

# HORIZONS



## SECURITY ON THE RISE

Addressing issues in the Cloud  
and on the ground

## A TOP NEW ZEALANDER

An educator making a significant difference

## SHARING THE POWER

Designing medical interventions  
that work



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### GETTING IN TOUCH

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### SUSTAINABILITY

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### FROM THE VICE-CHANCELLOR

This issue of *Horizons* has a strong focus on issues arising from the ubiquitous use of internet communication in modern society. Cybercrime is one of the most important threats arising from this reliance on the internet and it will be part of the focus for the University's new Institute for Security and Crime Science. This Institute will in turn be closely engaged with the new Centre for Evidence-Based Policing in Wellington, a research centre established by NZ Police with the University of Waikato as the primary partner assisting police in their work to prevent crime and protect the public. Reflecting this area of strength at the University of Waikato, in April this year we will host more than 400 cyber security experts from around the world for the annual International Organization for Standardization (ISO) event responsible for cyber security international standards, such as the ISO/IEC 27000 series.

More and more, universities, other research institutes and organisations are collaborating on projects, bringing a cross-section of knowledge, skills and ideas to the research pool and securing outcomes that can have wide application. You can read about some of these collaborations in this issue.

Late last year the School of Māori and Pacific Development changed its name to the Faculty of Māori and Indigenous Studies to better reflect its teaching, research and outreach. Staff from the Faculty, and from Management are working with the Waikato DHB and Māori health providers to develop a workable framework to improve health outcomes for Māori in remote areas, while Associate Professor Maui Hudson has been leading a Health Research Council project to develop culturally informed guidelines to protect Māori interests in biobanking and genomic research.

It is always gratifying to see academic research applied in communities and having an impact. A fine example of that is the work done by Associate Professor Mere Berryman to raise the level of Māori achievement in schools. She was one of three finalists for Kiwibank New Zealander of the Year. Four other academics in the field of Education were recipients of New Zealand Association for Research in Education awards.

As Vice-Chancellor I am committed to the highest levels of external engagement, and to quality research. I encourage you to contact our Research Office at [research@waikato.ac.nz](mailto:research@waikato.ac.nz) if you are interested in working with the University of Waikato. We look forward to your support as we continue to build our profile as one of the great applied research universities.

**PROFESSOR NEIL QUIGLEY**

*Dr Ryan Ko*



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# NEW CRIME SCIENCE INSTITUTE

*Crime science is an emerging field of study that aims to develop a fast, practical and effective scientific approach to crime prevention using data analysis to identify patterns.*

**P**olice services in the US and UK are partnering with universities to reduce crime by enabling the use of evidence-based policing in real time. Now New Zealand is following suit.

At the University of Waikato's Hamilton Campus the Institute for Security and Crime Science incorporates four interlinked components; theories of crime science, modelling and analysis of data on crime and security issues in New Zealand, the use of computer science to assist evidence-based police work, and research in psychology relevant to criminal behaviour and police processes, such as taking evidence from witnesses.

Professor Geoff Holmes, Dean of Waikato's Faculty of Computing and Mathematical Sciences (FCMS) says the Institute is a great opportunity for staff and students to do high impact, cross-disciplinary research and teaching.

Crime science is multi-disciplinary, covering topics as diverse as geographic profiling, mathematical modelling of patterns, hypothesis testing and

interpretation, psychology, sociology, economics, political science, engineering, law, and cyber security.

Big data is a crucial component in crime analysis and staff at the National Institute for Demographic and Economic Analysis (NIDEA) at Waikato will be feeding into the new Institute as NIDEA has access to the Integrated Data Infrastructure Suite that provides direct, secure access to Statistics New Zealand's datasets. The FCMS' Machine Learning Group and Centre for Open Source Innovation (COSI), which contains the world-leading pattern analysis tools WEKA (open-source data mining software) and MOA (Massive Online Analysis), will also be feeding information to the Institute.

Waikato University is also home to the Traffic and Road Safety (TARS) Research Group, an independent provider of quality research for NZ Police, Foundation for Science, Transfund, Road Safety Trust, Land Transport New Zealand (LTNZ), ACC, and local and regional road controlling authorities. The Group will be using

its state-of-the-art research capability to complement and assist crime science research.

Professor Holmes says it was logical to introduce new qualifications at the same time as launching the Security and Crime Science Institute. With support from NZ Police, the University has developed a Master of Security and Crime Science (MSCS), the first qualification of its kind in New Zealand and targeted at current and future law enforcement and security practitioners.

The Institute will continue working with NZ Police and Environmental Science and Research (ESR) to develop research programmes aligned with "Policing Excellence: The Future", NZ Police's new strategy document.

The University has made three key appointments to the institute; Professors of Psychology Maryanne Garry and Devon Polaschek, and Dr Joe Burton, a Senior Lecturer in Political Science and Public Policy.

## CYBER SECURITY SKILLS TASKFORCE

Dr Ryan Ko, head of the cyber security programme at Waikato University, is one of eight people selected by the government to be part of a Cyber Security Skills Taskforce to address the shortage of cyber professionals in New Zealand.

Dr Ko has extensive experience in cybersecurity skill and training development, including establishing the New Zealand Cyber Security Challenge. The Taskforce will focus on practical actions to increase the number of cyber

professionals available to help defend the country against cyber attacks, which cost the New Zealand economy \$257 million last year.

A pathway will be established for junior analysts, including a level 6 qualification and industry-supported internships, to be developed this year. With a growing global shortage of cyber security professionals, it's estimated there will be a global workforce shortfall of between one to two million positions by 2019. This shortage is limiting the ability of

organisations to protect themselves from the increasing threat of cyber-attacks. "New Zealand is competing for talent in a global market and it's important the Taskforce looks at ways in which New Zealand can grow its own talent," Dr Ko says.

The Taskforce will be led by Hewlett Packard Enterprises Chief Technology Officer David Eaton, and includes representatives from academia and industry to ensure training meets the needs of industry.

## MAJOR SECURITY FORUM COMING TO NZ

Cyber security experts from around the world will be gathering at the University of Waikato in April for the annual International Organization for Standardization (ISO) event responsible for cyber security international standards.

Event co-convenor and University of Waikato Head of Cyber Security Lab Dr Ryan Ko says the event will bring about 400 cyber security experts together.

Hosted by USA-based Cloud Security Alliance (CSA) on behalf of Standards New Zealand and supported by the University of Waikato and Tourism New Zealand, the 28th ISO/IEC JTC 1/SC 27 Plenary and Working Group Meetings will be held at the University of Waikato from 18-25 April 2017.

"This cyber security event is one of two held each year by the Swiss-based International Organization for Standardization (ISO), and helps shape how the industry moves and operates," says Dr Ko.

"The SC 27 working groups create and manage prominent international security and privacy standards such as the ISO/IEC 27001 and ISO/IEC 27018, which are used to evaluate the best practices of major organisations. With the support of Tourism New Zealand, we were able to win the hosting bid ahead of prominent

member nations such as China. This is a great achievement for New Zealand cyber security on the global stage."

ISO standards provide global alignment of definitions, industry best practices, frameworks and technical guidelines derived from subject-matter experts and member country standards bodies.

The cyber security ISO standards influence the policy and governance of information systems and assets such as critical data.

"By aligning with the standards, organisations can assess their current state, identify gaps within their processes, and plan a roadmap to align to an international security baseline," says Dr Ko. "The ISO standards are important for exporters as well. Products from organisations adhering to the standards meet high criteria which ensures ongoing trade."

Dr Ko says the University of Waikato aligns to the ISO/IEC 27001 standard, which allows it to plan a framework of preventative measures and security.

ISO is an independent, non-governmental international organisation with a membership of 163 national standards bodies, which are the foremost standards

organisations in their countries with only one member per country. ISO standards are developed by groups of international experts in response to requests from industry or other stakeholders such as consumer groups.

Dr Ko is also the principal investigator of the six-year \$12.2 million MBIE-funded project STRATUS which aims to create a suite of security tools, techniques and capabilities that return control of data to Cloud computing users. Now in its second year, STRATUS – Security Technologies Returning Accountability, Trust and User-centric Services in the Cloud – is a team of leading cloud security researchers and practitioners from University of Waikato, University of Auckland, Unitec Institute of Technology and Cloud Security Alliance.

"Currently, when we store and process data in the cloud, we need to trust cloud computing company staff that they will not abuse their rights," says Dr Ko. "STRATUS removes the need to rely on trust, but rather, empower users with actual control and visibility over the changes in their data. Several techniques to track the life cycle of data, and to process encrypted data have been developed and are now commercialised with New Zealand partners."

## NATO'S DURABILITY IN THE SPOTLIGHT

One of the new academics working closely with the Institute for Security and Crime Science is Dr Joe Burton. He lectures in Cyber Security and Cyber Warfare, and International Security, Strategy and Technology. His PhD examined NATO's durability in the post-Cold War period, particularly how the alliance has adapted to address emerging security challenges.

Recently, at NATO's headquarters in Brussels, Dr Burton presented the results of a multinational two-year research project funded by NATO's Science for Peace Programme which examined how five of NATO's Global Partners – New Zealand, Australia, Japan, South Korea and Mongolia – perceive NATO's role in international affairs.

Amongst other results, the research found that there is strong appetite in New Zealand for an ongoing partnership with NATO, the world's pre-eminent military organisation, and that maintaining these linkages is seen as an important goal of New Zealand's foreign and security policy. As part of its engagement to date, New Zealand has already contributed to the NATO anti-piracy maritime mission.

Dr Burton says New Zealand interviewees saw particular benefits in working with NATO on a variety of emerging security challenges, including cyber security and maritime security. "NATO has become one of the most advanced actors on cyber issues in world affairs and has implemented a collective cyber defence policy to deter cyber attacks against its members," he says.



Dr Burton's current research interests relate to how regional security co-operation is emerging on cyber security issues in both the Euro Atlantic and Asia Pacific regions, and how new technologies, including AI, drones, and cyber capabilities, are beginning to affect international security.



## UNLOCKING OUR GEOLOGICAL PAST

**A** University of Waikato scientist has been awarded a Rutherford Discovery Fellowship – a first for the University.

Ten Rutherford Discovery Fellowships, which are administered by the Royal Society of New Zealand, are awarded on a competitive basis annually for research based in a New Zealand host institution. The fellowships support the development of future research leaders, and assist with the retention and repatriation of New Zealand's talented early- to mid-career researchers.

School of Science Senior Lecturer Dr Adam Hartland has been granted \$800,000 over five years for his project "Unlocking the karst record: quantitative proxies of past climates from speleothems."

Dr Hartland came to the University of Waikato in December 2012 as a Lecturer, having completed a Postdoctoral Fellowship in groundwater geochemistry at Australia's University of New South

Wales. He was promoted to Senior Lecturer in Geochemistry at Waikato in 2014.

His study addresses the need to find new ways of working out the exact range of past rainfall and air temperature variations over the recent geological past (up to the last 10,000 years).

"The fellowship will enhance my ability to drive my own research, giving me time to focus on developing new insights while providing flexible funding to follow these lines of enquiry," says Dr Hartland.

Using new approaches including trace elements and magnetism, the project will develop new records of the past climate of the region, focusing on the major climate mode of El Niño – Southern Oscillation (ENSO). Combining cave monitoring, laboratory experiments and cutting-edge geochemical measurements, the new records produced will alter the existing understanding of cave science and the climate of this region.

"Caves can be thought of as nature's vaults," says Dr Hartland.

"They contain archives of Earth's past climate in deposits collectively termed speleothems. Common examples are stalagmites and stalactites, but many other cave formations can provide valuable insights which can inform our understanding of how our environment changes through time.

"Speleothems offer many advantages: they record information at high time resolution, from months to years, to decades, and can form continuously for many millennia. They can be dated very precisely using radio-isotopes, and they give us information from the major landmasses where people live," Dr Hartland says.

Speleothems can provide information on climatic changes of greatest relevance to human civilisations, and can inform the changes our climate is likely to show in the coming decades resulting from human activities."



# WAIKATO ACADEMIC LEADING SYSTEM CHANGE IN EDUCATION

*Associate Professor Mere Berryman ONZM has been pushing for “equity and excellence” in New Zealand classrooms for more than 20 years. This year her work was acknowledged nationwide when she was named one of three finalists in the Kiwibank New Zealander of the Year Awards for her initiatives to lift Māori student achievement.*

**D**r Berryman's mission began with a germ of an idea she had when working as a teacher at Mount Maunganui Intermediate in the early 1990s.

"The disparity between the participation and achievement of Māori students and

others started to cause me grave concern," she says. "Māori students weren't doing as well, and nobody seemed to see it as a problem but me. It was patronising and accepted; it was seen as normal."

"Only the principal supported me when I tried to address the problem. Other

teachers blamed the students, yet I could see, despite some of them coming from some harsh backgrounds, they were full of potential. But I felt like I was the ambulance at the bottom of the cliff, so I made the decision to leave classroom teaching and become a researcher, in search of some answers."

Those answers then became programmes, picked up by schools throughout New Zealand and used as a template in other countries. First there was Te Kotahitanga, then He Kākano, followed by Kia Eke Panuku: Building on Success.

Starting out as a researcher didn't come easily for Dr Berryman. Initially, after a round of door knocking, she found funding from Ross Wilson, then CEO of Specialist Education Services. Later, Professor Ted Glynn was appointed chair in Education at Waikato University, and later still, Professor Russell Bishop took up a chair in Māori Education. They worked together, driven by similar aims. At the same time, Dr Berryman was enrolled in the Faculty of Education at Waikato, completing masters and doctoral degrees, all the while adding to her research portfolio.

Together with Māori elders and others, Dr Berryman and Professor Glynn's first research contract was secured in 1995, to research ways to help parents and schools better manage learning and behaviour in both settings. Once Professor Bishop arrived at Waikato, they developed Te Kotahitanga, which supported teachers to improve Māori students' learning and achievement and to provide culturally responsive contexts for learning. "It's widely regarded as the most effective programme of professional learning and development of its type," Dr Berryman says.



Associate Professor Mere Berryman





Students from William Colenso College, Napier

Te Kotahitanga is the only New Zealand programme to ever win a World Innovation Summit for Education (WISE) Award.

He Kākano focussed on culturally responsive leadership and Kia Eke Panuku: Building on Success built on that. The programmes were funded by the Ministry of Education. Kia Eke Panuku is a strategic change-management approach that requires all participants to self-review their evidence of Māori students' participation and achievement. They must be open to the views of others, and to make the necessary personal and professional changes to ensure Māori students enjoy and achieve educational success as Māori. Kia Eke Panuku was led by the University of Waikato with contributions from teams from the University of Auckland and Te Whare Wānanga o Awanuiārangī. It was adopted by 94 secondary schools throughout New Zealand.

William Colenso College in Napier has a role of 410 students, 65% of whom identify as Māori. Principal Daniel Murfitt first started working with Dr Berryman in 2010 when, with support from his board, they also introduced Te Kotahitanga. Two years ago they implemented Kia Eke Panuku school-wide and Mr Murfitt says the programme is now "business as usual" at the College.

"Kia Eke Panuku has strong academic theory behind it but has practical solutions. It has led our staff to constantly reflect and improve their teaching practice. Staff and student interaction has become more responsive and reciprocal."

Since 2010 student achievement has steadily improved at William Colenso College, and last year Māori student achievement at NCEA Level 3 surpassed all other students.

Mr Murfitt and Dr Berryman have addressed international audiences, in Qatar and Canada about culturally responsive pedagogies; how programmes such as Kia Eke Panuku and Te Kotahitanga can be implemented, and demonstrating their positive effects in schools and families when students can enter a system that acknowledges their culture.

Dr Berryman has gained satisfaction from knowing her work has had substantial influence. "ERO, for example, is building its evaluation principles based on our research. We know it's not okay for Māori to leave their culture at home any more. Students should be able to enjoy learning and achieve success as Māori," she says.

Elizabeth Eley from the Ministry of Education worked with Dr Berryman on

Kia Eke Panuku and says Dr Berryman has had important input into system change. "She is a trusted advisor across education agencies including the Ministry, the Auditor General and ERO. It's also about teaching people to value bicultural partnerships. It can't be done by schools alone."

Dr Berryman is currently involved in the new Investing in Education Success policy of professional development the Ministry is running, working in an expert advisor role with a number of communities of learning. She is also a member of the academic advisory group working with the Education Council Leadership Strategy. Alongside that she continues to teach Masters-level papers, supervise higher degrees, publish, and seek out research funding.

This month Dr Berryman will be speaking at the University of Exeter about 'Decolonising Teacher Education'. Next month she'll be at the Education and Ethnic Studies Summit at Chapman University in California.

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## NEW DEANS, NEW IDEAS

**T**wo new Deans at the University of Waikato come with plenty of industry experience. Professor Mark Dyer has joined the School of Engineering from Trinity College, Dublin, where for nine years he led TrinityHaus, an interdisciplinary research centre, to provide innovative solutions for buildings, neighbourhoods and cities. Before this he spent many years in the construction sector.

The influence or impact engineering can have on improving or shaping environments for the better is a big part of Professor Dyer's work. As a consultant he advised the UK Research Council and the UK's Environment Agency on flood risk, contamination and land remediation.

"As a consultant I was always looking at ways to see if we could do things differently, maybe faster, with less risk, or more cheaply, or looking for alternatives. Returning to academia enabled me to explore new industrial technologies or design techniques to promote innovation which would never be possible in industry.

"At TrinityHaus we took a multi-disciplinary approach to engineering, including space (design), energy, air, water,

earth and creativity, putting people at the centre. I think you're likely to get change for the better if you work from the bottom up rather than decreeing from the top down," he says.

The support for multi-disciplinary study and application is echoed by new Dean of Waikato Management School Professor Tim Coltman.

"I think business schools need to realise it's not so much about educating business students but teaching students how to do business in the 21st century, whether they're from the arts, science, engineering or computing, even education," Professor Coltman says.

"The challenge moving forward is to find new ways to balance the pressure for scholarly rigour with the business need for research relevance."

Professor Coltman's research is primarily in the areas of technological innovation and the management of innovation. His latest publication is the result of a two-year project with SAS, a market-leading provider of analytics, business intelligence

and data management software and services with customers in 148 countries. He's currently in discussions with SAS to develop a Business Analytics Masterclass that they will market to industry in Australia and New Zealand.

Professor Coltman has worked with Ports Australia investigating ways to use technology to guide ships into ports from shore-based operations, rather than having pilots go out to ships and put themselves at risk. "It's complex research, but it's also fun. It's not just about developing a technological solution. It's getting everyone in the ecosystem on board – legislators, insurers, the pilots themselves, technology partners and owners, for example. My research is designed to assist port executives to decide when to move, and at what pace to introduce new innovations."

It currently takes about a decade to get a major innovation idea to market, Professor Coltman says. "I'd like to find a way to shorten the process."





Katy Anderson and Dr Fiona Petchey

## OLD BONES OVERTURN MIGRATION THEORY

**P**acific migration theory has been turned on its head with new research findings that show prehistoric Polynesians were East Asians who swept out into the Pacific, and it wasn't until much later that Melanesians, probably men, ventured out into Oceania and mixed with Polynesians.

Dr Fiona Petchey from the University of Waikato's Radiocarbon Dating Laboratory worked with academics from Harvard, University College Dublin and the Max Planck Institute for the Science of Human History in Germany to extract ancient DNA from the skeletons of four ancient women from the islands of Vanuatu and Tonga, dated to 2300 to 3100 years ago, including three directly associated with what's known as the Lapita culture.

The research has been described as a "game-changer".

The team sequenced the DNA at up to 231,000 positions across the genomes of each skeleton and compared the sequences to those of nearly 800 present-day people from 83 populations in East Asia and Oceania.

To their great surprise – the ancient sailors carried no trace of ancestry from people who settled Papua New Guinea more than 40,000 years ago, which is in contrast to all present-day Pacific islanders who derive at least one-quarter of their ancestry from Papuans. Instead, the women all shared their ancestry with the indigenous Atayal people in Taiwan and the Kankanaey people in the Philippines. This means that the Remote Oceanian pioneers swept past the archipelago that surrounds New Guinea without much sexual engagement with local people.

The results overturn the leading genetic model for this last great movement of humans to unoccupied but habitable lands.

Dr Fiona Petchey has been investigating the tricky problem of dating bone from these early Pacific colonists for the last 10 years. Her research has included the investigation of the age of 10 different Lapita burial grounds, including the sites of Teouma (Vanuatu) and Talasiu (Tonga) which were studied as part of the ancient genome research.

"When it comes to obtaining accurate dates, context is one of the most important considerations, and directly dating the human remains often gives us the best context possible," she says.

"Disturbance is a common problem in archaeological sites and by dating the burials we could be sure that the scientists were testing the first settlers.

"What the individual ate can also impact on the age since  $^{14}\text{C}$  [radiocarbon] is not evenly distributed between the ocean and terrestrial environments. Incorrect interpretation of the dietary  $^{14}\text{C}$  input can shift the ages by hundreds of years – this is where my research comes in," says Dr Petchey. "In this case we were sent 36 bone samples and our job was to isolate the protein to determine the age."

The  $\text{C}^{14}$  signal can tell us what people ate when they were alive. "In Pacific people's case it's likely to be marine and earth-grown foods. The percentages allow us to work out a correct time period by refining and measuring the graphite."



# SHARING THE POWER



*Diabetes research participant Wendy Easter from Te Kohao Health and Rewa Gilbert, community researcher at Te Kohao Health, and University of Waikato researcher Moana Rarere.*



*New Zealand's public health system is far from perfect. Despite constant policy revision and well-intentioned interventions, people still fall through the cracks. Often it's the people in rural and remote areas, particularly Māori, who suffer most through lack of access to health care.*

**A**s part of the National Science Healthier Lives Challenge, a large cross-sector group has come together to work on improving access to good health care. The project is called He Pikinga Waiora and its focus is diabetes.

Associate Professor Maui Hudson from the University of Waikato is leading the project with co-principal investigators Professor John Oetzel from the University and Dr Nina Scott from the Waikato DHB. They are working with representatives and community researchers from the Poutiri Trust and Te Kohao Health plus other researchers from the University, Wintec, and ESR (Environmental Science and Research).

The researchers are tasked with creating an intervention to address diabetes among Māori. "To help people make life-style changes services need to engage in a culturally meaningful manner," says Associate Professor Hudson. "There is evidence to say interventions do work, but those interventions aren't being done."

The Ministry of Health Virtual Diabetes Register estimates there are 260,458

people with diabetes (mostly type 2) in New Zealand; 38,500 of them are Māori.

Moana Rarere from the National Institute for Demographic and Economic Analysis at the University of Waikato is project manager for He Pikinga Waiora, linking with stakeholders, maintaining partnerships with community groups and providing research assistance. "I see this project as all about helping whānau," she says. "I'm excited to be a part of it, getting to work alongside community groups gathering meaningful data that will be used to shape good, workable interventions."

The researchers have developed an implementation framework that has indigenous self-determination at its core. It is made up for four elements, all of which have demonstrated evidence of positive outcomes. Those elements are cultural centeredness, community engagement, systems thinking, and integrated knowledge translation.

The framework is intended as a planning tool to guide the successful development and implementation of interventions. Associate Professor Hudson says they want community groups to design their

own programmes, "what's best for them, using information that we can access."

The plan is to first implement the framework across two health providers, and then take it wider to ultimately effect change at policy level.

Professor Oetzel, a communications specialist, has experience working with remote communities in the USA on health projects. "We're not looking for a one-size fits all solution here. We want communities to take ownership of this project – to work with us to design sustainable interventions, so we need multiple stakeholders; that's important. It's a complex thing, but by bringing communities into the conversation to work on processes that are inclusive, the end result will be interventions that are more sustainable."

Dr Nina Scott, a clinician who works for the DHB in public health and policy and research, says more than ownership, it's about "sharing the power".

"The medical environment is a massive challenge, but with research we plan to find out what will make it work for the people who need it," she says.

#### **AGEING WELL CHALLENGE FOR KAUMĀTUA UNDERWAY**

Significant disparities exist between Māori and non-Māori around poor ageing and health outcomes, which in turn implicate individual, economic, social and cultural costs. The Ageing Well National Science Challenge 'Kaumātua mana motuhake' is seeking to find a solution to the disparity through an inclusive style of research.

The study, with MBIE funding of \$915,000 for 2.5 years, was launched in Hamilton last month and is a collaboration between the University of Waikato and the Rauawaawa Kaumātua Charitable Trust. The research will be based on a 'tuakana-teina' peer-educator model looking at wellness, social connectedness, life enhancement,

independence and, in particular, significant life-transitions.

The model comprises two stages: training of kaumātua who will then serve as tuakana (peer educators) for other kaumātua (teina/peers).

Principal Investigator on the project is Professor Brendan Hokowhitu, Dean of Waikato's Faculty of Māori and Indigenous studies (FMIS). Professor John Oetzel and Dr Mary Simpson from the University's Management Communication Department are also involved, having had a long association with the Trust. They'll be joined by Māori researchers, kaumātua, and community health researchers.

Dr Simpson says they want the outcome to be a strength-based,

holistic, and cultural approach to meet the social and health needs of kaumātua and their whānau. "Instead of thinking of the elderly as a burden, we need to re-comprehend older people as highly valuable assets to Aotearoa New Zealand. So our research takes a strengths-based approach that highlights the potential of kaumātua mana motuhake.

"We'll be engaging with stakeholders throughout the project with the aim of scaling-up the intervention to larger organisations if it demonstrates efficacy and cost-effectiveness."

Chair of the Trust Owen Purcell says the study is an opportunity for kaumātua voices to be heard.

# TAKING CULTURE INTO ACCOUNT



Associate Professor Maui Hudson

**A**s biomedical research practices become more sophisticated, protecting the cultural and ethical interests of those who donate tissue or take part in genomic research has become more important than ever before.

The University of Waikato's Associate Professor Maui Hudson led a Health Research Council-funded national research project to develop culturally informed guidelines for ethical research to protect Māori interests in biobanking and genomic research.

Te Mata Ira Genome and He Tangata Kei Tua Biobanking guidelines draw on the foundations of mātauranga (Māori knowledge) and tikanga (Māori protocols and practices) to establish frameworks for researchers engaging with Māori for genomic research and biobanking.

Associate Professor Hudson says that with the increasing prevalence of genomic research, biobanks and the international nature of research collaborations, it's timely that Māori views on the practices are explored and, ultimately, protected.

"You have this altruistic factor where Māori genuinely want to help by contributing to research that aims to

improve health outcomes. But where it comes a bit unstuck is that in consenting to donate tissue for what's called 'future unspecified research', you are essentially consenting to be uninformed about how your donations are being used.

"In the discussions we've been having with Māori we were asking 'what would make you feel more comfortable about contributing to these kinds of medical research practices, and how can these researchers maintain your trust throughout the process?'"

Part of the answer, Associate Professor Hudson says, is having robust guidelines that represent and protect Māori interests.

"The resulting guidelines outline the cultural foundation and provide culturally grounded and ethical frameworks for biobanking and genomic research, along with guidance on engaging with Māori and appropriate methods for research and the resulting analysis and reporting."

Associate Professor Hudson and his team of researchers, which included Dr Valmaine Toki from Waikato's Te Piringa Faculty of Law, consulted a wide range of stakeholders to determine what was included in the guidelines, including iwi groups and scientists, with support from

an international indigenous advisory group. "Basically people who have an appreciation of the key issues Māori are facing in this area."

Sociologist Dr Barry Smith provided ethical and analytical input to the project and says it's rare to have such specificity in a document that outlines ethical approaches to a particular area of research. "So this project is unique, and very rewarding in that respect, given that many guidelines are more generic in nature."

Moe Milne, an independent consultant and Māori health advocate, facilitated many of the conversations with Māori as the research team was gathering information. She says the more in-depth the explanations of genetic research are for Māori, the more likely they are to work in partnership with researchers.

"Māori want the opportunity to protect their whakapapa, and genetic research can provide an avenue for them to do that, but they want to understand it thoroughly and come to a decision that encompasses these learnings and their spiritual beliefs," says Ms Milne.

"So what it comes down to is contributing to the wider good of genetic research, while maintaining those core values and beliefs."



# GETTING THE BEST MANUKA HONEY

University of Waikato Masters student Stevie Noe spends most days in a greenhouse collecting and analysing nectar from Mānuka plants in order to produce better honey.

"I'm measuring how much nectar is produced in the flowers and how that quality changes based on different growing conditions such as temperature, humidity and light," he says.

Stevie tests the quality of the nectar based on how much dihydroxyacetone (DHA) is present. DHA converts to methylglyoxal (MGO) which is the key ingredient that gives Mānuka honey its reputed health properties. The more DHA there is in the nectar, the more MGO there'll be in the honey.

"Honey is a big deal at the moment. The industry is trying to grow as there's more demand than supply, and the government is backing this growth," he



says. "Hopefully by the end of my study I'll be able to tell growers how best to test their Mānuka plants to get top results out of their honey."

Stevie won the University of Waikato's Masters Three Minute Thesis (3MT) competition where student researchers have to summarise their research in just three minutes. He is also the recipient of

two University of Waikato postgraduate scholarships and Pre-Seed Accelerator Funding (PSAF) from the Ministry of Science and Innovation.

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## HONEY BEES AND NATIVE FORESTS

As part of a national science challenge to protect New Zealand's biodiversity, improve biosecurity and enhance resilience to harmful organisms, Waikato University PhD student Rachel Nepia is researching the impact of the honey industry on indigenous biodiversity. She hopes this will lead to more effective management of apiaries on public conservation lands.

The honey bee was introduced to New Zealand in 1839. Its population has doubled in the past five to 10 years. Rachel will look at the reach of honey bees in submontane forest (forest in the foothills or lower slopes of a mountain range) to see what native plant species the honey bees are visiting and how that overlaps with native flower visitors.

Honey bees have been seen to visit about 180 native plants. Rachel aims to find out if the bees contact all the right parts of flowers to make pollination possible and how much pollen is taken.



"They have the potential to supplement pollination of native plants, fill gaps created by extinct native pollinators, and improve genetic diversity of fragmented plant populations. But introduced bees can also have negative impacts, including mechanical damage

to plants, deterring other more effective pollinators, and exacerbating invasive weed issues. If honey bees are present in large numbers they can deposit too much pollen on the flowers they visit, causing pollen crowding and lowering reproductive success."

# AN APP FOR HAMILTON GARDENS

**T**he million people who visit Hamilton Gardens each year now have an app available to help them get around the city's number one tourist destination.

The University of Waikato has worked with Hamilton Gardens staff to develop the Android app that provides information about the history and design of the themed gardens.

The app can be downloaded from the Google Play store. It's the work of staff from the Faculty of Computer Science, led by Associate Professor Annika Hinze.

"I've done a lot of work around location-based app systems and it's great to develop one for something that's so popular," Dr Hinze says. She created the app based on a framework she's been researching and developing for a number of years.

The app contains images and text and is triggered as users move into the different garden spaces. When users

enter a themed garden the app notifies them that information on the garden is available. Visitors can either read the information on their phones or listen to an audio version.

Hamilton Gardens Business Development Manager Malcolm Hazelton says the app tells the story of the history, meaning and context of gardens throughout time. "Interpretation is such an important part of the gardens. I see the app being used by tourists and local visitors alike."

Mr Hazelton views the app as a starting point in a long-term collaboration with the University. "The potential for features within the app to support our unique concept is unlimited. As new gardens are opened we have the opportunity to tell their stories too."

An iOS app is under development and Dr Hinze says the next logical step would be to be able to listen to the commentary in other languages.



*Chinese Scholar's Garden –  
Hamilton Gardens*

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with Waikato?**

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## A SECOND EUREKA MOMENT FOR STUDENT



*Shalini Guleria*

**A**n idea to turn wastewater into high-quality phosphate fertiliser earned University of Waikato engineering student Shalini Guleria second place in the 2016 Sir Paul Callaghan Eureka! Awards.

Shalini presented her idea during a 12-minute presentation alongside six other undergraduate finalists from around New Zealand. This is the second time Shalini has had success at the Eureka! Awards as she also placed second in 2014.

The purpose of the annual awards is to identify and foster young leaders who will support economic growth through science, technology, engineering and maths (STEM), while contributing to the late Sir Paul Callaghan's goal of New Zealand becoming "the most beautiful, stimulating and exciting place in the world in which to live and work". The key part of the Eureka! Awards is to show how STEM ideas

can benefit New Zealand's economic, environmental and social wealth and wellbeing.

"I proposed industrial wastewater be converted to a high-quality phosphate fertiliser called struvite," she says. "Currently in New Zealand struvite formation is a problem in wastewater treatment facilities but I proposed that this problem is actually a solution to some even bigger issues such as global warming, depletion of a non-renewable resource and water pollution."

Shalini received a highly-commended award of \$5000 for her second place in the competition.

She was also awarded the \$2500 Weta Digital Gold Scholarship for the most innovative and creative engineering solution applying science for technological innovation.



# FOUR AWARDS FOR EDUCATION RESEARCH



Associate Professor Jenny Lee-Morgan

**F**our University of Waikato researchers won awards for their contribution to education by the New Zealand Association for Research in Education (NZARE).

New to the University of Waikato, **Associate Professor Jenny Lee-Morgan** was the 2016 recipient of the Te Tohu Pae Tawhiti award for significant contribution to Māori education. Dr Lee-Morgan is the Deputy Director of the Te Kotahi Research Institute (TKRI) at Waikato. Her research has included marae-ā-kura (school marae), Māori-medium teacher education, and Māori pedagogy – all of which concerns improving Māori learner and whānau experiences and outcomes in education across the sector. More recently, Dr Lee-Morgan has been investigating pūrākau as a Kaupapa Māori narrative inquiry approach.

**Professor Martin Thrupp** from Waikato's Faculty of Education was awarded the McKenzie Award for his substantial contribution to educational research in the fields of policy and leadership, and their impact on school outcomes and social justice. The McKenzie Award honours a current NZARE member's significant contribution to educational research, and to NZARE, over an extended period of time.

In the early 2000s Professor Thrupp was involved in a large comparative study of

education policy in Europe. At almost 1.1 million euros, this study was one of the largest social science projects funded by the EU in its 5th Framework for Research and Technological Development.

The research involved eight research teams based in Belgium, England, France, Hungary and Portugal and concerned the relationships between schools, local authorities and central government in these five countries. The findings illustrated some convergence in education and social policy across them. Professor Thrupp co-directed the team in England and undertook research in an English local authority and its schools. He also contributed to the overall analysis.

From 2004-07 Professor Thrupp had another large education project funded by the UK's Economic and Social Research Council, involving schools in the south of England, which revealed how subtle differences in schools' social and organisational contexts impacted on school processes.

In recent years Professor Thrupp has undertaken research in New Zealand primary schools funded by NZEI Te Riu Roa, looking at the enactment of National Standards across six diverse schools. Known as the RAINS project, the research illustrated how schools took very different approaches to the National Standards and highlighted advantages and disadvantages of the

assessment system. Professor Thrupp's new book based on the study will be published later this year: *The Search for Better Educational Standards: A Cautionary Tale*.

**Associate Professor Jayne White** received the Judith Duncan Award for Early Childhood Education Research, recognising major contributions to New Zealand early childhood research for more than 20 years.

The Sutton-Smith Doctoral Award for an excellent doctoral thesis by an NZARE member was awarded to **Dr Jeanette Clarkin-Phillips**. Her thesis was titled "Fighting the odds to make it even: Mapping an affordance ecosystem in a kindergarten community."



Professor Martin Thrupp

## COMPOSER TAKES OMANU TO TELDEX IN BERLIN

In the history of audio recording, few studios have earned legendary status. Two of the most famous are Abbey Road in London and Teldex in Berlin. It's no surprise then that University of Waikato composer Martin Lodge describes having a work of his recorded at the Teldex Studios in December as "one of the great thrills of my life."

The opportunity came through the initiative of leading German cellist Wolfgang Emanuel Schmidt. He was keen to record *Omanu*, the virtuoso composition for solo cello that Dr Lodge was commissioned to write for Schmidt to premiere as part of the 2016 Waikato International Cello Fest, held at the University of Waikato and curated by cellist James Tennant.

The composition was inspired by Omanu beach near Tauranga, where Dr Lodge grew up. He says memories of birds and the sea were in mind when he wrote the music. "Wolfgang enjoyed the challenges of playing *Omanu* and began looking for further performance possibilities for the piece."

Dr Lodge travelled to Berlin to take part in Wolfgang Schmidt's recording of



*Omanu*. "The whole experience at the Teldex Studio was fantastic," he says. "It was a privilege to have my piece played by Wolfgang, one of the world's greatest living cellists. He didn't just rattle through the notes but played with wonderful understanding and commitment. The matching technical virtuosity of the studio producer and engineer were spine-tinglingly fabulous. Everyone worked together as what I can only call the Berlin Dream Team to make the occasion ideal and unforgettable."

The recording of *Omanu* made in Berlin is being mastered in Auckland by Wayne Laird and will be released internationally on the Atoll label later this year.

Dr Lodge says he recently learned that the winner of the 2015 Tchaikovsky Competition cello division, Andrei Ionita of Romania, played *Omanu* as part of his final examination at the exclusive Universität der Künste in Berlin in January this year.

## SEA-FARING POET DROPS ANCHOR AT WAIKATO

The University of Waikato's 2017 writer in residence is working on his ninth collection of poetry, which will have a distinctly Waikato focus.

Bob Orr knows the Waikato well even though he hasn't lived in the region for years. He grew up on a farm at Hoe-o-Tainui 20km north of Morrinsville and completed his secondary schooling at St Paul's Collegiate in Hamilton.

Bob started to write poetry when he was a teenager, and he [hasn't](#) stopped since.

Returning to the Waikato region has meant a big change for the poet. For more than 30 years his "office" has been the Hauraki Gulf where he worked on boats, most recently on tug and pilot boats for Ports of Auckland.

"The good thing about piloting boats is there's often down-time, time to think, and often I'd jot down odd little phrases on scraps of paper and then make something of them on my days off," he says.

Bob uses a portable manual typewriter, "screens make my eyes go fuzzy", and sometimes he'll do between 30 and 40 drafts of a poem before he's happy with the end result.

His inspiration comes from everywhere, he says, and his poems are often about everyday things; finding beauty in the familiar – the tyre shop and the hospice shop, for example. Then there's the sea, love, and observations of people.

Last year Bob won the Lauris Edmond Memorial Award for Poetry, a prize given



biennially in recognition of a distinguished contribution to New Zealand poetry. He's been writing for more than 50 years.

Bob can't specify what he'll be writing about in his next collection. "I don't want to restrict myself, but I'm here to re-immersify myself in the Waikato landscape and we'll see what springs from there," he says.



# UNLOCKING THE MYSTERIES OF FOULDEN MAAR



Dr Beth Fox

**A**n ancient crater lake in Central Otago has provided scientists with new insights into carbon dioxide changes and the effects those changes had on the Antarctic ice sheet 23 million years ago.

Dr Beth Fox, a paleoclimatologist from the School of Science at the University of Waikato, says fossilised leaves found at Foulden Maar near Middlemarch hold evidence of a sharp increase in atmospheric CO<sub>2</sub> levels associated with a major collapse of the ice sheet.

Dr Fox and her colleagues Drs Tammo Reichgelt and William D'Andrea at Colombia University in the US found that changes in the stomatal cells and carbon isotope ratios in the leaves indicated a major increase in the levels of CO<sub>2</sub>, rising from about 500 parts per million (ppm) to between 750 and 1550 ppm over a span of less than 10,000 years.

"What surprised us was how such large CO<sub>2</sub> fluctuations happened over, geologically, relatively short time scales," says Dr Fox.

"We found that atmospheric CO<sub>2</sub> levels began to rapidly increase around the same time as the ice-sheet began to decline and, more importantly, even when the CO<sub>2</sub> levels dropped back to previous levels, the ice kept on melting.

Once the process of destabilisation of the ice-sheet was kick-started, it could keep going by itself."

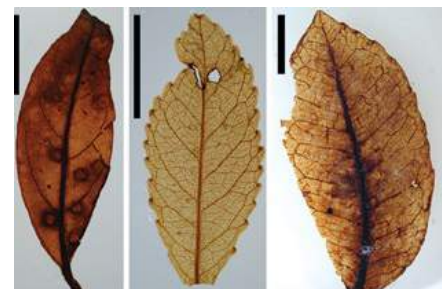
Dr Fox says this information is important as scientists study today's CO<sub>2</sub> concentrations and the melting ice in Antarctica.

"We need to build on this new information by doing more analysis and modelling. We don't yet know at which point between 500 and 1550 ppm that destabilisation of the ice took place and we'd also like to look at different plant species to confirm what we've found so far," says Dr Fox.

Dr Reichgelt says some models have shown that at the rate we're going right now, the Antarctic ice sheet might reach a critical tipping point and start destabilising very quickly. They now have evidence that it's happened before.

Dr Fox has been working on the Foulden Maar core since she began her scientific career. At the beginning of her PhD, she was involved in the initial retrieval of the sediment cores, which involved six weeks of diamond core drilling in Central Otago in the depths of winter, at temperatures down to -6 degrees.

A great deal of effort on the part of the drilling team led to the retrieval of two



cores, one 120 metres long and one 184m long. It was while she was working on her PhD that Dr Fox had the idea to work on the fossil leaves and reconstruct CO<sub>2</sub> levels from millions of years ago, but she didn't follow it up until she completed her doctorate.

She says the study was made possible by the fantastic level of fossil preservation in Foulden Maar, where soft tissues are preserved right down to the cellular level, along with the fact that the sediment contains annual layers, allowing for much more accurate dating than is normal for such an ancient deposit.

"It's an amazing site, with many more stories to tell us about how climate has changed in the past," Dr Fox says.

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with Waikato?**

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Les Arthur

## ONLINE COURTS – THE WAY OF THE FUTURE?

**A** Waikato University law academic's proposal to establish an online court and further increase the monetary threshold of disputes tribunals could enable more Kiwis who are unable to afford legal representation to secure access to justice.

Currently individuals and small businesses with civil claims can go to a disputes tribunal if the disputed amount is \$15,000 or less or, if all parties agree, up to \$20,000. The current proposal is to increase the monetary jurisdiction to \$30,000.

Waikato Senior Lecturer and disputes specialist Les Arthur says we need to increase the monetary jurisdiction to something a lot higher.

"There are lots of low-value disputes that range around \$50,000 which are not worth going to the District Court, so there's a large gap. The ceiling could be increased to \$50,000 and the legal rights of parties could be protected without the assistance of lawyers through the development of an online court," he says. Like the Disputes Tribunal, the online court

is designed to be used from start to finish by litigants without lawyers, although lawyers would not be excluded. All the essential details of the case and the evidence they provide would be placed in an electronic file, available to both parties and the court.

The software is designed to guide parties through an analysis of their grievance in such a way as to produce a document capable of being understood by both parties and the decision maker. This process would help to ensure the key facts and evidence are clearly outlined when they arrive at the tribunal for a hearing.

"Appeals from the tribunal, which should include errors of law, could be submitted electronically to a District Court Judge and in some circumstances a decision could be made on the documents," says Mr Arthur, a former barrister and solicitor.

"The online court system would resolve common disagreements over issues such as goods, services and property damage more quickly and easily."

A similar online court system was recently proposed in England and one of the most widespread concerns about it relates to parties challenged by, or without access to, a computer.

"An essential element of the development of an online tribunal would be the availability of voluntary agencies such as community law centres or Citizens Advice Bureau nationwide to assist the computer-challenged," says Mr Arthur. He says he's had plenty of support for his proposals from in and outside the judiciary.

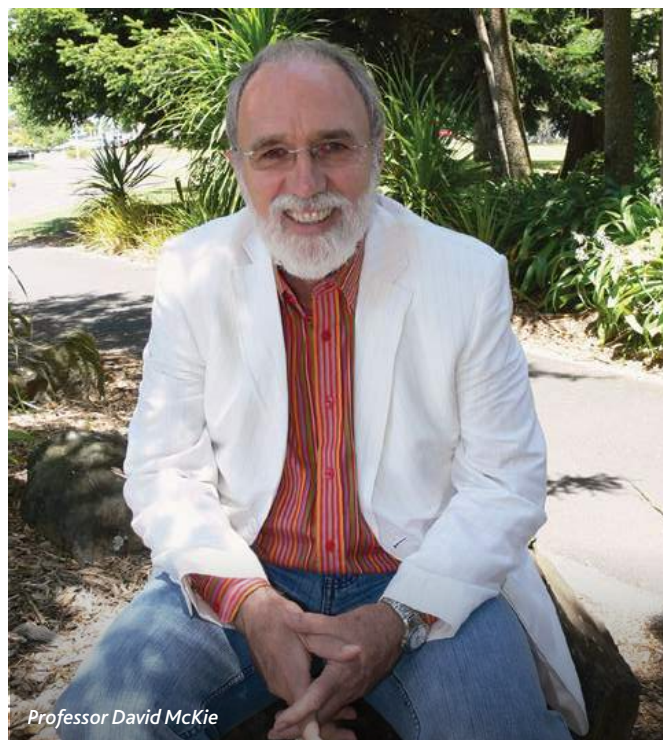
Mr Arthur teaches Legal Ethics, Mediation, Insurance Law and Advanced Civil Litigation at the University of Waikato. Before becoming an academic, Mr Arthur was in private practice doing general litigation including insurance, family and criminal law. He was also a corporate counsel for Vero Insurance for two years.

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# PR IN TROUBLED TIMES



Professor David McKie

**P**ublic Relations often gets a bad rap, but University of Waikato Professor David McKie is striving to liberate and reform the field of public relations. He hopes to change the way public relations practitioners, scholars and professional organisations perceive the practice, but it hasn't been an easy journey.

"Public relations is concerned with protecting reputation yet it has a terrible reputation in itself. It's ironic," says Professor McKie from the Management Communication Department at Waikato Management School.

The academic activist says there has always been a lack of self-criticism in PR on both individual and collective levels. "The industry has not examined its own practice and theories very critically. Without more robust self-criticism and self-questioning of its frameworks of power, PR will retain its poor reputation," he says.

The lack of criticism in PR was one of the motivators for Professor McKie to co-author *The Routledge Handbook of Critical Public Relations*, a ground-breaking text that includes critical perspectives on a vast range of PR topics, from 40 international authors.

The next step for Professor McKie is to investigate PR historiography. "To change the future, we need to look at the past.

"Historically PR innovation came from activists, and activists were a dynamo of innovation," he says.

Professor McKie is now working on a new book, *Public Relations History: Reworking Pasts and Reclaiming Futures*, with Professor Jordi Xifra from Pompeu Fabra University in Spain.

The book will review the history of public relations from an international perspective and examine PR's implicit claims to be objective and free of ideological bias. Professor McKie says it will undoubtedly arouse debate for PR scholars, educators and students alike. "We need to reconfigure PR and that means changing its conversations, and that's never been more evident as we enter the Trump era.

"The waves of criticism of the industry have turned into tsunamis, swamping public discussion with fake news, 'alternative facts' and Trump tweets. I think this is socially dangerous and should reawaken New Zealand debates over dirty politics before the next election," says Professor McKie.

It's concerning that PR practitioners are contributing to the fake news, he says. "Trump's PR team has put loyalty to their employer above their duty as communication professionals and what they're doing is only going to destroy the public trust there is left for PR."

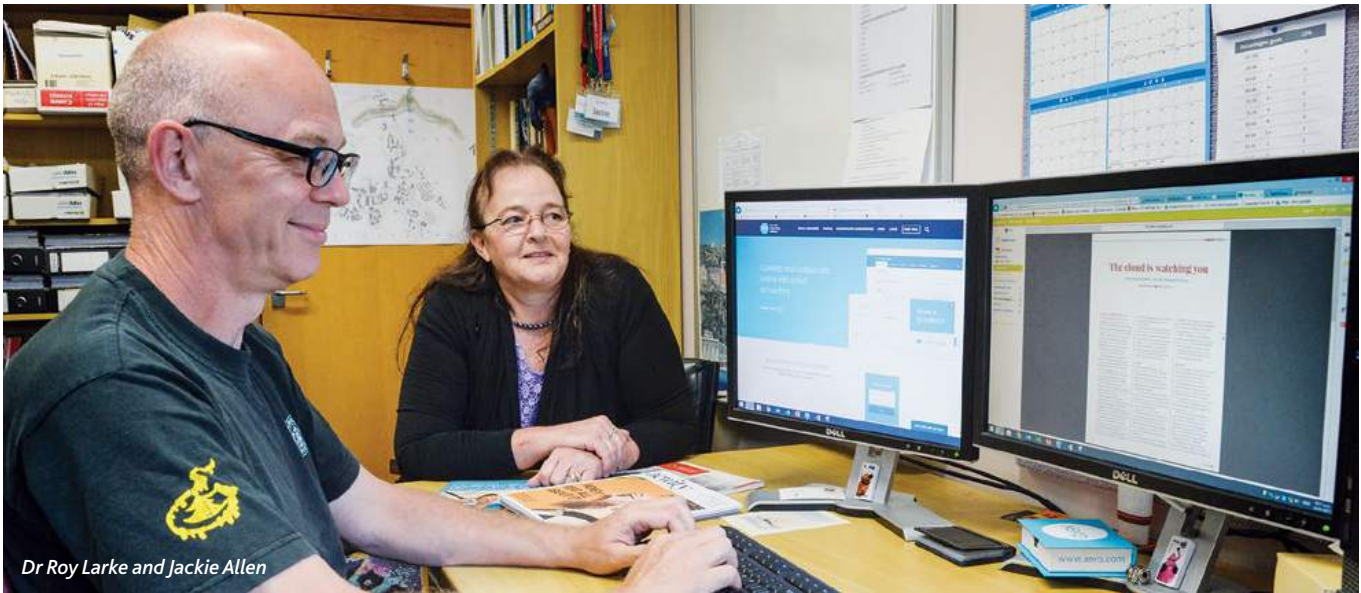


Professor McKie's colleague at Waikato, Dr Margalit Toledano, has also been working with academics offshore to produce a book *International Public Relations*. "It's all about doing PR in countries that are politically divided, in conflict or post-conflict," she says. "More and more across the world we're seeing societies deeply divided along racial, ethnic, religious or linguistic lines. So we've tried to find out how PR is practised in partisan societies, how it's used to incite political violence, for resolving conflict and building peace."

Countries covered in the book include Israel and Palestine, Northern Ireland, Turkey, and the former Czechoslovakia and Yugoslavia.

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Dr Roy Larke and Jackie Allen

## BUSINESS IN THE CLOUD

**M**any corporates have been quick to embrace cloud computing; small-to-medium enterprises are also exploring its potential as the technology evolves.

But with these opportunities come risks. University of Waikato Accounting Lecturer Jackie Allen and Masters student and business owner Carolyn Tait researched and reviewed the terms of service and privacy policies of cloud service providers to identify terms that may put the small-to-medium enterprises at a disadvantage.

"There are obvious benefits moving to the cloud," says Ms Allen. "It can keep costs down, improve access to data, and

backing-up to the cloud eliminates the need for onsite storage, making it safer and more secure physically as well as removing the risk of computer viruses. It also has the advantage of being able to expand and contract according to customer requirements, useful for seasonal businesses and start-ups."

So what are the risks? The researchers looked at four cloud service providers – Google, Zero, Yodlee and Dropbox – and found all four terms of service were strongly weighted towards the provider.

"Take Google for example. The user, the business in this instance, grants Google 'a world-wide licence to use, host, store, reproduce, modify, create derivative works

... communicate, publish, publicly perform, publicly display and distribute' any content that the user uploads onto or through Google services," says Ms Allen.

She says that could be anything from files to emails to photos, and in some cases the licence continues even after the services are terminated. People need to be making informed decisions by doing due diligence before choosing a service provider. "In effect you are giving away pieces of yourself, so get references from people who already use the provider you're considering, and find people who have walked away from them and ask them why. If you have good business advisers, they should be making those checks for you."

### OMNICHANNEL MARKETING

Retail is the core of consumer-related business and, with more and more people doing their shopping online, the retail sector faces a new and exciting future. But how should today's retailers change their tactics to adapt?

Dr Roy Larke researches omnichannel marketing, where manufacturers and retailers need to present one, single unified and branded marketing channel.

"At the moment there are plenty of different marketing links as a product moves through supply chains from manufacturer to the final consumer.

Different retailers may market the same product differently from another and differently in store and online. There's no clear channel for a consumer," says Dr Larke, Senior Marketing Lecturer at the University of Waikato.

"New Zealand's environment is ideal for a shift to online retailing," Dr Larke says, "but the high cost of investment means that it is large, highly diverse retailers around the world that are providing state-of-the-art examples.

"The aim of 'omnichannel' is they bring all brands together and sell through a uniform and integrated set of customer

touchpoints. Whatever you buy and wherever you buy, the purchase experience should be identical."

Dr Larke says the Warehouse Group, which includes Noel Leeming, Torpedo 7 and Diners, is perhaps the closest New Zealand gets to a large retail group. "Ideally, however I interact with one of their brands, I should expect to have options to products, services, and purchase options that suit me at that time, and if I buy online the experience should be no different to an in-store experience. It should be about making consumer access as easy as possible."



# WHAT'S ON AT WAIKATO

*The University of Waikato links with the community on and off campus*

## NATIONAL AGRICULTURAL FIELDAYS

**14 – 17 June**

The theme for 2017 Fieldays is Leading Change. The University of Waikato will have a stand in the Main Pavillion at Mystery Creek featuring some of the agri-sector research being undertaken by staff and students.



University of Waikato at the Fieldays



University of Waikato Open Day

## UNIVERSITY OF WAIKATO OPEN DAYS

**19 May Hamilton, 26 May Tauranga**

Open Days are an opportunity to spend a day on campus to find out more about study options and experience what the University has to offer.

Prospective students can:

- Get a taste of life at the University of Waikato
- Attend information sessions and gain information and advice on study options
- Talk with current students about what university life is like
- Learn about scholarships
- Experience mini lectures and talk to academic staff
- Take a guided tour of the campus, halls of residence and teaching facilities
- View current students' work through demonstrations and interactive displays
- Enjoy live entertainment and food stalls
- Learn about our sports and cultural clubs and the service and support available to students.

## ZURU BALLOONS OVER WAIKATO

**Saturday 25 March**

Each year hot-air balloon pilots from around the world take to the skies over the Waikato. Families flock to the University of Waikato Hamilton campus for the Zuru Night Glow, where the balloons, tethered to the ground, are inflated and light up to a musical playlist. A fireworks display will follow.





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