

# UNSW

UNIKEN WINTER 2015

magazine

## Weaving the body

How Melissa Knothe Tate  
is using an ancient art to engineer  
a biomedical revolution



### Mission: Possible

A new centre on campus  
aims to turn every student  
into an innovator

### Hubs of change

Social innovators  
make their mark

### Paying it forward

The entrepreneur breakfast  
club helping the next  
generation to connect



UNSW  
AUSTRALIA



# Winter 2015

## Cover story

08 The future weaver

## Features

- 07 The right stuff
- 12 Mission: Innovation
- 16 Hubs of change
- 17 Pay it forward
- 18 The nanoscientist and the sociologist
- 20 Crunching healthier data
- 21 The renegade constitutionalist
- 22 Agent of change

## Arts

- 23 Give me shelter
- 24 Spark of genius

## Regulars

- 03 Upfront
- 04 News
- 26 UNSW books
- 27 Backstory

**Cover photo:** Melissa Knothe Tate by Paul Henderson Kelly. The *UNSW magazine* is published by UNSW's Media Office: + 61 (2) 9385 1583 or [uniken@unsw.edu.au](mailto:uniken@unsw.edu.au). Issue 77. **Co-editors:** Steve Offner and Fran Strachan. **Editorial Advisers:** Denise Knight and Kathy Bail. **Contributors:** Dani Cooper, Amy Coopes, Wilson da Silva, Myles Gough, Susi Hamilton, Meghan Walsh, Dan Wheelahan. **Photography:** Aran Anderson, Tracey Allen, Michael Chin, Tamara Dean, Susi Hamilton, Sue Healey, Paul Henderson Kelly, Arunas Klupsas, Quentin Jones, Joshua Lynch, Zoe McMahon, Peter Morris, Brent O'Carrigan, Leilah Schubert, Susan Trent, Grant Turner

## From the President and Vice-Chancellor

This second edition of *UNSW magazine* for 2015 – the Innovation Issue – gives me the opportunity to talk about how we are claiming this space for ourselves in Australia and the region.



Those who work here know that UNSW is a hotbed of creativity and new ways of thinking; they were among the characteristics of the University that drew me here. From powering our future and providing clean drinking water to developing lifesaving HIV drugs and cancer therapies, UNSW research innovations have changed our world today and are helping pave the way to an even better tomorrow. I want to explore how we, as staff, can push ourselves even further and how we can boost the culture of innovation among our students.

These articles showcase the many initiatives underway to create and enhance this culture. The cover story details the amazing work of our Paul Trainor Chair in Biomedical Engineering, Professor Melissa Knothe Tate. Melissa was recruited to Australia and UNSW to help revitalise the country's medical devices industry. After only two years in the position, her 'Google Maps for the body' technology and her futuristic 'living loom' are examples of disruptive technologies in the true sense of the term, and are an inspiration to staff and students alike.

As part of our strategic consultation process, UNSW is looking at ways to support innovative work like Melissa's and to create a dynamic entrepreneurial and startup community. Crucially, we also want to connect students with industry, government and NGOs to improve their experience, employability

and capacity to become the innovators and research partners of the future. Your ideas will help shape how we move forward in this area.

While entrepreneurial outcomes are highly desirable and should be encouraged, we must not forget that many of our graduates will never launch a startup, but instead become what are known as 'intrapreneurs', who make a difference and institute change from the inside, in industry, government and the not-for-profit sector.

This is why the new Michael Crouch Innovation Centre is so important – it will change mindsets and turn every student who walks through its doors into an innovator. The centre will build on the excellent work by UNSW Innovations, and faculty initiatives, that are already yielding benefits. It will be a focal point on campus for ideas that can have a worldwide impact.

I hope you find the coverage of innovation in this issue as interesting and as exciting as I do.

Professor Ian Jacobs



### The magazine of The University of New South Wales

*UNSW magazine* is the University's flagship publication. Published quarterly, it reports on issues affecting the tertiary education sector and the latest developments in UNSW's research and teaching. The magazine is distributed primarily to staff, students and visitors to the University.

[newsroom.unsw.edu.au](http://newsroom.unsw.edu.au)

### DOWNLOAD THE UNIKEN APP



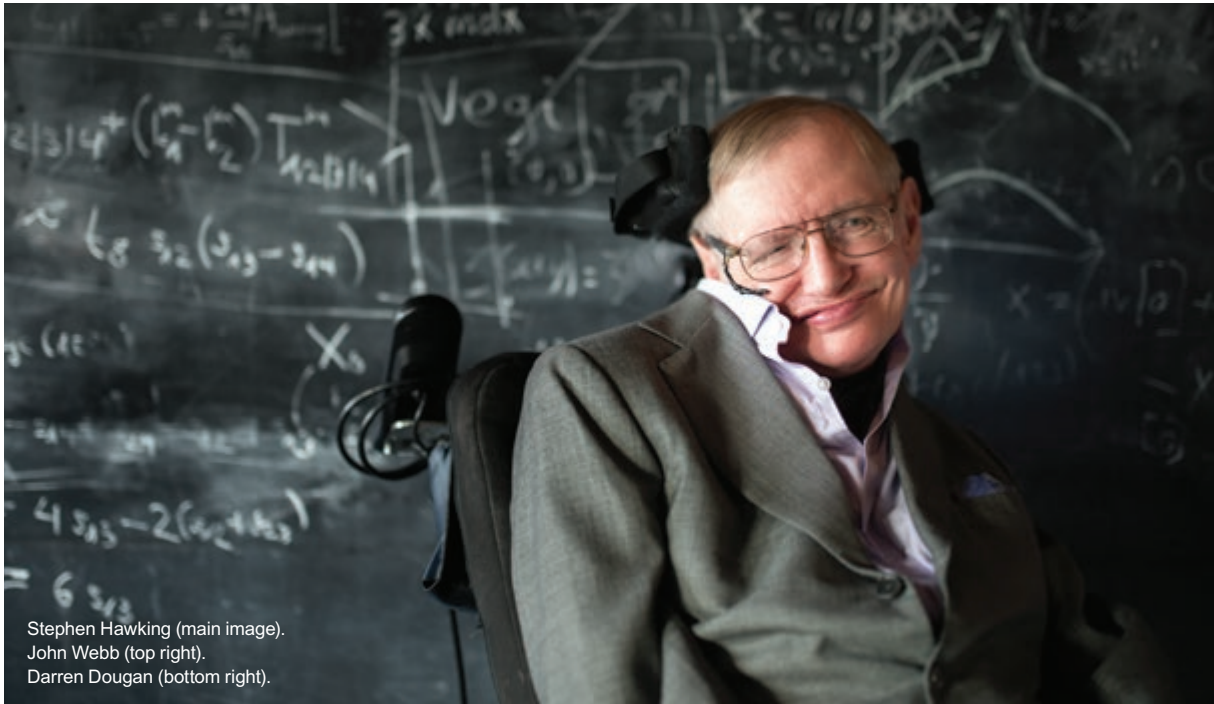
Video



Audio



Slideshow



Stephen Hawking (main image).  
John Webb (top right).  
Darren Dougan (bottom right).



## Questions about everything

Renowned physicist Stephen Hawking has helped launch the UNSW Big Questions Institute, a centre taking on the mysteries of life, the universe and everything.

Stephen Hawking appeared as a hologram, offered solace to One Direction fans everywhere, and spoke about his family, science, and our place in the universe.

It was a special event at the Sydney Opera House that also saw Hawking and his daughter Lucy, a successful author, awarded the 2015 UNSW Medal for Science Communication.

Although not typical for the Opera House stage, which has hosted many big names in the flesh, Hawking's talks were hugely popular.

UNSW astrophysicist John Webb, who helped organise the events, hopes they'll inspire Australians to dream big when it comes to science's most fundamental mysteries.

Webb is the co-founder of the UNSW Big Questions Institute (BQI), which counts Hawking as a key adviser. He says the idea for BQI stemmed from seeing "no real increase" in the number of students in Australia going into fundamental research.

The new venture wants to make science accessible, but more importantly, says Webb, the goal is to educate Australian research students and attract brilliant minds to help answer some of nature's biggest, most puzzling questions: *How did life begin? Are we alone? Could alternate universes and dimensions exist? And, are the laws of nature constant?*

They're speculative questions that funding agencies tend to shy away from because there's no guarantee of an answer, let alone a short-term gain.

Merlin Crossley, Dean of UNSW Science, knows they can be hard questions to ask.

"When I began in research I discovered something alarming – if you ask a little question, you only ever get a little answer," he said, while introducing Hawking at the Opera House event.

"Even worse, I next discovered when you ask big questions – big high-risk, high-reward questions – you sometimes get no answer at all."

But Crossley says progress and discovery have almost always hinged on people taking risks and testing new ideas.

Webb agrees: "It's these big questions that drive the human imagination, and we have to address them in order to make the big discoveries that will push the intellectual boundaries of society."

Webb and his team may be on the cusp of one such discovery that could turn physics as we know it on its head. Essentially it suggests the so-called "constants" that govern our universe – laws pertaining to gravity, quantum mechanics, the mass of atoms and their particles, and the speed

of light – may actually change across space and over time.

Using data from the Very Large Telescope in Chile, and the Keck telescopes in Hawaii, Webb's team uncovered a hiccup in the strength of the electromagnetic force – a very gradual variation between two very distant points in the universe.

Webb's early research on the subject attracted Hawking's attention due to its implications for his own research into a "theory of everything".

"It's controversial, and it's by no means proven," says Webb. "But we have a hint of it ... and if it turns out to be true it will change all of physics."

One of the PhD students working with Webb is Australian businessman Darren Dougan, the former CEO of property development firm Hindmarsh. "When I heard about John's research, I thought it was amazing and controversial, so I wanted to get involved," says Dougan.

Webb mentioned his idea for BQI to Dougan about 18 months ago, and they've been working to promote the institute ever since. "My contacts allowed us to raise some seed funding, and get in front of some influential people in the business world," Dougan says.

The pair travelled to Cambridge in March 2014 to recruit Hawking, who was happy to be involved.

Webb and Dougan are now aiming to raise a significant philanthropic gift, and hope BQI will one day rival the world's leading scientific centres. ■

– Myles Gough

## In Focus



The premiere of UNSW's Balinese Gamelan. Photo: Michael Chin

## The ancient sounds of Bali

Indonesian dignitaries attended the premiere concert of UNSW's Balinese Gamelan ensemble, where music students played a range of traditional percussive instruments. A Balinese dance and ritual blessing preceded the performance, which was held at the Io Myers Studio.

Led by Ensemble Director Manolete Mora from UNSW Arts & Social Sciences, students performed new work from Balinese artist Alit Adi Putra and Australian composers Gerard Brophy and John Peterson. "We hope the event promotes friendship and understanding between students, staff, music lovers and broader communities in Australia and Indonesia," says Mora.



Download the *Uniken* app to watch the slideshow



## He gave a Gonski

*I gave a Gonski: Selected Speeches*, a book by UNSW Chancellor David Gonski, has been launched in Sydney, with the help of Communications Minister Malcolm Turnbull.

Around 170 people from business, politics, education and the not-for-profit sector joined Mr Turnbull and Mr Gonski at the launch at UNSW's CBD Campus.

In the collection of previously unpublished speeches, Mr Gonski

reveals what drove him – the son of Polish/South African immigrants – to the highest echelons of public life as one of the country's leading businessmen and philanthropists.

Royalties from the sale of the book are being donated to the University, to be distributed to the ASPIRE program, which helps thousands of disadvantaged school students consider higher education. The UNSW Foundation is also working with ASPIRE on a fundraising initiative.

## 20 years revolutionising justice in Australia

It's the first – and most popular – free online legal resource in Australia and this year marks its 20th anniversary.

"When we set out, we didn't have any reason to suspect its influence would spread so far for so long," says UNSW Professor Graham Greenleaf of the Australasian Legal Information Institute (AustLII), which he co-founded with Professor Andrew Mowbray from the University of Technology, Sydney in 1995. Today, AustLII's 670 databases receive more than 600,000 hits each day, with users sourcing legal information from all Australasian jurisdictions.

"It began because we were frustrated that there was a monopoly on computerised legal information," says Greenleaf. "The government used crown copyright over legislation and case law to limit free access to the law. Our intention in creating AustLII was to provide free access to the Australian public to the essential legal information needed for the rule of law and democracy to function effectively."

The resource, which relies on charitable donations from users, has revolutionised access to justice in Australia and enabled similar legal information access platforms to take shape around the world.



## Briefs

## BETTER DETECTION OF OVARIAN CANCER

A new approach to ovarian cancer detection developed by UNSW Vice-Chancellor Ian Jacobs could lead to widespread screening for the disease that kills about two in three sufferers in Australia. The method uses a statistical calculation to interpret changing levels in women's blood of a protein called CA125, which is linked to ovarian cancer. A 14-year trial, involving more than 46,000 women over the age of 50 who had ongoing blood tests, found the new method detected cancer in 86% of women. This is more than double existing screening methods, which look for a fixed threshold amount of the protein.

## BUSINESS LEADS WORLD SUBJECT RANKINGS

UNSW has claimed the top spot nationally for Accounting and Finance in the 2015 QS world university rankings, with 18 of our subjects in the world's top 50. Accounting and Finance was placed 12th in the world and leads the University's top performers. Rounding out UNSW's five subjects in the top 20 are Civil and Structural Engineering (14), Law and Psychology (both 15), with the newly introduced subject area of Business and Management Studies ranked 19th.

## GENE EDITING TARGETS ANAEMIA

Professor Merlin Crossley and his team have shown that changing just a single letter of the DNA of human red blood cells in the laboratory increases their production of oxygen-carrying haemoglobin – a world-first advance that could lead to a cure for sickle cell anaemia and other blood disorders. Their gene-editing technique switches on a gene, which is active in the womb, but turned off in most people at birth. By keeping that gene switched on for life, the researchers hope they can alleviate symptoms. "Because the good genetic variation we introduced already exists in nature, this approach should be effective and safe," says Professor Crossley, who is Dean of UNSW Science.



## GATES CAMBRIDGE SCHOLAR

UNSW lecturer and alumna Aditi VEDI has been awarded a prestigious Gates Cambridge Scholarship to research the functional biology of stem cells to improve survival outcomes for children with leukaemia. "Despite increasing cure rates for children with leukaemia, relapsed disease still carries a poor prognosis," said VEDI, who is a conjoint associate lecturer with UNSW's School of Women and Children's Health. The prestigious scholarship program was established in October 2000 by a donation of \$210m from the Bill and Melinda Gates Foundation. VEDI was one of 54 successful candidates from 28 countries, and will begin her PhD at the University of Cambridge later this year.

Photo: Brent O'Carrigan



## INDIGENOUS ARTS AWARD

Celebrated artist and curator Brenda L Croft has been awarded an Australia Council National Indigenous Arts Award to develop *Solid/shifting ground*, a multimedia artwork detailing her father's experiences as one of the Stolen Generation. Croft is an ARC Research Fellow at the National Institute for Experimental Arts at UNSW Art & Design. She will stage her exhibition at the UNSW Galleries next year. Croft says being awarded the Fellowship, worth \$90,000 over two years, is one of the highlights of her career. "I want to write my father's story for his grandchildren, so they know they are following in the footsteps of those who fought for equal rights for all of us."

Photo: Carly Earl/NewsPix

## In Focus

## Desert art breaks new ground

1950s-style circle skirts painted in the Albert Namatjira watercolour tradition feature in a new national exhibition of contemporary desert art at UNSW Galleries.

*We are in Wonder LAND* explores how contemporary Aboriginal desert art is breaking new aesthetic and political ground through the use of new mediums – and old mediums in new ways.

The exhibition brings together works by over 30 artists from 18 remote desert community art, media and educational organisations, and 11 different language groups. Drs Jennifer Biddle and Lisa Stefanoff from the National Institute for Experimental Art at UNSW have curated the works in partnership with Philip Watkins, CEO of Desert Inc, a peak body representing 42 central and western desert art centres.

The exhibition runs until 15 August 2015. For more information go to [artdesign.unsw.edu.au](http://artdesign.unsw.edu.au)

West MacDonnell Ranges, NT. Artist: Gloria Pannka. Dress-maker – Bernice Bristow. Produced and directed by The Arts Department, Batchelor Institute of Indigenous Tertiary Education and Ngurratjuta Itja Ntjarra – Many Hands Arts Centre. Modelled by Rita-Mae Ross. Alice Springs 2015. © Tracey Allen



## Star alumni celebrated

UNSW has recognised the success and leadership of its most “exemplary” graduates at the 2015 Alumni Awards.

Under an illuminated marquee on the lawns of Alumni Park, UNSW has celebrated the achievements of its most talented graduates. UNSW President and Vice-Chancellor Professor Ian Jacobs said it gave him “a glow of pride” to read through the list of “exemplary” recipients from arts, science, engineering, innovation, design, medicine, law and sports.

Among the winners was Corrin Varady, who was celebrated for establishing the World Youth Education Trust – a charity to educate and rehabilitate former child soldiers.

When Varady started studying commerce at UNSW he planned on becoming an investment banker. That changed after a volunteer teaching assignment in Africa brought him into contact with former child soldiers from northern Uganda. When he asked them what they wanted more than anything, he says their response was unanimous:



Corrin Varady and former child soldier Jonathan Okwir with children in northern Uganda.

an education. “That experience just triggered something profound in me,” he recalls.

The trust now operates two schools, with more than 600 children – including former child soldiers – receiving support each year.

Varady shared the Young Alumni Award with James Hoa Phuc Nguyen, a legal counsel at Rabobank. Nguyen is heavily involved with

UNSW Law’s Ngoc Tram Nguyen Scholarship and the faculty’s alumni network.

Nguyen initiated an annual fundraising dinner that has now raised more than \$140,000 to help expand the scholarship scheme that helps disadvantaged students in south-west Sydney to study law.

For the full list of Alumni Award recipients go to [alumni.unsw.edu.au](http://alumni.unsw.edu.au). ■



(L-R) Helen Christensen, Katharina Gaus, Veena Sahajwalla, Michelle Simmons, Jane McAdam and Rose Amal. Photo: Tamara Dean

## Fifteen research trailblazers

Working across disciplines ranging from Indigenous law and mental health, to quantum computing and nanomedicine, 15 of the University’s top-performing female academics are featured in the latest edition of *Research@UNSW*.

The professors are making major contributions to many of the big challenges facing our society, and inspiring a new generation of scholars. Among those featured are the two newest female Scientia Professors: chief scientist of the Black Dog Institute, Helen Christensen, who is developing suicide prevention technologies, and Katharina Gaus from Medicine, who is investigating the rules that govern single molecules.

Three Australian Laureate Fellows and one ARC Future Fellow round out the list of Scientia Professors. They are chemical engineer Rose Amal, who is developing clean fuels from recycled carbon dioxide; materials scientist Veena Sahajwalla, who is leading an \$8.8 million ‘green manufacturing’ hub; physicist Michelle Simmons, who is developing a scalable quantum computer; and Jane McAdam, who heads the Andrew & Renata Kaldor Centre for International Refugee Law.

“While each professor has her own story of success, all share a particular trait,” says Professor Les Field, Deputy Vice-Chancellor (Research). “They approach their high-stakes research in decidedly creative ways; pushing boundaries, taking risks and tackling problems from a different perspective.”

Read the full stories at [15trailblazers.unsw.edu.au](http://15trailblazers.unsw.edu.au) ■

# The right stuff

The man leading Australia's biggest engineering faculty has grand ambitions for research, students and industry participation, writes **Wilson da Silva**.

Four months into the job, Mark Hoffman – the new Dean of Engineering at UNSW – is energised. He's just returned from the Asian Engineering Deans Summit in Singapore where he was talking up his goal of making UNSW one of the region's pre-eminent engineering centres.

"It was quite remarkable just how well UNSW Engineering was known and respected," Professor Hoffman says. He was enthusiastically buttonholed by peers keen to explore new opportunities. "There's a tendency [in the region] to defer to US institutions, but the way they approached and engaged, gave me the distinct impression that UNSW is seen as a leading engineering faculty in Asia."

Hoffman plans to build on these strengths: both as an academic institution and as a collaborator with industry. "I want to make the faculty the go-to place within the region for solving industrial and community technical problems. We've got the expertise, and Asia has a fast-rising trajectory of industrial development."

Asia faces acute challenges in energy, water, infrastructure and transport – all areas where UNSW has strong applied research expertise. "Our leading fundamental research will be better if we're working with applied problems. You really need to design solutions against reality, and we have that ability."

Hoffman came to the role after two years as Pro-Vice-Chancellor (Research), almost four years as Associate Dean (Research) in the Faculty

of Science, and six years as Head of the School for Materials Science and Engineering. He's held research positions in the USA, Japan, India and Germany, the latter as a Humboldt Fellow. Considered a leader in structural integrity of materials, more recently his work has centred on piezoelectric ceramics.

As Dean, he leads the largest engineering faculty in Australia, with more than 10,700 students and the widest range of programs. Notable graduates include Chris Roberts, CEO of global bionic ear giant Cochlear and Zhengrong Shi, billionaire founder of China's Wuxi Suntech.

Hoffman is aiming high: while UNSW Engineering rates in the world's top 50, he wants it to be in the top 30 – and maybe the top 25.

"It's an ambitious goal. But we're on a stronger financial base, compared with US and European institutions, and on a stronger expertise base compared to the rising institutions of Asia."

The rise of MOOCs (massive open online courses) is also presenting UNSW with opportunities. New, more student-focused ways of learning all play to the faculty's strengths, Hoffman says.

A core challenge he has set himself as Dean is to "get our fraction of female staff and students to 30%", from around 21% (students) and 18% (teaching staff) – numbers that haven't changed much for a decade. "We can get to 30% if we make a significant investment," Hoffman says. "Just about every other profession has addressed this – engineering needs to crack it too." ■



Mark Hoffman. Photo: Peter Morris



## Safe water for everyone

A new water research initiative is to be established at UNSW thanks to funding from the Tata Trust of India. In partnership with the trust and their teams, the program aims to provide clean drinking water to regional India through low-cost water purification solutions.

One project will develop a low-energy filter to remove salt, fluoride, arsenic and nitrates from water sources, and which is simple and robust enough to be used at the village level; the second is a larger reverse osmosis water filtration plant that can be mounted on small utility vehicles. The initiatives will be jointly run by the faculties of Engineering, Science, and Arts & Social Sciences, with the latter focused on helping engender social acceptance of the technologies.

The impact of the Tata–UNSW Water Initiative is likely to be profound, says Engineering Dean Mark Hoffman. Villages in India where the water quality is poor will be targeted first, before the intervention is scaled up across various states.

# THE FUTURE WEAVER

Biomedical engineer Melissa Knothe Tate is harnessing the ancient art of the loom to push the boundaries of regenerative medicine and to foment a materials science revolution. By **Amy Coopes** and **Steve Offner**.

Photos: Paul Henderson Kelly



**T**ucked away in a small room in UNSW's Graduate School of Biomedical Engineering sits a 19th century-era weaver's wooden loom. Operated by punch cards and hooks, the machine was the first rudimentary computer when it was unveiled in 1801.

While on the surface it looks like a standard Jacquard loom, it has been enhanced with motherboards integrated into each of the loom's five hook modules and connected to a computer. This state-of-the-art technology means complex algorithms control each of the 5,000 feed-in fibres with incredible precision.

That capacity means the loom can weave with an extraordinary variety of substances, from glass and titanium to rayon and silk, a development that has attracted industry attention around the world.

The interest lies in the natural advantage woven materials have over other manufactured substances. Instead of manipulating material to create new shades or hues as in traditional weaving, the fabrics' mechanical properties can be modulated, to be stiff at one end, for example, and more flexible at the other.

"Instead of a pattern of colours we get a pattern of mechanical properties," says Melissa Knothe Tate, UNSW's Paul Trainor Chair of Biomedical Engineering.

"Think of a rope; it's uniquely good in tension and in bending. Weaving is naturally strong in that way."

While the loom's materials have countless potential manufacturing applications – one tyre maker believes a titanium weave could spawn a new generation of thinner, stronger and safer steel-belt radials – Professor Knothe Tate is more interested in the machine's human potential.

She believes it is possible, for example, to weave biological tissues – essentially human body parts – in the lab to replace and repair our failing joints. What's more, she is convinced that one day those same parts will be woven inside the body.

"It's always been a dream of mine to teach cells to weave their own repair," Knothe Tate says. It would be a "living loom" and the ultimate disruptive technology, "but we're not there yet, so we want to learn from the cells and begin the process in the lab".

"Weaving is an ancient art but if you bring the newest technology to it, I think some pretty exciting things can happen."

### Biomedical "sweet spot"

Even in a discipline where the name is derived from the Latin *ingenium*, meaning "cleverness" and *ingeniare*, meaning "to contrive or devise", UNSW's biomedical engineers are pushing boundaries. Down the hall from Knothe Tate's office atop the Gordon Samuels Building, a team led by Scientia Professor Nigel Lovell and Professor Gregg Suaning is designing a bionic eye.

Nearby Dr Lauren Kark is engineering a new generation of prosthetic limbs, while other researchers are developing biomimetic-inspired materials to regenerate tissue.

And in UNSW's Wainwright Analytical Centre and the Biomedical Imaging Facility are some of the world's most advanced microscopes, capable of capturing the inner workings of a single living cell.

Knothe Tate believes biomedical engineering is on the cusp of enormous advances. "I always talk about being in the sweet spot. It's like there's a wave and biomed is at the forefront," she says.

The interface of mechanics and physiology is the focus of Knothe Tate's work. In March, she travelled to the United States to present another aspect of her work at a meeting of the international Orthopedic Research Society in Las Vegas. That project – which has been dubbed "Google Maps for the body" – explores the interaction between cells and their environment in osteoporosis and other degenerative musculoskeletal conditions such as osteoarthritis.

Using previously top-secret semiconductor technology developed by optics giant Zeiss, and the same approach used by Google Maps to locate users with pinpoint accuracy, Knothe Tate and her team have created "zoomable" anatomical maps from the scale of a human joint down to a single cell.

She has also spearheaded a groundbreaking partnership that includes the Cleveland Clinic, and Brown and Stanford universities to help crunch terabytes of data gathered from human hip studies – all processed with the Google technology. Analysis that once took 25 years can now be done in a matter of weeks, bringing researchers ever closer to a set of laws that govern biological behaviour.

Her vision was a key reason for UNSW and the Paul Trainor Foundation bringing Knothe Tate to Australia to take up the inaugural Paul Trainor Chair in Biomedical Engineering, named after the father of Australia's medical devices, who died in 2006.

"Paul Trainor was the veritable founder of the biomedical industry

in Australia. He was responsible for developing and championing the cochlear implant and cardiac pacemakers, among other technologies, and a big part of my position here at UNSW is to reinvigorate the industry he helped create, and to build on it even more," Knothe Tate says.

Head of School, Professor John Whitelock, says the future of biomedical engineering relies on innovative academics like Knothe Tate crossing boundaries and commercialising their discoveries. "Just two years into her role, Melissa is pushing boundaries and has already patented several new technologies. She's more than proved she is the right person to continue Paul Trainor's legacy," he says.

### Not your average engineer

The daughter of an electrical engineer who led the US Navy's nuclear program in EMP, the electromagnetic pulse aftermath of nuclear blasts, Knothe Tate had an itinerant childhood, following her father as he moved between postings.

Like her dad, she was fascinated with science and technology from an early age. Curious about temperature's effects on growth, the 12-year-old Knothe Tate asked for an incubator and cleared space in the family fridge to experiment with chicken embryos.

She spent her spare high school hours shadowing doctors and penned curious adolescent letters to surgeons about the ethical dilemmas of breast augmentation and cosmetic surgery. "I thought I was going to be a reconstructive surgeon for children with congenital malformations, but I just don't like hospitals," she admits.

**Weaving is an ancient art but if you bring the newest technology to it, I think some pretty exciting things can happen.**

– Melissa Knothe Tate

While hospitals proved a no-go zone, Knothe Tate still held a love for medicine's impact on human life. Moulding her own biomedical engineering degree long before the discipline existed, Knothe Tate enrolled at Stanford in separate degrees in biology and mechanical engineering, working three jobs for financial support.

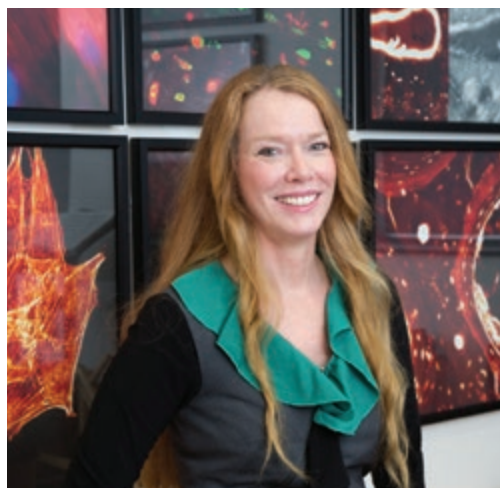
Though majoring in science, Knothe Tate was also passionate about philosophy and art, with a particular interest in German language and culture. Drawn to Europe, she packed up and headed to the Swiss Federal Institute of Technology – ETH Zurich – to complete her doctoral studies. It would be a seminal experience, opening her world to new opportunities and ways of thinking – as well as bringing husband, Ulf Knothe, with whom she's had a daughter, into her life.

Knothe Tate keeps a picture of her Swiss graduating class on her desk. It features just two women: "One is the secretary of the school and one is me."

Today, half of Knothe Tate's research team is women, a ratio reflected in the Graduate School of Biomedical Engineering as a whole. "It's a huge change, and it's one of the things that's most encouraging," she says.

From Zurich, Knothe Tate and Ulf, an orthopaedic surgeon who collaborates with his wife on many of her studies, were recruited to the Cleveland Clinic. Colleagues thought she was crazy to turn down a plum Swiss post – a *Gemachtesbett* or "made bed" in terms of academia – for the north-eastern US. "I always pick the challenge, I think it's sort of hardwired. I just needed to find my own path, a new path," she says.

It was a formative time that brought her out of the lab and into contact with patients. "You see



**I always talk about being in the sweet spot. It's like there's a wave and biomed is at the forefront.**

– Melissa Knothe Tate

all the families, it's so present," she says of her clinical role. "As an engineer I had the feeling that what we were doing was really important and we'd better make sure it's relevant for patients. It had a huge impact on my future research directions."

#### Weaving the future

In her UNSW office, Knothe Tate's desk is surrounded by bones. The walls, too, are filled with framed images of the inner workings of muscles, joints and ligaments. Captured by some of the world's most sophisticated fluorescence

and electron microscopes, the multicoloured architecture is scattered on black backgrounds like constellations.

On her computer screen, a research paper displays a cross-section of a sheep's femur, together with second harmonic and multiphoton images that capture the distribution of the section's structural proteins. "What you see is the weave of the cells that inhabit our bodies," Knothe Tate says, pointing to the fluorescent green, yellow and orange interplay of fibres between bone and muscle.

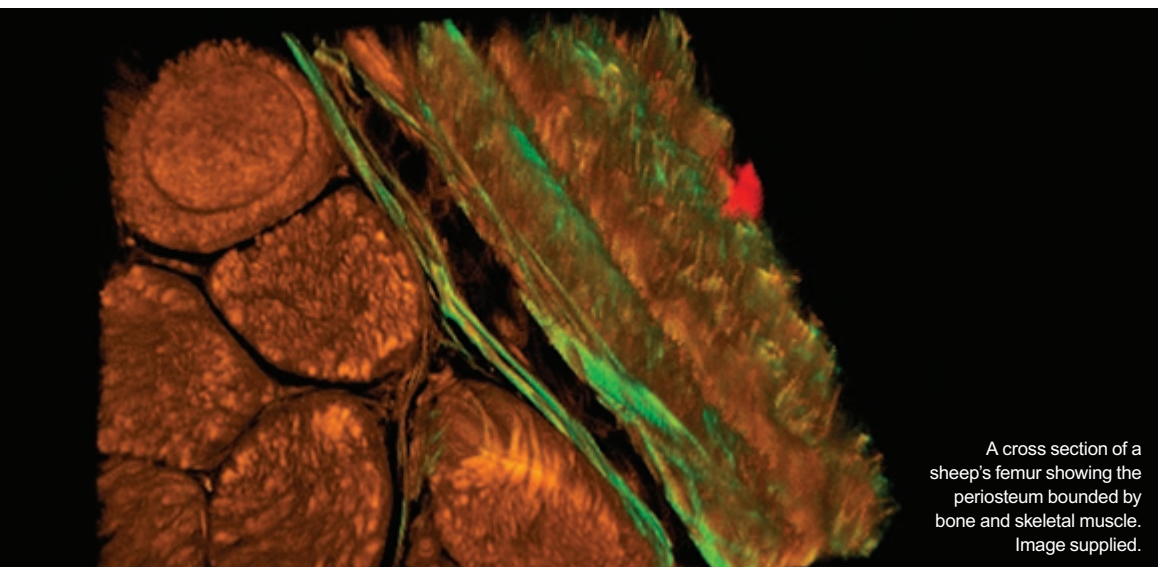
Our bones, she explains, are super strong, able to bear incredible weight because they contain the protein collagen (without it they would be brittle like chalk). They are covered by a sleeve of protective tissue called the periosteum.

One of periosteum's unique qualities is its toughness. Another protein, elastin, makes it, "stretchy like a rubber band". But due to the collagen, "it's a rubber band that doesn't break". "It's only 500 microns thick; so it's fascinating to think this soft fabric – our body's fabric – imbues our bones with such super strength," Knothe Tate says.

As a composite structure, periosteum has emergent properties – its strength lies in more than the sum of its parts. These "smart" properties are what Knothe Tate is reproducing on her loom.

"What we do with the loom algorithms is a scale-up process. It's mimicking the patterns we find in nature," she explains. "That could be in periosteum or tree bark or a whole host of other things that you then apply to medical products or in other industries."

Those other industries could end up being particularly lucrative. On a recent flight between Frankfurt and Singapore, Knothe Tate got talking to two steel executives. "When they heard about the loom, they could see it had enormous potential



A cross section of a sheep's femur showing the periosteum bounded by bone and skeletal muscle. Image supplied.

## BIOMEDICAL ENGINEERING PROJECTS TO WATCH

- > The bionic eye
- > Pre-suicidal speech recognition
- > Sugar polymers for tissue regeneration
- > Human haptics and touch-enabled computer applications for surgical simulations and rehabilitation robotics
- > Next-generation lower-limb prosthetics
- > Bio-engineered heparin for better and longer blood storage
- > Flexible conducting polymers for future medical devices.

for designing and weaving new and improved steel belts in their tyres, an area that's seen little innovation in the past 20 years," says Knothe Tate. She promised them she would be in touch.

Meanwhile, work has begun on the loom's first medical pilot project: weaving the prototype of a custom compression sleeve for women suffering lymphoedema after breast cancer surgery. The painful, disfiguring condition is caused by an accumulation of fluid in the limbs after draining nodes, or after glands are removed from the armpit. Not all women who undergo lumpectomy or mastectomy develop lymphoedema but for those who do, Knothe Tate says, it can be "almost as bad or worse than the cancer diagnosis itself".

Treatments currently focus on using a one-size-fits-all static pressure cuff that compresses the limb to prevent fluid build-up. As well as being uncomfortable and ugly, Knothe Tate says it's possible the cuff exacerbates the condition over time by shutting down the lymphatic system's natural pumping action.

"We're interested in more gentle sleeves that also enable active pumping, and that's the whole idea of this technology; you harness the movement of the patient," she says of the patented sleeve, which is designed using super-resolution imaging to map the tensile properties of an individual's arm, the special fluorescence channels highlighting the sleeve's elastin and collagen weave. Collaborators on the project are Stan Rockson at Stanford, Sydney University's Sharon Kilbreath and Helen Mackie of Mount Wilga Private Hospital.

Also on board is UNSW Art & Design's Liz Williamson, an internationally acclaimed textile artist. Williamson's role will be to provide artistic and technical advice on the intricacies of the weaving process (see breakout story).

"The project's been a lot of fun," says Knothe Tate, who travelled to Chico in northern California for weaving lessons with the loom-maker before she got started. She also keeps two antique Bernina sewing machines in her office to sew new research prototypes. "They're old machines but they're so tough. They can handle almost any material – even leather."

### The ultimate weave

A "smarter" lymphoedema sleeve that reduces harm is no small achievement, but Knothe Tate has her sights set far higher.

Her next step is to use the loom technology to weave biodegradable tissues for joint replacements and repairs, replacing high-tech metals and plastics with biological polymers that can be absorbed and recycled by the body. The inspiration for these came after a sickening mountain bike accident in the US in 2012 that shattered her shoulder.

"The first titanium implant the surgeons used to reconstruct my AC joint failed before I even

recovered from surgery. And I thought if this is the best they can do, it's not very good," Knothe Tate says. So she invented a new technology, to address the problem, creating solutions for tissue repair in the process.

Also in the pipeline is a second loom-related product – artificial periosteum, which can be implanted in the body to speed up the repair of bone fractures, damaged cartilage, and other sports injuries. "It's a prototype of a surgical membrane that's been made on the sewing machine. We are weaving them now, and we'll be testing them soon in a live animal model," Knothe Tate says.

However, the periosteum prototype is made from silicone, which, like titanium doesn't integrate well with the body. The ideal would be to weave implants out of a patient's own biological material. This too is on the horizon.

In 2013, along with a colleague from San Sebastian in Spain, Knothe Tate proved a "biological weave" could be done on a micro scale, publishing a paper in which the team described successfully "programming" stem cells to weave tissue on a silicone substrate in the lab. The cells essentially became a living loom.

"Cells are already expert weavers," Knothe Tate explains. "If you can provide them with a pattern, or architecture, in the form of adhesional proteins, the cells will just do what they naturally do."

Ultimately, Knothe Tate wants to teach these stem cells to weave their own repairs inside the body. That may seem like the outer limits of science fiction, but Knothe Tate believes it will happen within a decade. "These kinds of disruptive technologies move things forward exponentially," she says. "When it happens it will be a huge step forward at once."

Knothe Tate believes the calibre of biomedical engineering research underway at UNSW, combined with "unbelievable infrastructure and imaging capacity" means the University will be at the vanguard of this leap forward.

"We have these Ferrari microscopes – where you can see right down to the ruffled membrane of a cell and the cell's own skeleton – you can go down and down. We have that capacity here, which is pretty phenomenal."

Knothe Tate says she is thriving in Australia. Importantly, she says, there's an "entrepreneurial spirit" here that has dwindled in the US following the global financial crisis. The loom and its associated patents are testament to that. "Life's too short, we've got to try it all. There's too much fun to be had." ■



Download the *Uniken* app to watch the video

### In Focus



## CRAFTING THE BODY

Though they approach weaving from radically different perspectives, creative partner Liz Williamson sees an elegant synergy in her collaboration with Knothe Tate.

Williamson (pictured), an associate professor at UNSW Art & Design, is an internationally renowned textiles artist and weaver celebrated as one of Australia's Living Treasures.

She is a key partner in Knothe Tate's lymphoedema project – the pair has jointly applied for an NHMRC Development Grant to finalise the research and Williamson will provide technical and creative guidance.

It's an unusual collaboration, but Williamson says art and science go hand in hand, particularly weaving and medicine.

"Where I weave structures that relate and respond to the body, Melissa [Knothe Tate] creates architectures that harness the body's movement. We are coming from different directions but we are both responding to the body," she says.

"There's a wonderful flow and counterbalance with Melissa's engineering work. It's exciting to be challenged by her vision."

Beyond the biomedical realm, Knothe Tate envisages a suite of creative applications for the loom, including art installations and woven sculpture.

Williamson is thrilled to have a world-class Jacquard loom at UNSW – an instrument she describes as "state-of-the-art in terms of its scale and quality" – and says the sky's the limit when it comes to potential uses. ■

– Amy Coopes

Photo: Susan Trent/Gasbag Studios

# Mission: Innovation

The new Michael Crouch Innovation Centre aims to transform the thinking of every student who steps through its doors. **Myles Gough** reports.



Risk takers – Solange Cunin and Nathan Adler.  
Photo: Grant Turner/Mediakoo

**S**ometimes inspiration strikes early. Solange Cunin's love affair with the night sky began while growing up on a eucalyptus plantation in northern New South Wales. "I was the eight-year-old who asked Santa for a telescope," she laughs.

Now 22, the UNSW aerospace engineering and maths student wants to make access to space more affordable by organising ride-sharing for experimental payloads. And her big idea involves satellites so small they can fit in the palm of your hand. Cunin recently co-founded a startup called Quberider and hopes to start organising launches next year. It's a risky move, but Cunin is undeterred. "When you're young you can fail hard and fail fast, and you can pick yourself back up again," she says.

Likewise 23-year-old mechanical engineering and commerce student Nathan Adler is also thinking like an innovator. In 2012 he helped found Create UNSW, a student club that teaches members how to program and build devices, ranging from robots to drones, and offers 3D printing services.

After signing up more than 500 members during O-Week, Adler took his first leap of faith: he started a small, online retail business for electronic components, sourced from China, which has been hugely successful. The turning point for the club came when UNSW Art & Design provided a workshop space last year, which meant Create members could start investing profits into their own ideas and projects.

Today, Intel and Cochlear sponsor the club, and its members are hired as consultants to lecturers, student entrepreneurs and external companies. "Through this process the wealth of knowledge in our group grows exponentially," says Adler.

Tapped into a growing network of student innovators, Adler is considering his future. For his thesis, he's developed a portable GPS device that can pinpoint user location to less than five centimetres. The proof-of-concept is finished and an entrepreneur friend – who he met through Create – is in San Francisco meeting with potential investors.

## The age of the innovator

Students like Cunin and Adler are increasingly developing innovative ideas and products, chasing startup dreams, taking risks, and trying to carve out their own opportunities all before they graduate. Underpinning it all is the confidence to think creatively. Nurturing these big ideas and a culture of innovation in all aspects of student life is the next big challenge for universities worldwide.

Martin Bliemel, an award-winning lecturer in innovation and entrepreneurship in the UNSW Business School, says the shift is being driven by new technologies and popular media – which celebrates young tech entrepreneurs like they're rock stars – to the economic uncertainty caused by the global financial crisis. "It's a myth now

that you'll have a job for life," he says. "So more students are thinking, 'Hey wait a sec, why not become an entrepreneur right off the bat?'"

UNSW software engineering student Hayden Smith believes it requires an attitude shift for students to make the leap from ordinary to extraordinary. "There's a culture of mediocrity you can sometimes feel at university – an idea that until you graduate you're not able to accomplish anything of value," Smith told a recent TEDx event.

After spending the first half of his degree on "cruise control", Smith made that leap. He began working on the UNSW solar racing car, SunSwift, and after six months was leading the project.

In October 2014, the team obliterated the world record for the fastest solar-powered car over 500 km, maintaining an average speed of 107 kmh. The previous record of 73 kmh had stood for a quarter century. The team is now poised to develop the first roadworthy, solar-powered passenger vehicle in Australia.

"University is not some obstacle to overcome. It's a platform on which you can do some of the most important work of your life," Smith says. Students should seek out opportunities to work in teams and be part of something cool, he says, because those opportunities do exist. "And I'm not talking page two of your resume cool. I'm talking world-altering cool."

Today, 90% of Australian universities are offering credit courses in innovation and entrepreneurship, and many of them are also rolling out extra-curricular programs, such as incubators, accelerators, hackathons and maker spaces. UNSW is a leader in the field: among its initiatives are a raft of undergraduate and postgraduate courses, including the first



Photo: Daniel Chen

## University is not some obstacle to overcome. It's a platform on which you can do some of the most important work of your life.

– Hayden Smith/SunSwift

online MBA with a focus on technology and innovation; a venture incubator space in the School of Computer Science and Engineering supported by Google and the NSW Government; the Business School's Centre for Innovation & Entrepreneurship, which runs the Peter Farrell Cup – a whole enterprise competition for students; and Enactus UNSW, which helps support social entrepreneurs.

There is also the University's technology transfer and innovation office, UNSW Innovations, which runs the Startup Games competition, and has a whole department dedicated to supporting student innovators. So far they've offered legal and technical advice to more than 300 student teams with business ideas.

But increasingly, there's a push to provide physical spaces where students can network, collaborate and access technical resources and equipment. "The spaces are the one thing that's been missing," says Adler.

### Finding a better way

"Everybody is an innovator, and should be an innovator," explained Michael Crouch, the executive chairman of Midgeon Holdings in a conversation with UNSW Chancellor David Gonski on why business should support universities to produce creative thinkers.

That doesn't mean students and staff need to start a business, said Crouch, who in 2013 funded a research Chair in Innovation at UNSW. It just means they have to want to improve processes and not accept the status quo.

Going about things differently is part of the thinking behind the new Michael Crouch Innovation Centre (MCIC). Unique within an Australian university, the centre will open inside the state-of-the-art materials science building later this year. Open to students from all faculties, the MCIC will provide access to free, co-curricular foundational and experiential learning programs, facilitated by experts from UNSW and a network of corporate partners.

"We're a new kind of student experience," says the centre's chief operating officer Brad Furber. "We're a showcase for innovative ideas. We provide a platform for faculty and industry

## UNSW's creative legacy

Universities in the US, like MIT and Stanford, have set the gold standard for supporting innovation. In Australia, UNSW's research strengths mark it out as the university most likely to succeed in a similar mould. UNSW has led the world in developing photovoltaic technology under the leadership of professors Martin Green and Stuart Wenham, resulting in a number of spin-off companies. The university also has strong programs in the fields of implantable prosthetics, materials and polymer sciences, and UNSW physicists and engineers are pioneering the world's first scalable quantum computer.

UNSW has also established itself as one of the nation's top universities when it comes to producing wealthy graduates and high-performing student startups. In 2013, data compiled by consulting company WealthInsight and *Spear's* magazine revealed UNSW had more millionaire graduates than any other Australian university.

The "who's who" of entrepreneur alumni includes Ori Allon, who sold his first two ventures to Google and Twitter respectively, and Mike

Cannon-Brookes and Scott Farquhar, the founders of software company Atlassian, who met at UNSW and are now estimated by *Business Review Weekly* to be worth more than \$1 billion each. There's also Danny Kennedy, a long-time environmental activist and the founder of clean energy company Sungevity in the US, and social entrepreneur Dorjee Sun (see story on page 16).

An impressive list of rising stars is following in their footsteps. One is Alfred Boyadgis, a former Built Environment student whose Robocop-inspired motorcycle helmet won a silver medal at the 2013 James Dyson Award, a global competition dominated by UNSW design students. The 25-year-old is now commercialising another 'intelligent' helmet for the ski slopes. With the help of UNSW Innovations, Boyadgis and his team secured a government grant to establish Forcite Helmet Systems.

The friends also participated in the UNSW Startup Games, which helps bring student business ideas to life. "We learned how to pitch and develop a business plan and discover what investors think," Boyadgis says.

partners to engage with students, and a pathway to complementary support services.”

Furber says the centre’s measure of success will be getting students with great ideas through the door. From there, the focus will be on removing barriers so students can collaborate across disciplines, and access resources to develop those ideas as quickly as possible.

Making clear the distinction between innovation and entrepreneurship is also important to Furber and principal donor, Michael Crouch. “When we allow innovation and entrepreneurship to be interchangeable we run the risk of excluding the majority of staff and students whose innovative ideas and practice will not result in an entrepreneurial outcome, like a startup,” Furber says.

Professor Joe Cheng, the Michael Crouch Chair in Innovation based in UNSW’s Business School, agrees. “If we can just get students to be creative we are already on the right path,” he says. “A lot of students are still afraid to be innovative because they have all these pressures placed on them to meet certain standards and to conform to existing norms. We need to teach and encourage them to think in new ways and not worry about whether their new thinking will lead to a successful product or business.”

One permanent feature of the MCIC will be a maker space with 3D printers, laser cutters, and other machining tools, where teams of students can design and build physical prototypes.

“The University is getting on board with the idea that it’s good to have students able to access resources and facilities, to experiment, to design, and to conduct their own research and development,” says Create’s Adler. He thinks the

**We need to teach and encourage students to think in new ways and not worry about whether this thinking will lead to a successful business.**

– Joe Cheng

MCIC will attract a lot of “outside interest from companies that want to find innovative students to test and develop their ideas”.

Martin Bliemel agrees and says it’s perhaps the biggest benefit. “It’s a win-win,” he says. “It’s low-cost consulting for industry, and it’s great experience for students. It will make it blatantly obvious that there are pockets of initiatives happening on campus that can be amplified.”

**Stiff competition**

While students and their universities are taking the lead on innovation, they can’t do it alone. The 2014 Australian Innovation System Report, compiled by the federal Department of Industry, highlights some glaring weaknesses for Australia. Despite travelling in the middle of the pack compared with other OECD countries on most indicators, our number of new-to-market innovations has declined over the past decade, due, in part, to poor engagement between industry and publicly funded research, and a lack of financial incentives from government.

“One of the risks for Australia is that we don’t get right the connection between government, industry and our universities,” UNSW President and Vice-Chancellor Ian Jacobs said during the recent Risky Business public forum.

Professor Jacobs, who steered several of his own commercialisation projects relating to cancer treatment in the UK, says there’s “wonderful discovery work” in Australian universities. If this can be harnessed and commercialised, then “the opportunities for diversifying the economy to get beyond a mineral base are absolutely enormous”.

It’s a sentiment echoed by Australia’s Chief Scientist Professor Ian Chubb, who has repeatedly warned we are falling behind on return from R&D investment. “The number of patents issued per dollar spent on R&D is nearly four times greater in the US and UK than Australia,” he said. “The number of startup companies founded per dollar spent on R&D in the US is nearly four times greater than in Australia; and in the UK, it’s over nine times that of Australia.”

Recognising this need to improve, UNSW Innovations has been helping researchers connect with industry. It ranks first out of 24 institutions in the world in Easy Access IP deals and has brokered creative, problem-solving “Sandpits” with Australian and international companies, leading to three research agreements with Cochlear, drug development firm Novogen, and building firm Boral.

“The University is a large organisation and often industry may want to innovate with us, but don’t know where to begin,” says Kevin Cullen, UNSW Innovations’ CEO. “Sandpits are a process of discovery to find out where our research interests overlap with the problems industry is facing.”

**Innovation: Can it be taught?**

Innovation and entrepreneurship are engines for growth and job creation. But how do you teach them? An OECD report on Entrepreneurship in Education found some programs focus on starting businesses, while other programs strive to make “students more creative, opportunity oriented, proactive and innovative”.

UNSW’s ethos is to combine both. But defining, structuring and teaching these courses can be difficult, says Martin Bliemel (pictured), who lectures in Innovation and Entrepreneurship within UNSW’s Business School and who is the faculty’s liaison with the new Michael Crouch Innovation Centre (MCIC).

“It’s not like learning to build a bridge where you need to understand the mechanical properties of the materials and each component, then learn how components fit together and build up your knowledge layer by layer,” Bliemel says. “You need to know everything in almost equal parts ...

marketing, finance, HR, product development, and you need to know a little bit of psychology as well.” To get around the challenge of sequencing the course content, Bliemel is making all material available from week one, and has adopted a more dynamic “flipped-classroom model” where students learn by doing.

Class activities usually involve input from an industry representative, to reinforce that the concepts and tools they’re learning are relevant, says Bliemel. His course is a popular elective and will be complemented by a new Global Entrepreneurship course he is launching in the second half of the year.

Also in the pipeline is a massive online open course (MOOC) in innovation and entrepreneurship, developed by a team Bliemel is leading, which students can be directed to by the MCIC as a fundamental starting point.

Photo: Aran Anderson



As to why Australian researchers are less willing than their US counterparts to engage directly with industry, UNSW Business Professor Joe Cheng suspects it is in part a silo mentality and also fears about compromising research integrity. But, he says, this attitude needs to be re-adjusted if Australia is to be more competitive.

Cheng has launched the Australian Innovation & Competitiveness Initiative at UNSW, which seeks to identify ways businesses can work with universities and government to innovate. On 18 September it will hold a summit to develop a research and engagement agenda to coincide with the official launch of the MCIC.

### Embracing volatility

“This is the most excitingly disruptive, intriguingly subversive time to be alive,” Communications Minister Malcolm Turnbull told the recent Risky Business forum. “We have never had so much uncertainty in our economic, geopolitical environment ... and it’s driven in large measure, by the rapidity of technological change.”

Rather than being scared of this change, Turnbull urged the audience to embrace it. “That means we have to be smarter, more competitive, more productive, more technologically sophisticated, [and] better informed by science. If we equip ourselves in that way ... then volatility becomes your friend, not your foe.”

One strategic area in which Australia has failed to engage is the space sector. “India sent a satellite to Mars for less than the cost of producing the film *Gravity*, and yet Australia hasn’t even launched a commercial CubeSat,” says student entrepreneur Solange Cunin.

She has support for her satellite ride-sharing company from Microsoft, through its BizSpark program, and is finalising her first major customer, but she’s facing an uphill battle.

It’s a struggle familiar to Australian Centre for Space Engineering Research director Professor Andrew Dempster. “Right now there’s no space industry, and there should be. There’s no electronics industry, and there could be,” he says. In partnership with Saber Astronautics director Jason Held, Dempster recently launched a business accelerator for space-related start-ups called Delta-V. The venture now has support from UNSW, the University of Sydney and NSW Trade & Investment.

Dempster says the goal is to create a space industry ecosystem in Sydney, and across Australia. “We have quality and quantity when it comes to engineering students and researchers,” he says. “We should be developing these students so they can create their own opportunities and businesses.”

Cunin is the prototype. “She’s exactly the type of person we’d love to support.” ■

## UNSW’s champion startups



### CHUFFED

Chuffed is a crowdfunding platform that helps people raise money for their social causes, whether environment initiatives, projects aimed at helping refugees and asylum seekers integrate into their communities, or funding international development projects. So far, Chuffed has raised more than \$3 million for more than 200 causes, with one of its most successful campaigns raising \$160,000 for Australian animal welfare sanctuary Edgar’s Mission. Founded in 2013 by former UNSW biomedical engineering student Prashan Paramanathan, Chuffed received seed funding from the Telstra Foundation.



### HEYLETS

HeyLets is an app that helps travellers make the most of their time in a new city. Users get a personalised feed of recommended experiences, which has been created by locals and fellow travellers, who have shared interests and a similar demographic profile. After raising \$1 million in seed money from Australian venture capital firm BlueSky Funds, former UNSW student Dean Kelly (pictured left) and his co-founder Justin Parfitt (right) were able to expand in the US, continue developing the product, and launch globally. HeyLets is now available in 91 countries and has more than 100,000 users. Kelly says he benefited immensely from UNSW connections. “The sheer breadth of experience that people had across the globe, and being able to call upon that experience whenever needed was extremely valuable.”



### CONSCIOUS STEP

Conscious Step wants to sell you ethically produced socks that look awesome, and make the world a better place. The former UNSW students behind the startup have partnered with four charitable organisations and now have lines of socks where proceeds go toward planting trees, improving literacy rates, providing food packages to malnourished children, and providing treatment to pregnant women infected with HIV. Hassan Ahmad, who co-founded the company, was a medical doctor interning at the World Health Organization. Driven by a desire to create positive social change, he teamed up with friends Adam Long, a marketing strategist, and Prashant Mehta, a microfinance expert. “University is a great time to learn business skills, network, and meet new co-founders while risk is low and time is high,” says Ahmad. “UNSW is doing a great job with their multitudes of programs... but students still have to be hungry enough to seek these out.”



### POLLINATE ENERGY

Pollinate Energy is a social enterprise that aims to bring solar lighting to millions of India’s poor. The company was co-founded with UNSW graduates, Ben Merven and Monique Alfris, to reduce the use of harmful kerosene lamps, which the World Health Organization estimates kill more than 1.5 million people each year. The not-for-profit business provides solar lamps and smoke-free cook stoves that are sold and installed by locals. The business has so far sold over 8,000 solar lights to more than 500 communities in India. Pollinate was recently featured on the ABC’s *Foreign Correspondent* program.

# Hubs of change

Not all innovation is geared toward commercial gain. **Susi Hamilton** looks at three social initiatives making a difference in the world.

They might not know it, but the students working in a shared office space in Sydney's Edgecliff are social innovators. From the faculties of law and business, the students are working at the Social Impact Hub on projects with real-world clients with a social focus, including social enterprises (for-profit business with a social bent) and not-for-profits. In exchange they get course credits, professional experience and a taste for innovation.

"Our aim is to create UNSW alumni who are passionate about making a difference and have the skills to do it," says hub director and Adjunct Lecturer at UNSW Law, Jessica Roth, who was inspired by a similar program at Harvard.

It's work that gives students a sense of purpose and opens their minds to career opportunities. "I wanted to do something to help, rather than just doing a paper to get a mark," says Master of Commerce student, Jillian Kornie.

Roth says while some participants will gravitate towards entrepreneurship, others might become "intrapreneurs", those who may not launch a startup, but instead change their organisation from within. Both are worthwhile pursuits, Roth believes.

It's a sentiment espoused by UNSW's new Michael Crouch Innovation Centre. Director Brad Furber says the centre aims to dispel the notion that being an innovator or entrepreneur is solely about starting a business. Some of UNSW's most popular courses, he points out, are in social innovation, including the Graduate Certificate in Social Impact offered by the Centre for Social Impact.

At the Social Impact Hub, one of the five projects underway involves students devising a campaign for the Australian Charities Fund to expand giving in the workplace nationally, targeting Generation Y partly through social media.

Rose Khattar, who is studying Economics/Law, says the work has been far-reaching and rewarding: "I didn't know anything

about workplace giving two months ago, but now we're nearing the end, we feel confident in what we're coming up with."

Roth says the social enterprise and impact investment sectors are on the cusp of massive growth. "There has already been a near-doubling of impact investment funds globally in the past five years," she says.

Serial entrepreneur Dorjee Sun is already making good use of that growth. Since graduating from a UNSW Commerce/Law degree in 2001, he has founded or co-founded 16 social businesses – 15 of which generate revenue or raise money.

Sun was named a Hero of the Environment by *TIME* in 2009 for his work as a carbon trade broker. But he is perhaps best known for his project fighting deforestation in the Indonesian province of Aceh, which was the subject of the award-winning documentary, *The Burning Season*, narrated by Hugh Jackman.

This year Sun is running a two-week intensive course for law and engineering students called Unswot, which aims to use innovation to tackle some of Australia's most challenging problems, such as the lack of affordable sustainable housing.

Apart from coming up with entrepreneurial ideas, Sun hopes students will develop connections. "The people you know lead to the opportunities you get," he says. "If we double connections, we should be able to double innovation.

"This course is a call to action to help each other. There's a bigger pie if you help others out."

That's a philosophy also embraced by the UNSW Yunus Social Business Health Hub, launched this year by Nobel Peace Laureate Muhammad Yunus. The hub will help researchers and students collaborate on social enterprises to improve the health of poor and marginalised communities. A first for an Australian university, it will be part of a global network of university-based Yunus Social Business Centres. ■



Jessica Roth with Social Impact Hub students.  
Photo: UNSW Media



Serial entrepreneur Dorjee Sun.  
Photo: Arunas Klupsas



Nobel Peace Laureate Muhammad Yunus.  
Photo: UNSW Media





Nick Carney with CBA's Head of Innovation Tiziana Bianco.  
Photo: Grant Turner/ Mediakoo

## A breakfast club of entrepreneur alumni is opening doors to the next generation, writes **Steve Offner**.

A few years ago, Nick Carney began to notice something curious about his friends.

Most were UNSW business and law graduates working in “the traditional places – law, management consulting and investment banking”. But when some decided to strike out in a more entrepreneurial way, they hit a wall.

“They were facing similar challenges: How do you make the connections you need as an entrepreneur, how do you build a business, raise money, find good staff?

“I was having breakfast with a couple of former classmates who had their own startup businesses and they all commented about a lack of peer support and mentoring. Questions arose about whether the University could play a role,” says Carney, a senior associate at law firm Herbert Smith Freehills and UNSW Council member.

The group continued their monthly breakfast meetings; each bringing along a friend with an interest in entrepreneurship. Within months their number had expanded, and the UNSW Global Alumni Entrepreneurs Network was born.

Carney, who describes himself more as a lawyer than an entrepreneur, says 90% of members are graduates, the rest are “friends of the University”.

Most are entrepreneurs, investors, advisers, and people who are interested in learning more. Alumni from San Francisco, Singapore, Hong Kong and New York City regularly dial in. “It was just word of mouth to start with,” Carney says. “Now we’re hitting capacity constraints; it’s really hit a nerve and people are interested.”

The network’s philosophy is based on the Stanford Business School model. “If someone wants to drop an email or a phone call to another member of the network, the culture is you will help them out [and] introduce them to your contacts – it’s a culture of pay it forward,” Carney says. “I’d like that to be the case for this alumni network and we’re already seeing it happen.”

Carney says the UNSW network is driven by a core group who are “very active in the innovation space”, including entrepreneur Jonathan Barouch, COO of the Women in Banking and Finance group, Raji Ambikairajah, the Boston Consulting Group’s Julian King, and Herbert Smith Freehills partner Michael Gonski. A guest speaker is invited to each meeting.

At a recent gathering at the Commonwealth Bank’s Innovation Lab in Sydney’s Darling Quarter, the bank’s Head of Innovation Tiziana Bianco outlined the bank’s efforts to foster a culture of creativity.

Alumnus Seb Ruiz, from software company Atlassian was at the CBA event. He believes the benefits of the regular meetings flow both ways. Not only do entrepreneurs get to thrash out ideas and learn from their peers but the university also

profits. “Keeping in touch with the University allows us to influence the curriculum over the next five years, to help change and encourage the culture of innovation there,” he says.

Carney says universities can, and need to, teach entrepreneurship. “You can get all the information you need now through your mobile phone or watch. What you need to learn is problem-solving and how to work creatively in teams. If unis don’t do it, the best and brightest kids may decide they don’t need to go to university at all.”

He predicts the Michael Crouch Innovation Centre will be “a game changer”. “It’s a fantastic example of a whole-of-university commitment to supporting and encouraging entrepreneurship and innovation.”

There’s a lot to be optimistic about, Carney says. “One of the great things about the new vice-chancellor is he has spun-off businesses of his own. To have someone leading the University who has actually lived the entrepreneurial experience is really exciting and a good indication of where the University is heading.” ■



---

Dynamic duo:

# The nanoscientist and the sociologist

Her vision is to use nanotechnology to deliver drugs and gene-silencing therapies directly to cancer cells. He is a social scientist with an interest in the social and ethical issues of technological change.

Together Professor Maria Kavallaris and Dr Matthew Kearnes are embarking on a research project to consider some of the social implications of nanomedicine, and to develop a platform for engaging the public in the unfolding nano revolution. The pair sat down recently to talk about their collaboration.

**Matthew: Maria, can you tell us a little bit about nanomedicine and why you think it is so important?**

**Maria:** Absolutely. I'm a cancer researcher, and I'm particularly interested in developing effective and less-toxic therapies for cancer. Many cancer patients are treated with chemotherapy. This is a highly toxic therapy that not only targets the tumour cells, but also damages normal cells, and you often hear about the side effects that people go through. We're also working at the Children's Cancer Institute. Now, when children are treated with chemotherapy, because they're young and they've got growing tissues, survivors often get lifelong side effects such as hormone imbalances, fertility issues and even secondary cancers. So, not only do we lose almost three kids a week from cancer in Australia, kids who survive the disease often have lifelong health issues. There's an urgent need, not just for children but also for adults, to develop treatments that can target tumour cells but spare the normal cells. And I see nanotechnology as offering a lot of promise.

**Matthew: Can you define nanotechnologies for us?**

**Maria:** Effectively, they are engineered materials put together in nano-sized structures, which are very, very small, thinner

than the diameter of a human hair. And these structures can be modulated in different ways: you can make cubes, you can make squares, you can make wonton shapes, you literally can make any sort of shape. And within them you can put drugs, or you can add drugs to their outsides – antibodies and peptides to be delivered specifically to the diseased tissue.

**Matthew: What might these targeted therapies mean for cancer patients?**

**Maria:** Imagine cancer is like a running engine and you want to stop that engine: targeted therapies are like putting a spanner in the works, in the end destroying the growth of that tumour. One of the oldest examples, is Herceptin®, for breast cancer, which is given only to patients who have got a herceptin-positive [HER2-positive] receptor on their tumour.

**Matthew: So that's a particular mutation?**

**Maria:** Exactly, it's a particular change on that breast cancer. If you give that same therapy to a patient who doesn't have that herceptin-positive tumour, it's not going to work. So that's what we would call a targeted therapy. But even with those therapies often patients can develop resistance. We feel with nanotechnology, we may be able to develop systems to bypass some of those resistance mechanisms.

**Matthew: This is a fascinating area of science, but you've taken your research a step deeper and you've engaged me, a social scientist. Tell me a bit about why you did that?**

**Maria:** Well, we like to work with strange people! But on a serious note, because this is a rapidly evolving area, it has the potential to be amplified in the media with false information, and it's important that, as we're developing these technologies, we take the public with us. It's important to have someone like you involved because you can challenge us on some of the things we're doing, how we express our ideas, and how we engage people, the consumers. We want you to be involved in our research as it develops.

Photo: Getty Images



**Matthew:** A cynic might ask is this just about selling it to the public or is there something else going on?

**Maria:** It's definitely about much more than a sales pitch. We know what happens when there's a miscommunication about scientific achievements – genetically modified [GM] crops are the classic example, where the company came out and said, "These are going to happen and they're going to be good for you", and then people said, "No, we don't want them." We can't let that happen with nanomedicine because it's just too important.

**Matthew:** The GM example is a good one, because there are a number of misconceptions around how the public responds to new technologies. There's the idea the public is just innately fearful of new things, or that people don't really understand the science. My research shows there are really significant areas of concern around the direction and pace of change in general, and the actual benefits from the technology that is developed. These are big social questions and economic questions, and, to some degree, ethical questions. One of the things my work looks at is how we build platforms for dialogue and engagement at a much earlier stage in the process.

**Maria:** I agree that's something researchers need to get better at. We tend to fear talking about our research before we publish it. It's finding a balance between giving false hope to the public, and informing them about what we're doing. Working with you as part of this ARC Centre of Excellence is going to give us a great opportunity to inform people in the right way.

**Matthew:** Targeted therapies, for example, rely on some degree of genetic screening. So there are issues here with privacy – particularly in the relationship between genetic screening and health insurance. There are also questions about how this screening data might challenge our models of healthcare.

**Maria:** Well, you've hit on something that is really important in this genomic revolution. We're getting a huge amount of information, but we need to consider what we do if screening a patient for cancer, for example, inadvertently uncovers something that suggests a susceptibility for Huntington's disease. How does the medical profession deal with that, when the patient didn't ask to find out? It's important we work out the ethical obligations.

**Matthew:** One of the implications is that these developments will challenge our models of informed consent, and the relationship between patients and doctors is also likely to change significantly as we move to more targeted treatments.

**Maria:** That's why it's going to be very important to engage the public in this whole discussion.



Matthew Kearnes  
and Maria Kavallaris.  
Photo: Quentin Jones

## We tend to fear talking about our research before we publish it. It's finding a balance between giving false hope to the public, and informing them about what we're doing.

– Maria Kavallaris

There are legal implications; you've got the ethics; and you've got the economic arguments, as well. As a society, how do we deal with these? There are companies now that do genome screening; give you a report on all your susceptibility. When you fill out your insurance forms, what do you say if you have a full run-down of your potential weaknesses? Because those reports only deal with probability measures; they're not absolute. It's a dialogue that has to happen.

**Matthew:** And are there always going to be populations who are left out?

**Maria:** It's not that these patients are being deprived of treatment; it's just that we don't have the understanding of how to treat them. But remember, we're also generating knowledge. So as we identify these new genes, then we have to go back to the laboratory and figure out what they are doing. If they are driving the disease, can we develop therapeutics to target them? That's where there is enormous potential

**Maria:** Enough of me though. Matthew what will you, as a social scientist, get out of this research partnership?

**Matthew:** I'm really interested in the relationship between science and society and one of the key challenges we've got in our work is how do we interact with science in real time? We tend to think of science as a relatively autonomous sphere of work, but I think we're recognising there are significant social challenges attached to processes

of scientific and technological development. We want to build new ways of engaging the public, new ways of speaking across disciplinary boundaries. I'm fascinated by where the science is taking us, and how we might develop more mature, more nuanced discussions around the social ramifications. My feeling is we've done that pretty well, but we could do it a lot better, and one route is through engaging more directly across what have tended to be quite strict disciplinary perspectives.

**Maria:** From my perspective, I want to make sure whatever we develop in the clinic is adopted by people, and that they see it as a good therapeutic strategy for them to treat their disease. What's important for me is to make sure we can learn from social scientists, such as yourself, the sort of things that may actually raise concerns, so we can better articulate our responses. But I also think it's even more general than that; it's how we express ourselves, and how we engage people. So that's what I'm hoping to get out of this partnership.

**Matthew:** Well, I'm looking forward to it, and let's come back in a few years time and see where we've got to.

**Maria:** If we're still talking to each other! ■



Download the *Uniken* app  
to watch the video



Louisa Jorm. Photo: Grant Turner/Mediakoo

# Crunching healthier data

A new health research centre led by vet-turned-epidemiologist Louisa Jorm is taming the big data beast, writes **Dan Wheelahan**.

In the late 1980s, while studying a Q fever outbreak in a secondary school in the UK, Louisa Jorm remembers having to legally “bribe” the kids with Mars bars so they’d participate in her epidemiology research.

Today, as head of UNSW’s new Centre for Big Data Research in Health, Professor Jorm has the opposite problem – too many willing collaborators.

“I’ve been surprised by the number of people who have come out of the woodwork and are crying out to collaborate on big data,” Jorm says.

Officially launched in May, the centre aims to realise the potential of big data to reduce the costs of healthcare while improving the prevention and management of many diseases.

With more than 80% of healthcare data unstructured, Jorm says one of the main challenges facing her research team is how to extract the most valuable information. “Big data sets by their very nature are so large and complex that they become extremely difficult to process,” she explains.

The nature and vast amounts of personal health data being collected and stored across the globe raise questions about how an individual’s privacy will be protected.

“Advances in technology have also made it easier to protect private and personal health information. Having said that, we will need to continuously update our technologies, and the policies and guidelines that govern access to data, to ensure confidentiality is protected in public health research,” she says.

Initiatives such as the Open Humans project point to where big data health research may be heading, and the risks involved. The website allows individuals to publicly share personal health data, including their genome, for the use of researchers around the world.

“While this is an innovative concept, this data is highly identifiable. Once someone’s genome is mapped and publicly

available, in principle their DNA could be synthesised. What if that information falls into the wrong hands?” Jorm asks.

An internationally recognised epidemiologist, Jorm came to public health from an unlikely quarter – veterinary science.

After completing her undergraduate degree at the University of Sydney, Jorm ventured to the UK, a rite of passage among the vets of her generation. The brutal side of vet work quickly became evident. “If your client couldn’t pay, their pet got put down. There was no room for sentiment.”

After becoming the first female vet to complete a Masters of Science in Epidemiology at the University of London, Jorm returned to Australia to complete her doctorate. Her focus was Group C Streptococci, a bacterium common to horses. The racing industry’s sometimes-ruthless approach to animal welfare helped in her decision to finally leave vet science behind.

By this time, Jorm had established herself as a leading communicable diseases epidemiologist and spent the next five years investigating disease outbreaks with NSW Health, before heading up their epidemiology department and shifting her focus to chronic diseases.

While there, she set up new systems to link routinely collected data so researchers could follow patients’ journeys through the health system. When academia beckoned, Jorm transitioned to the University of Western Sydney where she worked before joining UNSW last year.

She thinks there are enormous opportunities for the UNSW centre and the field of big data.

“Australia is in a position to be a world leader in this area, but we need an industrial-scale approach. That means collaborating globally, which I think is the way forward.

“We don’t want to be a group that just does research; we want the centre’s work to be a catalyst to improve health globally.” ■

# The renegade constitutionalist

One of the world's finest legal minds is turning her thoughts to how laws shape democracy. **Meghan Walsh** reports.

It was supposed to be the usual keynote address in front of hundreds of esteemed lawyers, judges and scholars attending the Australian Constitutional Law Conference. But speaker Rosalind Dixon (pictured) rarely does usual. Though only 35 years old, the pixie-haired professor used the address to lecture veterans twice her age on how to interpret the country's constitution.

In her mind, the wig wearers out there were ruling too much by the letter of the law, without injecting enough context. "You could tell people were uncomfortable," says Scott Stephenson, a colleague at the lecture.

So much for diplomacy. But Dixon can ruffle a few feathers when she has the imprimatur of Mark Tushnet, a top Harvard legal scholar, who cites her as "the leading comparative constitutional scholar of her generation". Sure it's not riveting dinner conversation (unless you're a fan of TV series *The Good Wife*), but legal minds around the world are tuning in – and watching her words turn into action. Kenya, for one, solicited her commentary on its new constitution. "You want to know what she's thinking about," says Samuel Issacharoff, a constitutional law professor at New York University. "Minds like hers don't come along too frequently."

Harvard-bred and now a professor in UNSW's Law School, Dixon doesn't just study vaunted legal documents, she examines how they translate in the real world, where they have to be enforced by people and institutions with competing agendas. Her work is particularly relevant today, as countries from Afghanistan to Colombia form new democracies. But Dixon is equally ready to take on established legal systems such as in the United States where she says the nation's progressively polarised politics have warped the legal process. "That's the joy of being a scholar," says Dixon. "You have the great freedom to tell them how to get it right."

Scholars may have a reputation for moving at their own pace, but not Dixon. Good luck getting her on the phone – or keeping her there. When we finally catch up over Skype, she's just finished a morning jog, and from the start the conversation is racing. In Dixon's spare time, she swims and runs; no marathons here, though. She prefers to push herself at work. Yet she says those

"leisurely" 30-minute workouts often produce her boldest ideas including that lawmakers need to get more input from judges, since they are the ones enforcing new laws.

Constitutional design, she argues, doesn't stop after the document is ratified; it's how the sentiment is carried on in case law that shapes it. To show this, Dixon – who was born in South Africa to two lawyer parents and moved to Australia when she was three – has looked at how embattled democracies function judicially, politically and psychologically. That's important when it comes to figuring out why some succeed and others fail.

Countries like India have tried to tie the hands of judges by writing amendment after amendment until the constitution is the size of a phone book, but even then it's never perfectly thorough. That's why Dixon feels judicial involvement is so important, and would reduce the number of laws getting struck down. "We can't rely on language to do all the work," she says.

Dixon's prescription for the perfect constitution? It can't be too rigid, because you have to allow space for future politicians and courts to shape its meaning. But it can't be too fluid either, since it has to guard against the dangers of abuses of power. It has to prod democratic action as well as constrain it. Oh, yeah, and it has to capture the hearts and minds of citizens for generations to come. No big deal.

This article first appeared in [Ozy.com](http://Ozy.com) ■

Photo: Zoe McMahon





Andrew Martin.  
Photo: Grant Turner/Mediakoo

# Agent of change

The buzz word is resilience, but one education expert believes adaptability is what schoolchildren need to thrive. **Susi Hamilton** reports.

As a 15-year-old student, Professor Andrew Martin admits his grades slipped so much his high school questioned whether he should go on to Year 11.

It's a remarkable confession for a man who is now an internationally recognised educational psychologist, working to help students thrive in school and beyond.

Martin says his Year 10 academic slump was the result of "a profound lack of effort". "It was a classic case of disengagement, which for many teenagers can be a rational response to everything going on in their lives. Like them, I just wanted to have fun," he says.

As a senior student, he changed from not wanting to be seen to be trying too hard, to someone who wanted to improve. He was lucky to have a great teacher and supportive parents who provided a good home environment. "Other kids don't have that luck," Martin concedes.

It was a turnaround that led to a longstanding interest in how and why we learn. "Like most things, you need a personal reason to be motivated to look at something in any sort of quality and depth," Martin says. Most recently, it's led him to a pioneering project, researching the role of adaptability in education – the capacity to respond to change, uncertainty, variability, transition and novelty.

It's a relatively new area of inquiry. "There's a lot of work on resilience," Martin says, "but resilience is only relevant when it comes to adversity – which is not necessarily a frequent occurrence for many students. Arguably, adaptability is more relevant because change, uncertainty, novelty and the like are pretty much daily occurrences."

And, whereas the purpose of resilience is to "get by" or "push through", adaptability is very much about making the most of circumstances, a particularly relevant skill in today's rapidly changing world.

In one of Martin's recent studies – published in the *Journal of Educational Psychology* – adaptability significantly predicted academic success and personal wellbeing. The study, which included more than 1,000 students from nine high schools, shows students who embrace change are more ambitious about their future plans, enjoy school more, are less likely to give up, have a greater sense of purpose and less psychological distress.

Crucially, Martin believes adaptability can be taught. He's identified three key areas that can be adjusted: thinking, behaviour and emotion. "You can help kids think about a new or unexpected situation in a different way, how to come up with a different plan or how to minimise their disappointment, for example," he says.

"It's not often you can teach a specific skill that can be used even in three to four years time –

adaptability is a lifelong asset," says Martin, whose work is supported by an ARC Discovery Project grant.

But there are caveats. Older students are less capable of adjusting the three key areas. And an adaptable student is also likely to have shown prior achievement. These suggest the importance of early intervention.

Martin would like to see schools introduce individual mentoring geared towards adaptability, plus a parent enrichment program to help support their growth.

While the benefits for the individual at school and in the workplace are clear – there are also benefits for society as a whole. Martin's most recent research found the more flexible the young person is, the more likely they are to have greater environmental awareness and hold pro-environmental attitudes.

"Adaptability may be one of the human attributes we most need as the planet changes," says Martin. "In the face of these changes, we will need to adjust our behaviour and our thinking on climate, just as we did when tackling challenges with the ozone layer.

"How it plays out is largely dependent on our kids. Those who are adaptable will be more likely to recognise the challenges and respond to them." ■

## HOW TO BE MORE LIKE A CHAMELEON

Adaptability is a skill best developed young, but it can be worked on at any stage of life. To become more adaptable:

- > have an inner motivation to adjust your thinking, behaviour and emotional responses
- > be mindful of when new situations or circumstances arise and be disposed to the opportunities they present
- > be willing to seek help where needed
- > see adaptability as an ongoing, natural part of life, rather than a temporary attribute.





Richard Goodwin with his *Barangaroo Doppelganger*.  
Photo: Joshua Lynch

arts

## GIVE ME SHELTER

Sydney's iconic "trolley man" has become an unlikely muse for a very public criticism of the city's urban planning, writes **Fran Strachan**.

For the next year, artist Richard Goodwin will push a cumbersome trolley from Walsh Bay to Hyde Park retracing the footsteps of Joseph Cindric, Sydney's homeless "trolley man" who died more than 20 years ago.

Cindric was known to Sydney locals for his eccentricity and clockwork regularity on the city's streets. A homeless immigrant from Yugoslavia who pushed his life possessions around in a handmade cart, Cindric rarely spoke. He slept during the day because it was safer and wore construction helmets as protection after he was mugged.

Goodwin has created a replica of Cindric's trolley entitled *Barangaroo Doppelganger*. Inscribed with the words "Barangaroo Masterplan" and topped with a gilt-bronze model of James Packer's proposed \$2 billion casino, the artwork is a political statement on wheels.

Every Friday for the next year the Art & Design professor and accomplished architect will push the trolley out of UNSW Galleries towards Walsh Bay to retrace Cindric's steps.

Equal parts endurance test and performance piece, *Barangaroo Doppelganger* will be featured in UNSW Galleries' latest exhibition, *Shelter Union*, which aims to explore living in an "age of unsettlement".

Presented in partnership with the *Big Issue* magazine and UNSW Built Environment, *Shelter Union* aims to address the issues of rental affordability, urban planning and homelessness.

"The point of *Barangaroo Doppelganger* is to openly question the inclusion of a monolith like the casino from the perspective of an already compromised urban-planning process," says Goodwin.

"Joseph Cindric is an integral part of the work because as an iconic figure in the city's memory, he has helped form Sydney's conscience."

Describing the homeless man as a "public artwork in the flesh" Goodwin became obsessed with Cindric in the 1970s, making an Australian Film Commission-funded film about him in 1981 and building replicas of Cindric's trolley. The original is now part of the Powerhouse Museum's collection.

"Like Cindric, *Barangaroo Doppelganger* is a public artwork, with all the power art has to critique and hold us to account. It asks a simple question, 'How did this casino happen, and how does it implicate us all?'"

Goodwin believes the state government "padded the casino model with public art funds and boutique architectural projects, and dressed it up in the fluff of landscape design to placate criticism".

*Shelter Union* curator Lucy Ainsworth, from UNSW Galleries, says the exhibition asks audiences to re-imagine the social, environmental, economic and political fabric of cities.

But the exhibition's focus isn't just on Sydney. International artists Artéria (Portugal), Teddy Cruz (USA), Urban-Think Tank (Venezuela) and Jesper Wachtmeister (Sweden) will also exhibit new projects that consider alternative living solutions.

A major photographic project depicting the varied lifestyles of the *Big Issue*'s vendors will also be unveiled, providing an important human element to the exhibition.

"The photographers all have different stories to tell – some are homeless, while others have limited employment opportunities and are selling the *Big Issue* magazine to earn an income. The pictures connect with *Shelter Union*'s broad theme of 'What does it mean to be living in our cities now?'" says Ainsworth.

*Shelter Union* runs until 15 August as part of the UNSW Galleries *Living Here Now* season. ■



arts

# SPARK OF GENIUS

New Artistic Chair Paul Stanhope is determined to ignite the spark of invention and new ideas in this year's Australia Ensemble program, writes **Fran Strachan**.

Going to a performance of the Australia Ensemble was the equivalent of “receiving a blood transfusion”, an audience member recently told Paul Stanhope. The comment was music to the internationally acclaimed composer’s ears.

“The concert enlivened her,” he says smiling. “We had provided a stimulating and evocative experience and to me that’s what music is all about.”

As the new Artistic Chair of one of the country’s finest chamber music groups, Stanhope is shaking things up with “new compositions, commissions and collaborations” and

a determination to provide audiences with “music that starts a conversation”.

He says the title of this year’s season, *Raising Sparks*, captures his approach. “It’s about finding the spark of invention and the spark of new ideas.”

Establishing himself early as one of the most important Australian composers of his generation, Stanhope gained international recognition when he took out the prestigious Toru Takemitsu Composition Prize more than a decade ago at the age of 34.

L – R: Ian Munro (piano), Dene Olding (violin), Irina Morozova (viola), Julian Smiles (cello), Geoffrey Collins (flute), Dimity Hall (violin), David Griffiths (clarinet). Centre: Paul Stanhope (artistic chair). **Photo:** Quentin Jones



A cascade of honours and awards followed. Now he comes to UNSW after an nine-year stint as musical director of the Sydney Chamber Choir, bringing with him incredible talent and unlimited ideas.

But Stanhope has big shoes to fill. He succeeds Emeritus Professor Roger Covell, co-founder of the Ensemble and founding head of the School of Music and Music Education. In 1980, Covell joined forces with then UNSW colleague and clarinettist Murray Khouri to establish the Ensemble, which quickly became known for engaging outstanding artists to present unusual and varied performances as well as a regular chamber music repertoire.

Covell's 34-year tenure ensured the remarkable growth of the Ensemble in Australia's cultural scene and Stanhope plans to "build on the tremendous foundation Covell built".

This year audiences will enjoy an even more varied program due to the diverse artistic influences Stanhope brings to his role.

He is as comfortable working with oud master and Best World Music Album award winner, UNSW alumnus Joseph Tawadros, as he is conducting the classical strains of the Goldner String Quartet, and his own scores are pervaded by myriad influences.

The history, culture and landscape of the Kimberley have provided rich inspiration resulting in his choral work, *Jandamarra*, collaborating with the Sydney Symphony Orchestra, youth choir Gondwana Voices, and the Bunuba people of the Kimberley region.

The Ensemble's cellist of 24 years, Julian Smiles, says Stanhope's connections with the composing world have brought an interesting repertoire to the group.

"Paul brings a new and young approach to programming and has a great sense of where music is heading – this year's program is definably different," says Smiles.

Not afraid to take risks, Stanhope has also included theatrical compositions like the virtuoso vocal writing of James MacMillan's *Raising Sparks* and the unusual, spoken interruptions in Martin Bresnick's *My Twentieth Century*.

In a first for the Ensemble, the group has performed Scottish composer Thea Musgrave's *Narcissus*, with the addition of contemporary dance and a video installation (see breakout).

Australian composer Robert Davidson's *Big Decisions* will also

bring what Stanhope calls "a quirky sense of social satire to the stage" with his composition incorporating sampled speech and video.

"Not everyone likes everything but we are lucky the Ensemble has built up such a level of trust that the audience allows us to experiment," says Stanhope. "If people walk away from a concert talking about what they just heard then I've done my job." ■

– with Gordon Kerry

## If people walk away from a concert talking about what they just heard then I've done my job.

– Paul Stanhope



Download the *Uniken* app to watch the slideshow.

## DANCE BRINGS NARCISSUS TO LIFE

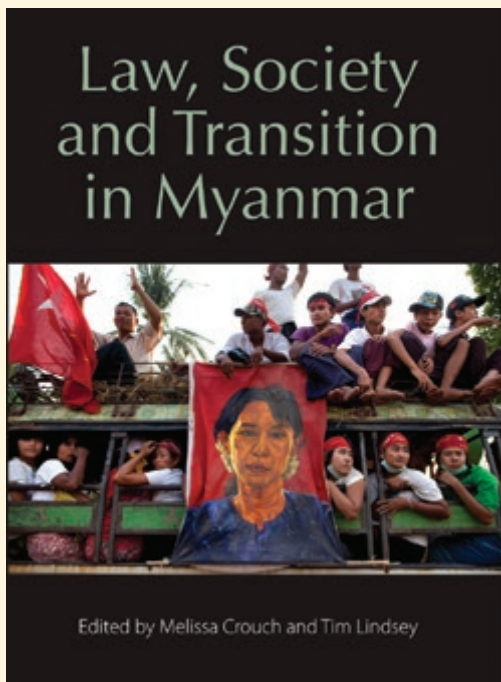
Contemporary dancer Raghav Handa brought the Ensemble's performance of *Narcissus* to life by dancing with his own "reflection" projected on a large video screen. Choreographed by former UNSW Visiting Fellow Sue Healey, the music and dance replicate Narcissus' emotions on first seeing his image.

Played by long-standing flautist, Geoffrey Collins, the challenging 14-minute solo piece features digital delay as a further suggestion of reflection. "Finding the attraction between musicians, dancers and other artists and using it to start a conversation is what the arts is all about," says Stanhope.

Find the full program at [www.music.unsw.edu.au/australia-ensemble](http://www.music.unsw.edu.au/australia-ensemble)



Raghav Handa rehearses for *Narcissus*. Photo: Sue Healey



### Law, Society and Transition in Myanmar

Co-edited by Melissa Crouch, UNSW Law and Tim Lindsey

This edited volume addresses the dynamics of the legal system of Myanmar/Burma in the context of the dramatic but incomplete transition to democracy that formally began in 2011. It includes contributions from leading scholars on a range of key legal issues now facing Myanmar, such as judicial independence, constitutional law, human rights and institutional reform. The first chapter examines how a resurrection of law has started in Myanmar with opportunities emerging for law reform that would have been unthinkable five years ago. The current political transition has reinvigorated engagement between the legal profession and the government, including the Parliament and the Attorney-General's Office. It has also created room for connections between local actors and international law firms, non-government organisations and a range of other groups. The resulting scramble for information by legal practitioners and international development agencies is a reflection of the practical challenges for access to information about law in Myanmar

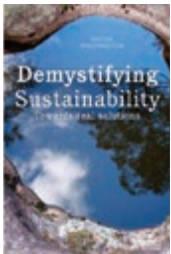
**This book comes at a critical juncture in Myanmar's legal development and will be an invaluable resource.**

and the lack of scholarship on law in the country. The book also features chapters on the legal history of Myanmar, electoral reform, the role of the judiciary, economic reforms and the state of company law. It also draws on the experiences of other countries to contextualise Myanmar's transition to democracy in a comparative setting, including Myanmar's participation in regional bodies such as ASEAN. This topical book comes at a critical juncture in Myanmar's legal development and will be an invaluable resource for students and teachers seeking greater understanding of the legal system of Myanmar.

Hart Publishing

### Demystifying Sustainability: Towards Real Solutions

Dr Haydn Washington, UNSW Science



Much has been said about the terms "sustainability" and "sustainable development". This book aims to demystify sustainability so that the

layperson can understand the key issues, questions and values involved. Accessible and engaging, the book examines the "old" sustainability of the past and looks to the future, considering how economic, ecological and social sustainability should be defined if we are to solve the entwined environmental, economic and social crises. It looks to the future after examining the difficult but central issues of overpopulation and overconsumption that drive unsustainability and explores the central role played by society's world view and ethics, along with humanity's most dangerous characteristic – denial.

Routledge

### Military Robots – Mapping the Moral Landscape

Jai Galliot, UNSW Arts & Social Sciences



Philosophers have wrestled over the morality and ethics of war for nearly as long as humans have been waging it. The death and

destruction that unmanned warfare entails magnifies the challenges we face in conventional warfare and everyday society. Inherently linked are questions and perennial problems concerning what justifies the initial resort to war, who may be legitimately targeted, who should be permitted to serve the military, and the methods of dealing with violations of the laws of war. This book provides a comprehensive and unifying analysis of the moral, political and social questions concerning the rise of drone warfare.

Ashgate

### Men Who Sell Sex – Global Perspectives

Edited by Scientia Professor Peter Aggleton, Arts & Social Sciences

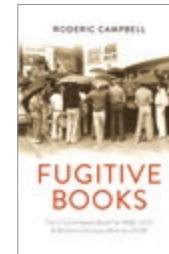


All over the world, men as well as women exchange sex for money and other rewards. Yet relatively little is known about male sex work, leaving

major questions unanswered about the individuals involved: their personal and social identities, their self-understandings and beliefs, the practices concerned, and the contexts in which these occur. Edited by Scientia Professor Peter Aggleton, this book updates a groundbreaking 1998 volume of the same name. It includes new chapters exploring health, social, political and human rights issues. Pushing the boundaries of current understandings, *Men Who Sell Sex* is a key book for academics and researchers interested in sex work and men's health.

Routledge

### Fugitive Books: The U Committee's Book Fair 1968–2012 & Women's Voluntary Work at UNSW



Roderic Campbell

The UNSW Book Fair, Sydney's largest book sale, started in 1968 during a moment of optimism

for bookselling and publishing, and closed in 2012 at a time of uncertainty over the future of books and libraries. The Book Fair was founded, organised and run by the U Committee, a group of volunteer women who fundraised for a diversity of projects at UNSW. It was the committee's largest, most demanding, and most financially rewarding fundraising activity. This book tells the story of that book fair, as well as of the significant contribution of the U Committee.

UNSW Archives

# BackStory

Tun Aung Shwe, School of Public Health and Community Medicine

The Football United program officer tells **Fran Strachan** about growing up under an oppressive military regime and why he traded medicine for a career in public health.

**I was in the final year of my medical training in the former Myanmar capital Yangon when Aung San Suu Kyi emerged as a national democracy icon in 1988.** She was a colleague of my father's, Tin Shwe, and often visited our house after he died. My father was a lawyer, writer and founding member of the National League for Democracy and a member of the "Intellectuals Group" led by Suu Kyi. During my medical internship my father was arrested and imprisoned for his role in the political movement during the 1990 election. He was sentenced to 18 years in the notorious Insein jail at the age of 61. He died six years later after succumbing to the prison's atrocious conditions.

**The government's repression was severe.** No one escapes if a family member has opposed it so I left Yangon to set up my own general practice in remote Kachin state. For ten years I treated patients with malaria, TB and other infectious diseases and sent money back home.

**When I left general practice I joined the Red Cross to work on HIV/AIDS prevention.** The situation in Myanmar was nearly hopeless – in 2002 the country had the second highest HIV infection rate in the region but we managed to roll out a successful program across five major cities.

**I don't miss practising as a doctor.** I found it boring. I would read medical textbooks and fall asleep but now I read public health books and fall in love.

**I decided I wouldn't allow my children to grow up under a brutal regime** so I followed my two brothers and mother to Australia to establish a life for my wife and child. I enrolled at UNSW to study a Masters in Public Health and a Masters in Health Management. Three years later my family joined me here.

**One of my research areas is how sport can be used to promote positive social change.** At Football United we use the World Game to help migrants and refugees settle into Australian life. I have experienced the things that all migrants do: language barriers, social isolation, lack of job security and re-establishing my professional career, so I understand where the people I work with are coming from.

**When I started at Football United I had 20 contacts in my phone, all Burmese** but now my social network is huge – corporate, NGOs, government departments, schools and communities with African, Asian, Latin and Caucasian backgrounds. My personal experience shows how the Football United approach works.

**Of course I love football! I played for my university football team when I was medical student.** My dream has always been to take Football United to Myanmar and in 2013 that dream came true. I established the first international program in Myanmar with the Myanmar Red Cross and four local universities, followed by the establishment of a year-long football-based HIV prevention campaign. ■



Photo: Grant Turner/Mediakoo

# UNSW LIGHTS UP THE CITY

**UNSW's literary, film and design expertise has illuminated Sydney's winter festival season.**

Student creations helped light up VIVID Sydney including *Arclight*, a grove of weather-responsive synthetic trees (pictured) co-created by Built Environment students, while Martin Place hosted a giant robotic Pac-Man designed by members of UNSW's student club CREATE.

Arts & Social Sciences celebrated its first year as the Sydney Film Festival features partner.

Academics and alumni from Arts & Social Sciences participated in 11 Sydney Writers' Festival panels as part of the faculty's ongoing partnership with the city's largest literary event.

UNSW Press continued its traditional success at the Sydney Writers' Festival, contributing 50 authors to this year's program.

Photo: Studio Workshop

