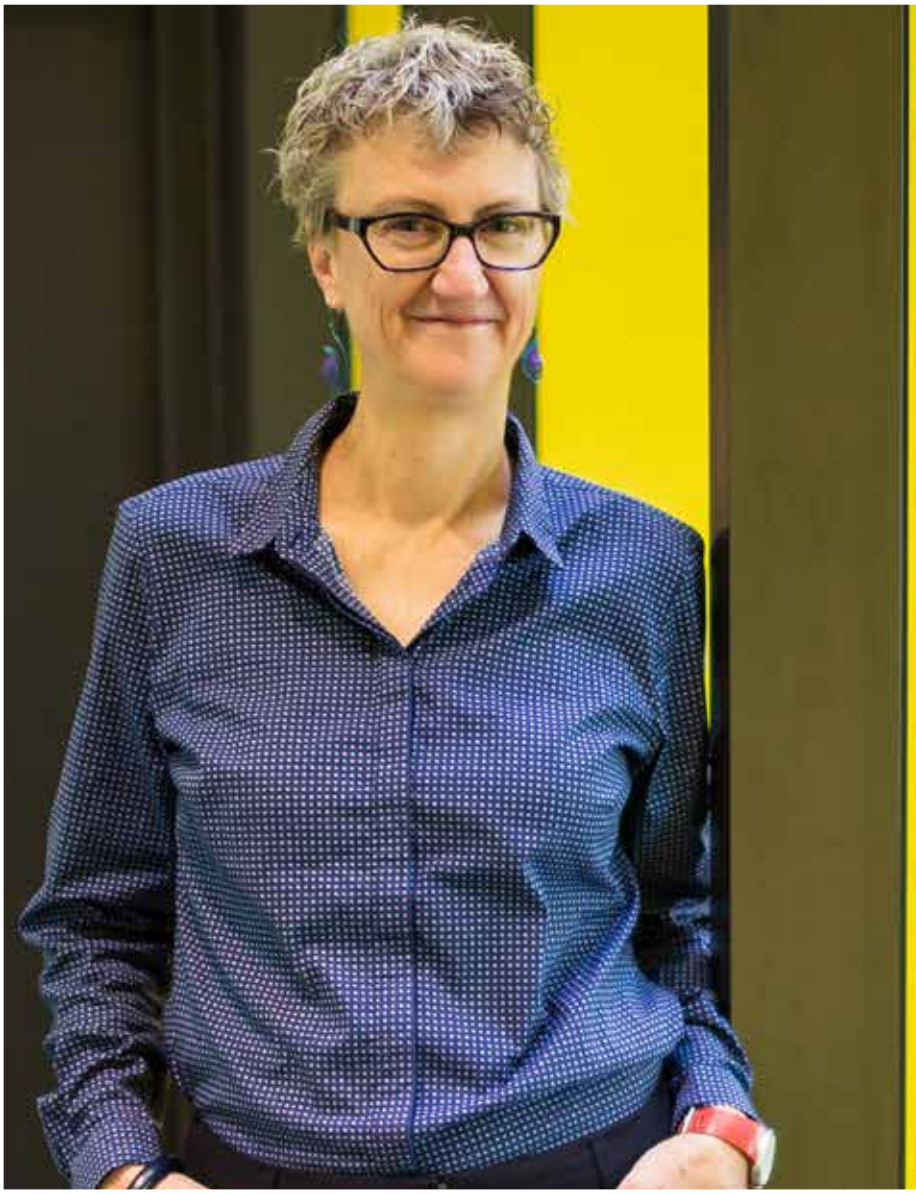
RESEARCH SPECIAL ISSUE



CUTTING THROUGH THE CLUTTER

How to make your research stand out: three UTS experts tell all

PIECE OF CAIK

Shaping a new body of knowledge on Indigenous Australia

THE POWER OF CITIZEN SCIENTISTS

How one research icon continues to engage the public

ASK THE EXEC

Professor Glenn Wightwick

deputy vice-chancellor (research)

In an earlier interview, you mention, "I have been mucking around with computers since I was 10". What is your funniest or strangest childhood computer memory?

I did lots of strange things with computers when I was a kid. The machines back then were very crude by today's standards and I remember once using a can of Freon (a refrigerant) and spraying it onto each computer chip to detect which one was overheating and causing an intermittent fault.

Is there a service UTS provides to staff that you make use of?

I make good use of UTS's flexible work arrangements. I tend to get into work early most days, but when I need to get to a school function for my children or get home and help them with an assignment then I'm not afraid to take advantage of UTS's flexible work policy. My days are typically full of back-to-back meetings, but it's really important to me to have the flexibility when required to make sure I can do things outside work too.

What has been your most memorable holiday?

I once did the Coast to Coast walk which follows public footpaths from one side of England to the other, crossing the Lake District, Yorkshire Dales and the North York Moors. Each day we'd eat a huge breakfast and then climb up out of the valleys, enjoy spectacular walking and scenery and then descend into the next town and eat a big dinner at the local pub!

If you could achieve one thing for research at UTS, what would it be?

The easy answer would be for one of our academics to win a Nobel Prize, which would certainly put UTS on the map! However, what is ultimately important is that our research is relevant and makes a difference in the world. It's something I'm passionate about and, as a young university with such strong ties to industry and the community, I see this as an area UTS can really own.

What's been the highlight of your job so far?

Without doubt, the highlight of my job is the times I get to spend with our researchers listening to them describe their work and what they are planning to do in the future. There is nothing more inspiring than listening to passionate people describe insights and discoveries in their fields.

How do you think the government's focus on impact and engagement will change the landscape of research in Australia?

I hope the government's focus on impact and engagement will contribute to a positive change of culture across the entire Australian research ecosystem, such that research impact is as highly valued as excellence. This has certainly been the experience in the UK, where impact has been integrated into their research excellence framework and I think this as a great role model for the Australian system. The UK experience has also highlighted that the pathway from research to impact is enormously varied and that trying to measure impact doesn't make a lot of sense.

Photographer: Joanne Saad

Articles

Next issue

The next issue will be released on
Monday 7 August 2017

All U: articles are available to read online via **newsroom.uts.edu.au** or follow us **@utsnewsroom**
Send your story ideas, opinions and events to **u@uts.edu.au**

Research Special Issue

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Associate Professor Tapan Rai

Preparing for a brave new world

An increasing focus on applied research, a shrinking pool of government funding and a growing need to work effectively in multidisciplinary teams means that today's researchers need skills beyond academic expertise.

Enter Associate Professor Tapan Rai, Director of the Researcher Development Program in UTS's Graduate Research School. Rai and his team deliver a range of skills development courses that prepare UTS researchers for the challenges of a research career.

"We're in a changing landscape compared to, say, 20 years ago, when academic researchers focused more on the academic impact of their work than the benefit to society or the economy," says Rai.

"We have a larger cohort of students than we used to, but they're not all going into academic careers beyond their PhDs. So a lot of it is getting them to think about developing a career in applied research that facilitates the solutions to industry problems."

PhD and masters by research students can access both general and research-specific skills development modules. From project management to finding funding, working in interdisciplinary teams and understanding research ethics, these programs support the development of skills that can be applied across a range of professional environments.

There are also targeted programs available for early- and mid-career researchers. These offerings, called ECR Connect and MCR Boost, reflect the fact that no two stages of a research career are the same.

For example, says Rai, "ECRs are people who've finished their PhDs, but they're also quite clearly pursuing an academic career while they're here.

"The ECR program might be more related to 'How do you pitch your own research to industry?' or 'What are the kinds of things you need to include to make yourself stand out?'."

MCRs, meanwhile, might focus more on long-term research career planning, reputation building, and managing intellectual property. Women in research programs are also available at every stage of a UTS research career.

And supervisors get a look-in too, with modules on intercultural and interdisciplinary research relationships, as well as refresher courses on UTS regulations and the UTS Doctoral Framework.

Though Rai is only a few months into the job, he has big plans for the next couple of years. He's already teamed up with other units across the university to implement a new mentorship program that will pair research students and ECRs with industry mentors, increasing their understanding of industry-based research.

Similarly, media training and developing a data science training strategy are also future focuses. The development of online modules will also support researchers to study when and where they like.

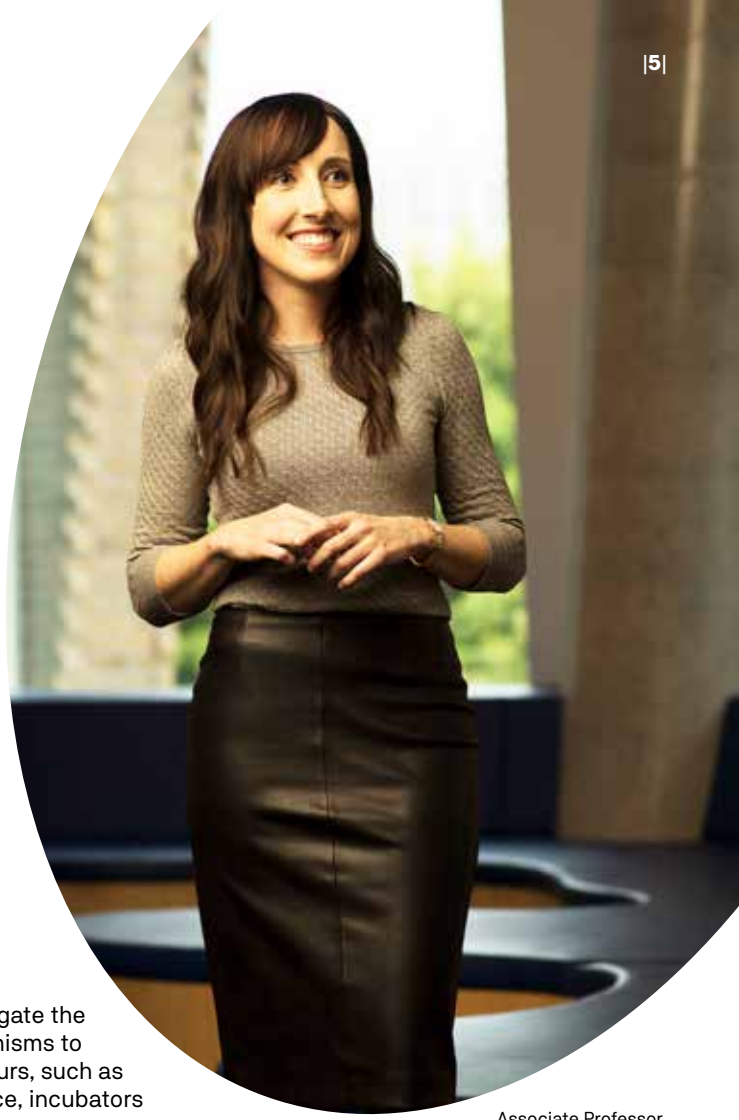
"For researchers, it's a matter of finding the time investment. We know students would prefer to actually do some modules in their own time, so we're looking at offering what we're doing online," he says.

"Any experience that you gain in terms of developing yourself as a researcher and not just looking at things narrowly from your own research project perspective is going to be useful to you in your career."

CLAIRE THOMPSON

Photographer: Shane Lo

Doing aid differently



Associate Professor Danielle Logue

A research partnership with the Department of Foreign Affairs and Trade (DFAT) is looking at ways to tap into the growing appetite for socially aware investment in order to amplify aid and development efforts in the Indo-Pacific.

Associate Professor Danielle Logue has been working with the new InnovationXchange (iXc) unit within DFAT to examine ways to better connect social enterprises in the region with 'impact' investors.

Impact investors seek a social as well as a financial return when they place their money. The social enterprises they partner with make profits, but they do so to do good.

"The focus of this project has been to look at how we might be able to do aid differently, for example, how might we use aid as a catalyst for greater private sector investment in the region – investment that seeks a social good return alongside a financial return," says Logue.

"How can we engage businesses in these efforts – recognising that there are business models that not only do well, but also do good?"

DFAT's Director of InnovationXchange, Matt Steine, says the untapped potential of social entrepreneurs is enormous.

"Innovative, market-based solutions have the potential to deliver more sustainable, effective and scalable solutions to development challenges," he says.

iXc asked Logue to investigate the viability of various mechanisms to support social entrepreneurs, such as crowdfunding, microfinance, incubators and social stock exchanges.

"Because impact investing is a nascent market, and social innovation is a term that's still being worked out, it was important for us to talk to people in the field trying to solve these problems – to try to understand what the weak spots are in the system and what the government can do to help them," Logue says.

"We wanted to find examples of those doing it well; examples of best practice where people were gaining traction in really resource-poor areas."

Altogether, the research team interviewed more than 110 people across the region, building a database of incubators and accelerators, crowdfunding platforms and microfinance organisations.

The research found these sorts of tools were all at different stages of development and each had its pros and cons when it came to achieving the goals of aid and development.

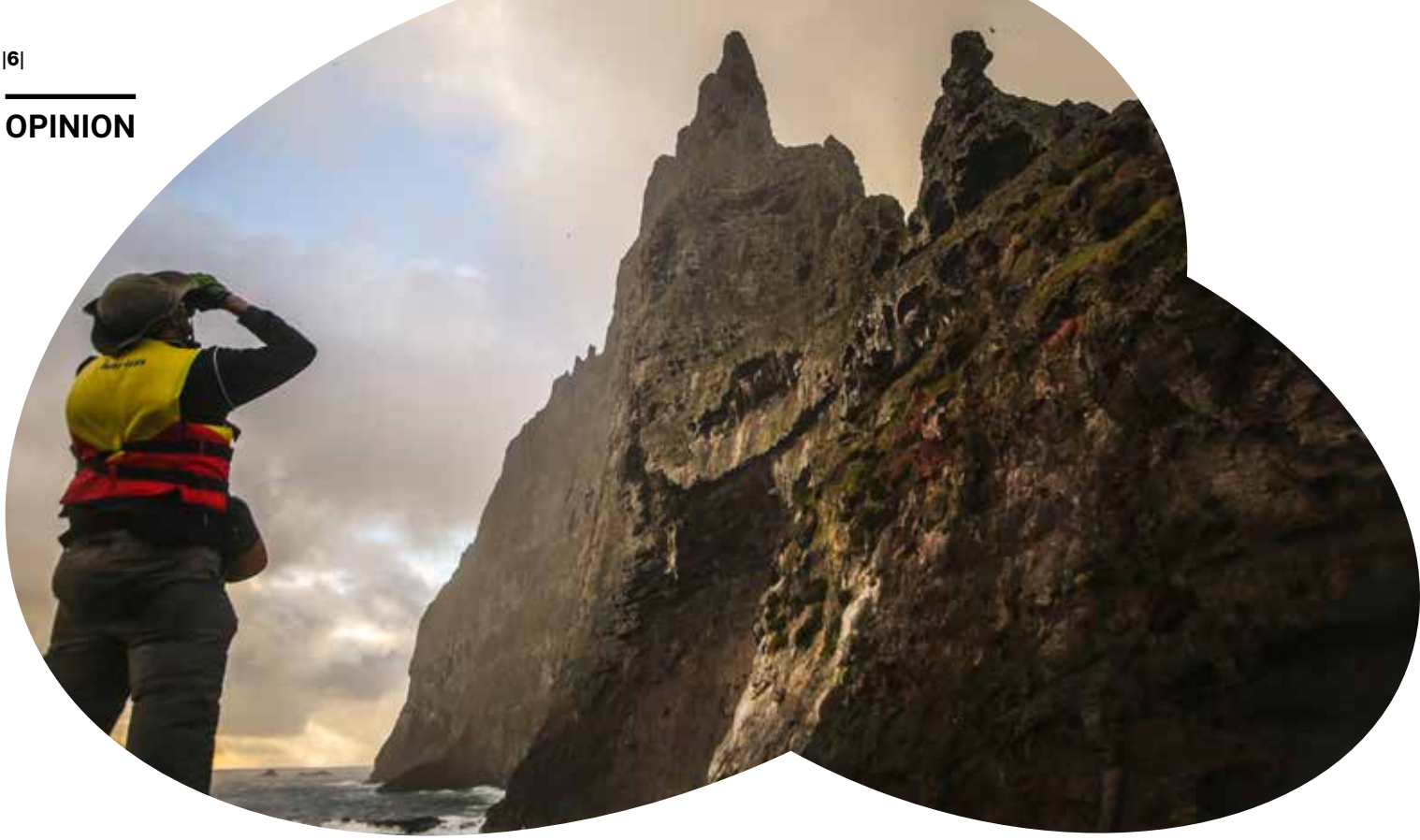
For example, crowdfunding – where small contributions from a large number of people are collected via an online platform – is potentially useful for early-stage finance. But its reach can be limited by a lack of online banking infrastructure in some places. So, one idea to support programs identified as likely to have high social impact could be for the government to match crowdfunded amounts.

"This is a very dynamic area, with new actors coming onto the scene even as we researched," Logue says.

"We hope this project will make a material difference to aid and development being more effectively delivered, and to the lives of people in the region."

LESLEY PARKER
Marketing and Communication Unit

Photographer: Damien Pleming



Australian Museum
Ball's Pyramid expedition

The power of citizen scientists

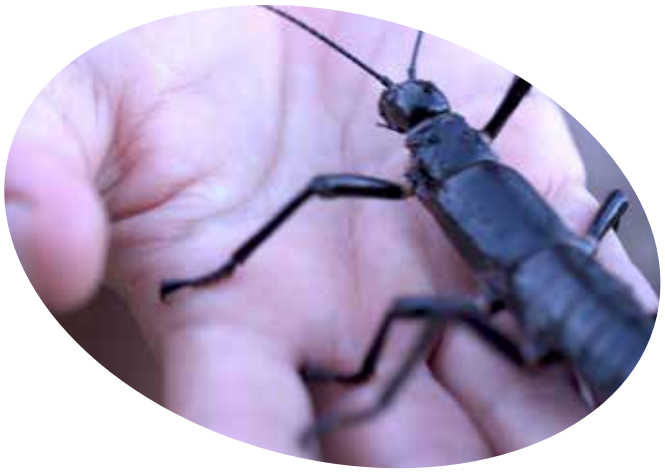
How does a 190-year-old research icon remain relevant? Just ask the Australian Museum. Director and CEO (and UTS Luminary) Kim McKay AO reveals how, as the museum celebrates its 190th anniversary, it continues to engage with and involve the public, and why community participation is so important.

Kim McKay

Scientific research institutes tend to be, by nature, inward-looking and often solitary in the work they do. My perspective has always been from the public engagement side – how can we be 'social' scientists working to engage the community?

In my role at the Australian Museum I bring a very generalist and outward-looking perspective; one based on how you can effectively communicate science to the public and involve them.

It's perhaps no surprise; my background is in communication – I graduated from UTS in 1981 with a Bachelor of Arts (Communication), co-founded Clean Up Australia in the 1990s and, since 2014, have been part of the UTS Vice-Chancellor's Industry Advisory Board (among other things).



Lord Howe Island Phasmid

> "When people can see the real-world impact of research, and how their participation can contribute to the bigger picture, that's when they become engaged"

In my experience, the way you change public opinion or influence people's belief systems, and change behaviour, is through participation. Once you have actually participated in something you have a whole different perspective and understanding.

At the Australian Museum, and with IBM's assistance, we've been developing a citizen science initiative related to frogs. The initiative will launch later this year as part of our 190th anniversary celebrations. Through it, we hope to see 500,000 citizen scientists, not just 10 to 20 scientific experts, working in the field to gather data about the 250-plus frog species living in Australia. It's an incredibly exciting project!

At the more extreme end, the museum recently enlisted experienced climbers to help our scientists scale Ball's Pyramid – the incredible, spikey volcanic spire sitting out in the middle of the Tasman Sea 20 kilometres from Lord Howe Island. It's also the only known home of the rare Lord Howe Island Phasmid, once thought to be extinct.

The live specimens the scientists and climbers collected have since been sent to Melbourne Zoo to join a breeding program. The plan is to reintroduce them to their native home sometime in the near future. It's exactly the sort of thing I want to do more of at the Australian Museum.

We have more than 18 million specimens and artefacts in our collection that can be used to show the impacts of issues like climate change and the effects on biodiversity. And our Australian Museum Research Institute works with the collections to conduct relevant and practical science that helps inform decision-making for governments and non-government organisations, and that educates the community.

However, explaining to the public why research is important in a museum context has its challenges. We are not advocates in the political sense. Our role is to present the facts to the public and to help them interpret science through our exhibitions and other outreach.

Recent research in the United States ranks museums as the number one most trusted science institution, so we have an important role to play in communicating contemporary issues.

And technology can help us. Not only have those wonderful little smart devices we all hold in the palm of our hands enabled a new way for the public to engage, but so too has data science. I'm very passionate about exploring how we can make use of data through our citizen science initiatives.

UTS has been leading the study of data science with their research and the UTS Data Arena. It's so impressive! Once you start visualising data, what it can tell you is mind-blowing. It's therefore fitting that UTS is sponsoring the Australian Museum Eureka Prize for Excellence in Data Science. The award, which was established this year, highlights the pioneering reputation of UTS in both academia and scientific fields.

It's so exciting to be part of a university that has such a bold vision and is really passionate about making a difference in the world. When people can see the real-world impact of research, and how their participation can contribute to the bigger picture, that's when they become engaged. And those are stories we can all share.

KIM McKAY AO
Director and CEO
Australian Museum

Photographer (K McKay): Ross Coffey
Photographer (Ball's Pyramid, Lord Howe Island Phasmid): Tom Bannigan © Australian Museum

A piece of CAIK

Have you ever considered what the educational experiences of young, incarcerated Indigenous males actually looks like? What about the role Aboriginal women's groups play in building social capital? The Centre for the Advancement of Indigenous Knowledges (CAIK) has. These are two of the higher degree by research projects underway at CAIK – a centre that in just two years has transformed the way we interact with and understand Indigenous cultures.

Professor Michelle Trudgett

In a sunny corner of building 10, three academics are shaping the future of the university.

Professor Michelle Trudgett, Professor Susan Page and Associate Professor Gawaian Bodkin-Andrews have played a leading role in the establishment of the UTS Centre for the Advancement of Indigenous Knowledges (CAIK). Together, they're making a major contribution to the progression of Indigenous research and scholarship at UTS.

"Most of our research is based around Indigenous education – that's the centre focus of what we do," says Trudgett, CAIK's Director.

"For Susan and I, our interest is very much based on higher education. We recently completed an Australian Research Council - funded study on the supervision provided to Indigenous doctoral students. I'm particularly passionate about research that looks at Indigenous postgraduate student experiences, and that was the topic of my doctorate when I did it a decade ago.

"Gawaian's research area is predominantly racism and discrimination in education, and he is one of the most renowned academics in the country in that space."

Since CAIK's inception in February 2015, the team have attracted 10 higher degree by research students. Incredibly, supervising these students is a sidebar to CAIK's broader mandate – the team was brought to UTS specifically to embed an Indigenous graduate attribute into every course at UTS.

But the research program has taken on a life of its own, complementing CAIK's original mission while simultaneously creating a significant body of new knowledge that directly involves or impacts Indigenous Australians.

The diversity of this knowledge is evident in the wide range of projects that CAIK students are undertaking. PhD student Grace O'Brien is investigating the educational experiences of male Indigenous youth who are incarcerated in Queensland, and what she calls the 'school to prison pipeline'.

She posits that exclusion from school often results in young Indigenous men coming into contact with police, leading to their dramatic over-representation in the juvenile justice system in Queensland.

"I was just astounded to see that Indigenous children were being incarcerated 28 times more than their non-Indigenous counterparts, even though they made up a smaller percentage of the cohort," says O'Brien, whose research is supervised by Trudgett.

O'Brien is working with Indigenous community organisations, Elders and individuals in Queensland's Moreton Bay area to develop Indigenous-led, community-based education solutions to correct the imbalance. Her aim is to give Indigenous kids who've been excluded from school, or who are falling through the gaps of the education system, a culturally supportive place to come to where they can get back on track.

Lisa Oliver, meanwhile, is a Master of Education student and a Gamilaraay woman. She is supervised by Page, and investigating the role of Aboriginal women's groups in building social capital. It's a topic close to her heart – as an Aboriginal woman and a women's group participant, Oliver has had first-hand experience of the value of these groups in a community setting.

"They play such an important role for Aboriginal women in connecting with each other, in becoming more resilient. I thought there was a need to do some qualitative study with those groups, and also tie some western social capital theory to the types of things that come out of them," she says.

Oliver's project uses Indigenous research design and methodologies developed by First Nation researchers. This approach, she says, allows her to conduct research in a way that reflects an Indigenous view of the world.

"The exciting thing about Indigenous research is that it is an emerging field, but we've got the opportunity to look at western theory and try to explain it in our own words, in our own terms and to be supported by UTS to do so," explains Oliver.

CAIK's students are part of a growing cohort of Indigenous research students across UTS. In 2015, there were 12 Indigenous research students at UTS. Today, there are 36, 14 of whom enrolled in the 2017 Autumn session alone. These numbers reflect a university-wide commitment to Indigenous education, which has resulted in UTS's high profile reputation as a leader in the field.

"The exciting thing about Indigenous research is that it is an emerging field, but we've got the opportunity to look at western theory and try to explain it in our own words"

According to Pro Vice-Chancellor (Indigenous Leadership and Engagement) Professor Michael McDaniel, this reputation is underpinned by extensive scholarship support for Indigenous research students, the collegiality of the UTS community and high-level Indigenous staff employed across the university.

That includes not only the staff in CAIK, but others like Professor Larissa Behrendt, who, McDaniel says, has been the driving force behind the establishment of Indigenous research at UTS.

Lisa Oliver

Grace O'Brien

Departments like CAIK and Jumbunna: Institute for Indigenous Education and Research, which plays a crucial role assisting Indigenous students through the application process and provides cultural, social and academic support over the lifespan of a research degree, are also key to ongoing growth in this area.

Says McDaniel, "I think generally UTS is seen by many Indigenous people as a welcoming university, a university whose academics and the research of those academics is well known and is considered to be ethical and committed to having genuine impact with Aboriginal communities."

CLAIRE THOMPSON

Photographer (M Trudgett): Shane Lo
Photographer (L Oliver): Joshua Oliver
Photographer (G O'Brien): Elena Anderson

COVER
FASS | HEALTH | SCI

Cutting through the clutter

Dr Catriona Bonfiglioli

Thanks to mobile technology, the latest news is always at our fingertips. But this convenience has come at a price – a 25 per cent drop in science and health reporting in the mainstream media in the 10 years to 2014, and a rise in blogging, advertorials and fake news. All of which makes finding accurate and reliable information more difficult. Three UTS experts share their insights into how researchers can cut through the noise and how we can all contribute to better health and science literacy.

"We're absolutely drowning in information," says Senior Lecturer in Media Studies in the Faculty of Arts and Social Sciences Dr Catriona Bonfiglioli.

"We haven't just got a reduced quantity of health and science journalism, we've got wider access to press releases that come from commercial entities, we've got all the bloggers and tweeters and all the research-focused, hospital-focused and disease-specific websites, and now we have to add a drop of fake news into the mix.

"How on earth are ordinary folk supposed to navigate this wave of information and come out understanding what they're meant to do?"

As an experienced journalist, medical writer and former president of the Australasian Medical Writers Association (a leading body promoting excellence in health and medical communications in Australia and New Zealand) Bonfiglioli sees huge potential for equipping the public with tools to better navigate health and science issues.

The first is by recruiting citizen journalists and giving them targeted training in health reporting. "I have an idea for a project to enhance and support the public being a kind of citizen journalist, bearing witness to the health and medical hazards and benefits around them and using their citizen journalism kit to tell the world what to watch out for."

As the coordinator of the new undergraduate subject Communicating Health and Science, Bonfiglioli is teaching students critical appraisal skills so they can effectively evaluate the significance of research publications.

She says, "Every single member of the public needs to have these skills to some degree and I think that ordinary people who are interested in health and science can develop these skills with a bit of help."

To this end, she would like to develop publicly available training in critical appraisal. Bonfiglioli also plans to develop resources to bridge better communication between journalists and scientific and medical researchers. It's part of an ongoing Australian Research Council Discovery Project in collaboration with researchers from the University of Sydney and Monash University.

But, Bonfiglioli says, there are also steps researchers can take "to get their research out to the public in more ways". She recommends utilising communication experts and taking advantage of opportunities to communicate directly with the public, such as writing for the independent online news site *The Conversation*.

"You're not getting the most out of your job if you're not engaging with the community and the public about your research"

Chancellor's Postdoctoral Research Fellow Dr Caleb Ferguson from the Centre for Cardiovascular and Chronic Care has done just that. He's been seizing the opportunity to write for *The Conversation* since 2012 and utilising Twitter to communicate his research from 2010.

Ferguson has seen "huge benefits" in disseminating his work and engaging with consumers, end users of his research and non-government organisations. As a stroke researcher, he says this is particularly important.

"No one really realises how big an issue stroke is. When I say it kills more women than breast cancer and more men than prostate cancer and it affects one in six of us, people are always shocked. There's not a public discussion about it."

For Stroke Week 2016, Ferguson wrote a piece for *The Conversation* and participated in a UTSpeaks public lecture - *Broken Brains, Breaking Hearts* - which attracted a lot of media interest. He also did an *All in the Mind* podcast with ABC's Radio National. He says, "It definitely got a lot of impact to start generating community awareness around this topic."

Ferguson puts this success down to having a targeted approach across multiple media.

"I'm on quite a few editorial boards and now they say having a social media dissemination strategy once a paper has been published really is key to driving the success of their journals. Certainly the papers I've done when I have a targeted dissemination strategy have been really successful."

In addition to Twitter, Ferguson now uses LinkedIn to blog about papers he publishes. "It's almost a way of 'direct marketing' to a highly engaged audience."

One barrier Ferguson sees to researchers engaging in these ways is the feeling of not having time. But, he says, "You've got to make time. You spend three years doing the research, then to write the paper, why not spend 10 minutes to write a blog and tweet about the findings, which could have quite a good impact in translation and dissemination?

"You're not getting the most out of your job if you're not engaging with the community and the public about your research. That's an important aspect of your work."

Given the highly competitive nature of traditional sources of research funding – success rates for 2016 National Health and Medical Research Council project grants sit at just 15.2 per cent – Ferguson points to social media's potential as a platform for attracting alternative funding.

"We have to start thinking outside the box for research funding. There are some good success stories of people crowdfunding using Twitter – there's one example where cardiac research at UNSW was awarded $40,000 for a project.

"It's something for people to think about as a benefit of using social media – how you craft that story and what you do and why it's important."

Dr Caleb Ferguson

COVER
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Director of the ithree institute Professor Liz Harry is a keen advocate of science communication. But she was discouraged from talking to the media early in her career by senior researchers.

"As a postdoc I was frightened of communication because a lot of the older professors would say, 'Be careful what you say to journalists. What they write in the papers is nothing like what it really is'. I can understand where they were coming from, but I don't agree that the experience with journalists has been bad – it's been terrific."

The turning point came in 2002 when Harry was awarded the Eureka Prize for Scientific Research for her pioneering work on bacterial cell division, and she had to take "a big jump into the deep-end of the pool of communication".

"After the Eureka Prize I was interviewed, I was on television, I did lots of things that I never thought I would do. Although I'm a very social person, I was worried because suddenly my audience went from people I could speak to analytically and in-depth about something that I knew a lot about, to trying to simplify that information for the public."

Harry says the experience taught her that effective communication at different levels, including public speaking and media interviews, was a skill that could be learned – and even enjoyed.

"It made me realise how much my research matters to the person in the street and the difference I can make by messaging to people something that's important to them. For example, if people understand antimicrobial resistance, they can make informed choices and the community can push for better health outcomes."

The experience changed the way Harry thought about research.

Professor Liz Harry

"A lot of my research life, particularly before UTS, I was focused on the specifics of my research – not the broader impact it would have. We never really talked about the fact that the taxpayer's money is paying us and therefore we have a responsibility to them."

She adds, "I have shifted the direction of my research towards application because of that realisation."

It also resulted in a eureka moment with her parents. "I did a five-minute perspective for Radio National about growing up and being a scientist – why I'm a scientist and what I've got out of it. My father listened to that, and he rang me up and said, 'I finally understand why you do what you do'."

Harry now ensures all researchers and research students at the ithree institute pursue communication training and experience by embedding it into their workplans and facilitating opportunities. They capitalise on UTS's relationship with 2SER radio and close proximity to the ABC to hone their skills, and enter public speaking competitions like FameLab. In fact, in May this year, a member of Harry's research team, Dr Nural Cokcetin, won the national competition and will compete internationally in the UK later this year.

The aim, says Harry, is to raise researchers' profiles and open up funding and collaborative opportunities for them, the institute and the university. It's also a way to engage and inform the public. "As is the UTS way, we're advocates for what we really believe in and where we think we can make a difference," she says.

"Sometimes you get a call or email after you've been on radio or in the media from someone saying that they or their loved one have not had a limb amputated because they heard you speak about a health solution they hadn't known existed.

"You realise you are making such a huge difference that you never would have thought possible, and it's so powerful – just by getting the message out."

RACHAEL QUIGLEY
Marketing and Communication Unit

Photographer (C Bonfiglioli, L Harry): Shane Lo
Photographer (C Ferguson): Stella Thai

RESEARCHER FOCUS
FEIT

The quantum experiment

Dr Chris Ferrie

Dr Chris Ferrie likes to experiment. The Centre for Quantum Software and Information quantum theorist likes to "mix things up" in his research, in the way he communicates with fellow academics and in the work he has published.

It's a unique perspective that has found Ferrie occasionally moonlighting as a children's book author, with titles like *Quantum Physics for Babies, Newtonian Physics for Babies* and *General Relativity for Babies*. Ferrie says the books started as a "nerdy baby book joke", but have since turned into a series of six (and counting) children's books on similar scientific concepts.

"Writing picture books was quite easy and natural for me because I have four small children and I could see how they would grasp and process the world around them. I simply took that process, converted them into short, five-word sentences, drew some pictures and that formed the basis of my books," says Ferrie.

While the term 'quantum physics', probably doesn't conjure thoughts of a kid-friendly read, the books have been a runaway success. "I was very lucky to receive some free publicity after Facebook founder Mark Zuckerberg posted a family photo of himself and his wife Priscilla Chan reading *Quantum Physics for Babies* to their daughter."

A flurry of media and social media interest followed and his children's books have since been signed to an American publishing house.

Back at UTS, Ferrie's using the same approach in his research. He's hoping to contribute to some of the theoretical building blocks of a yet-to-be developed quantum computer.

"Right now, much of the current research is heavily influenced by physicists and the ideas and culture of physics, whereas I want to bring ideas from other fields such as machine learning, statistics and information theory to solve the same problem," says Ferrie. "This way of thinking doesn't really exist now."

For Ferrie, experimentation is key. "I think you need to try a lot of different things, and from there, have the successes or failures dictate your next step."

It's one of the reasons why Ferrie looks to capitalise on research seminars and conferences to uncover new and engaging ways to present his work. At a recent conference, Ferrie's academic poster looked more like a popular news and entertainment website, presenting quantum tomography and optimisation via a series of clickbait-style headlines, like, 'This data will restore your faith in science'.

The off-beat approach successfully cut through the clutter. Ferrie's became the most-viewed poster at the Australian Institute of Physics Congress last December. "My aim is to keep people engaged and excited," says Ferrie. "And it certainly got a lot of people talking!

"With over two million academic papers being published each year, academics can't rely on journals to make their work visible.

"I'm having a bit of fun, and I'll keep doing this because I can see that it has a positive effect on people."

ELIZABETH KUO
Marketing and Communication Unit

Photographer: Shane Lo

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TWO OF U
ISF

Stuart White (centre) with ISF staff at an operations meeting, 2002

A better tomorrow, today

Cynthia Mitchell with Juliet Willetts at an HDR retreat, 2006

On the 20th anniversary of the Institute for Sustainable Futures (ISF), we take a look back at how a chance meeting in 1995 influenced the centre's development and how it has pioneered transdisciplinary research.

Professor Cynthia Mitchell

I fell into an academic career accidently. A few years after graduating from university I began a PhD in biotechnology, but I quickly became disillusioned with that sector. So I took off travelling around Australia for a year camping in the bush. All these years on, Western Australia's Karijini National Park still holds a special place in my heart.

As much as I loved the nomad life, I needed to get a job! My background was chemical engineering and biotechnology. But my passion for the environment got me a position in a civil engineering department. I had to come up with a research area quick smart, and when you add that mix together you end up in the shit, so to speak – with sewerage. My work focused on more environmentally sound technologies, like artificial wetlands.

Over the years at ISF, I've sought to bring sustainability to water and sanitation projects in Australian cities and in an international development and social justice context in the Asia-Pacific region.

When I met Stuart in 1995, I was running international short courses at the Gold Coast. I'd take participants on field trips down to wetlands and ponds around the wonderful NSW Northern Rivers area. Stuart had installed a composting toilet and greywater system in his Lismore home, so I integrated it into the field trips and he kindly let my professionals crawl in and under his house!

Fast forward a few years and Stuart and I were both in Sydney – he was working at the institute and I was at Sydney Uni. I was actually working with Stu's partner, and one day I told her what I really wanted to do was, 'engineering as if sustainability mattered'. And she said, 'You know Stu is looking for people?'. So, in 2001, I joined the ISF team. It was a big decision – all the advice I got at the time was that I shouldn't take it – but it's a decision I've never regretted. A big part of that lies in Stu's enthusiasm and positivity – he always asks, 'What would it take to... '; encouraging all those around him to be the best they can be.

Part of my motivation for joining ISF was to work out how we create learning environments that are motivated by something other than marks. Over the decade before I joined ISF, I had become very passionate about learning. For me, creating change is all about learning; each of us has to learn to do things differently if change is going to happen. When I arrived at ISF, Stu asked me to take on the postgrads.

Most PhD students elsewhere were another brick in the wall, bounded to deep explorations of a single discipline within their supervisor's work. That certainly has its place, but I felt something more practical and unconventional was necessary in the face of the world's complex sustainability challenges.

It's been so rewarding, and just plain fun, to learn and grow with our higher degree by research (HDR) students over the years. They've always been a disparate bunch; it's the nature of a transdisciplinary PhD. But we've developed a rich community of practice and now the HDR program is an engine room of innovation for ISF's research programs.

What's remarkable is that we've always had a kind of magic at ISF. That's something I think is still here. It's impossible to pin it down to one thing or another, but for sure part of it lies in how we build capacity in people. Stuart has a wonderfully inclusive and humble leadership, and our increasingly decentralised model of decision-making encourages innovation and fosters respect.

Most of all, our staff and students are passionate and committed to making big and audacious change. We believe that tomorrow can be better than today.

Professor Cynthia Mitchell and Professor Stuart White

Professor Stuart White

Cynthia and I first met in 1995. I was a sustainability consultant, walking the halls of the national water industry conference in Sydney. I gravitated towards a research poster making the case for alternative methods of treating sewage using constructed wetlands – as you do!

Sustainable sanitation was a pretty new concept at that time, especially for an engineering crowd, so I struck up a conversation with the researcher presenting the poster, and that was Cynthia.

Cut to 1997 and I heard about a senior research position at this new institute. The role was exactly what I had been doing as a consultant – I'd been working for a number of government agencies on everything from energy to sustainable buildings. But, I felt, with the credibility and backing of a university I'd have much greater prospects for creating change.

And, for me, it wasn't just any university. I have a long history with UTS. In the late 1980s, as a physics PhD student at the Solar Energy Group at Sydney University, I was a casual lecturer for the Design School at the Sydney College of the Arts. Of course, that was absorbed into the faculty of Design, Architecture and Building at the very founding of UTS in 1988. So some of my last pay cheques before I finished my PhD were from UTS!

Shortly after I started at ISF, contacts at Sydney Water rang and said they wanted to work out how to meet their targets for reducing water demand. We pioneered an approach called 'integrated resource planning' and focused on water recycling, leakage and efficiency. That became a major body of work for ISF, especially during the Millennium Drought, which started in 2001 and was the country's worst dry-spell since European settlement. We're now sharing that expertise with governments in California, Sao Paulo, The Philippines and other drought-affected areas around the world.

This relationship was also important because it led to the contract research model that ISF operates under today. It's been so successful that we've grown from a handful of staff and postgraduate students to almost 70 staff and 40 students across 10 research areas.

In many ways, Cynthia has been fundamental to ISF's evolution. Her arrival was a lifesaver. We had very few senior staff and were growing rapidly. Cynthia led the development of a world-class transdisciplinary postgraduate program, and mentored students and staff.

She was also a vital part of grounding our transdisciplinary approach to research. We have always done it at a practical level – every project has a diverse team approaching the problem holistically, using systems thinking to examine the economic, policy and technical aspects – but Cynthia's really elevated that practice to be more transparent and reflective, and in the process become a global transdisciplinary thought leader.

XAVIER MAYES
Marketing and Communication Unit

Photographer (C Mitchell and S White): Shane Lo Photographs (2002, 2006) supplied by: Institute for Sustainable Futures

Designs for life

Imagine living in a share house with four people you don't know or don't like. You'd pack your bags, hop online and find a new place to live, right? For people with the highest level of needs living in supportive disability accommodation, the answer isn't that easy. But one day, it could be, thanks to research by industrial designer Dr Phillippa Carnemolla.

"I'm never shocked by people's capacity, but I have been shocked by how people have been held back."

Dr Phillippa Carnemolla has always had a "deep interest in design and human rights". For the past 25 years, she's worked as an industrial designer, jewellery designer, researcher, lecturer and an expert in design and compliance for litigated and non-litigated matters.

She's also acted in advisory roles for and sat on the board of organisations like Achieve Australia, the City of Sydney Inclusion (Disability) Advisory Panel, Centre for Universal Design Australia and the Community Consultative Committee for Centennial Parklands.

And, as of November last year, she's taken on the role of Postdoctoral Research Fellow in the Built Environment, Information and Informatics Research Centre based in UTS's Faculty of Design, Architecture and Building.

Dr Phillippa Carnemolla

“I want it to be much easier for people to have houses that they can live their entire lives in with autonomy and mobility and freedom”

It’s a perfect fit for Carnemolla, who, as a child dreamed of being a doctor and as a uni student (she studied industrial design at UTS from 1991 to 1995 and completed a Master of Design at UTS in 2003) wanted to design furniture in Milan.

“I was good at maths, I was good at science and I liked the idea of being a doctor; of the healing, of being able to help, and understanding the human body,” recalls Carnemolla. “But I was also very creative, so industrial design won me over. Now, here I am, not having searched for it, but I’ve somehow found a way of coming back to what I was searching for in a health-based career.”

Today, Carnemolla is helping people through good design. Her work has seen her investigate how home modifications and the built environment can positively impact the quality of life for older people and people living with a disability. In fact, one of the first papers she wrote was cited in a Productivity Commission report on ageing and health.

Currently, Carnemolla says, “One of the projects I’m working on is with a disability organisation providing supported accommodation for people at the highest level of need; people who require assistance to be available 24-hours a day.

“We’re starting to do some research around the wellbeing and quality of life differences between living in a group home with a support person sleeping overnight, and living in mixed-tenure individualised apartments with additional technology and 24-hour support through a hub.”

It’s a revolutionary approach that could well change the way support is provided in Australia. Community-based options for people requiring higher levels of support remain limited. And for older people living in the community, the onus for care often falls on family.

The 2015 Australian Bureau of Statistics *Survey of Disability, Ageing and Carers* reveals there are 2.7 million unpaid carers in Australia and 96 per cent of those are the primary carer for a family member.

It’s something Carnemolla has experienced first-hand, caring for family who live with a disability and supporting close friends and family to live, and thrive, at home through declining cognitive and physical health. Carnemolla says the impact of improved at-home care can be staggering.

“The design of the built environment is critical because it means the difference between getting out of the house or going to the toilet independently or getting up the stairs.

“My PhD was able to show that improving people’s home environments not only impacted the amount of care received in the home – it almost halved the amount of care – but it changed relationships.

“Being able to be autonomous while also reliant on care is a critical, but delicate balance,” she adds.

“Interestingly, absolute independence isn’t always the answer, but the nature of care definitely impacts our sense of dignity and power. In some cases in my research, a small $40 handrail in the bathroom made as much impact on a person’s life and care needs as a larger modification, like a lift.”

For Carnemolla, listening to her clients is key. “I think that’s really important,” she affirms. “That’s what makes us human – being able to help and support each other in times of need.

“I want it to be much easier for people to have houses that they can live their entire lives in with autonomy and mobility and freedom. I want that to be valued and understood.”

And that’s why, Carnemolla says, good design needs to be inclusive. “Inclusive design is design that enables people to have that quality of life that we’re talking about – so to participate, to be as independent as possible, to be autonomous and to live in the world without having to ask permission.

“It’s not just me making decisions about what’s best for people. It’s about how we include people in the research and design process so that they’re a participant in that decision making and that what we get in the end works for as many people as possible.

“Built environments have tended to be considered as permanent and fixed. However, conceptualising and designing built environments as evolving and multi-layered, physical and digital spaces opens up so many new possibilities for accessibility, both in public space and private housing.

“It’s an exciting time to be considering the scope of disruptive technologies in the built environment and ways of supporting more vulnerable people in our community, including people living with dementia, to participate safely and with dignity and confidence.

“Although standards are there to provide part of the answer, they rarely present the full extent of what’s possible.” Carnemolla hopes to uncover what is.

FIONA LIVY
Marketing and Communication Unit

Photographer: Shane Lo

Saving the silver lining

Dr Cindy Gunawan

Using silver to protect against bacteria has a long history, from treating burns to purifying water. Hippocrates first described silver's antibacterial properties in 400BC and ancient Phoenicians knew enough to keep water, wine and vinegar in silver vessels to keep them fresh.

Today, with the rise of multi-drug resistant bacteria, nanosilver – which is very potent in killing bacteria – is seen as an alternative to antibiotics. So, it's no surprise that nanoparticles of silver that measure less than 10,000th of a millimetre are increasingly found in medical devices like internal catheters and implants, and in wound dressings to fight infections.

But, Chancellor's Postdoctoral Research Fellow in the ithree institute Dr Cindy Gunawan is concerned the nanoparticles are now also increasingly being used in everyday products.

"Companies have been incorporating nanosilver in personal care products, such as toothbrushes, toothpaste, clothing, socks, kitchen appliances, washing machines – even baby bottles, teats and toys – without effective regulation or adequate research into the risks of this approach. We don't know if it is going to harm the babies," says Gunawan.

As a mother of three small children herself, this lack of regulation and risk to children and the community has spurred her research to draw attention to the potential harm of the widespread use of nanosilver.

The key question for Gunawan is: will the increasing use of these particles in everyday products mean silver nanoparticles become less effective and create resistance in bacteria?

In previous studies, Gunawan has already found bacteria have the natural ability to adapt to nanosilver attacks, but she wants to find out more.

"I wanted to explore how bacteria develop resistance to nanosilver, which is why I joined ithree. This kind of work is their bread and butter," says Gunawan. "They focus on bacterial research. Combined with the research environment and intellectual resources of ithree as one of UTS's research strengths, their focus will bring my project even further and help me answer my questions.

"I would like my research to be meaningful, to be beneficial for society, for the world," adds Gunawan. "I'd like to see nanosilver more effectively regulated in future. The aim is for a more judicial use of nanosilver, not to just put it in everything.

"Once we know how bacteria develop resistance to nanosilver, we can use the knowledge to develop a new generation of nanoparticles with less tendency of resistance from bacteria, which in turn will increase the efficacy," she says.

"Equally important, we can also use the knowledge to track for resistance genes in many bacteria, so we don't have the same crisis we're now facing with antibiotic resistance."

JEN MANSELL
Marketing and Communication Unit

Photographer: Stella Thai

Crime in context

Professor Katherine Biber

You've heard the saying 'context is everything'. For Faculty of Law Professor Katherine Biber, she's using context to explore the foundations of modern law and criminal justice in Australia.

Biber's current research project, funded by the Australian Research Council, is focused on the case of colonial Australia's last outlaw Jimmy Governor. Governor, together with his brother Joe, were outlawed after killing nine people in the year 1900. Joe was subsequently killed by a hunter, while Jimmy was shot, then apprehended and left to face the criminal justice system.

"One hundred and seventeen years on, the case of Jimmy Governor still endures," affirms Biber.

Though Governor's story has been captured in books, poetry, theatre and film, Biber's work is the first time it's been investigated through the prism of the law. She is examining his treatment in the context of Australian Federation, which established the new nation in 1901.

So far, Biber's research has revealed a series of unexpected and unusual legal processes behind Governor's capture, trial and execution. She believes the context of Federation might help to explain these unconventional approaches, in part because the authorities in question didn't want to "kick off a new nation by hanging a black man".

"We have identified that all the personnel involved in this high-profile case – the Attorney-General who didn't want to outlaw him, his lawyer who ended up becoming an Attorney-General, his other lawyer who ended up becoming a High Court judge – were all important figures in the Federation movement," says Biber. "And whilst they were busily working on Federation, they were also involved in bringing Jimmy Governor to justice.

"It seemed that some of the bigger principles about what kind of nation do we want to have, and what kind of rule of law do we want to have, were actively in the minds of the people who were also trying to apprehend, defend and punish Jimmy Governor."

In some ways, Biber believes this case is a precursor for some contemporary instances where administrative or executive powers are used to blur the separation of powers – the mechanism enabling the three branches of government (legislature, executive and judiciary) to maintain checks and balances on each other.

She cites control orders, preventive detention, emergency intervention and other risk-mitigation measures as examples in which the rule of law is tested and proper oversight might be neglected.

"In the modern climate of terrorism and counter-terrorism, we are also seeing more and more instances where administrative orders are used, or usual legal processes are suspended, to detain people whose detention hasn't been scrutinised by a court."

Biber believes her unique research approach – combining historical and archival methods with legal doctrine and modern criminological theory – will generate new knowledge about practices of policing, punishment and surveillance in today's nation.

"Through this research, I hope to contribute to our understanding of what motivates our society to police and punish criminal behaviour in the way that it does. These are relatively modern traditions, but they've evolved because of past criminal conduct and the challenges it poses to our legal values and institutions."

ELIZABETH KUO
Marketing and Communication Unit

Photographer: Shane Lo

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From the deep blue

Two southern elephant seals *(Mirounga leonine)* playing in the shallow waters off Davis Station, Antarctica. They were spotted by a team of researchers from UTS's School of Life Sciences, led by Dr Katherina Petrou, who spent the summer at Davis Station investigating interactions between the ocean's smallest inhabitants – phytoplankton and bacteria.

Photographer: Dr Daniel Aagren Nielsen

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