THE UNIVERSITY OF AUCKLAND
TAMAKI

Tāmaki Update

September 2012
A newsletter for Tāmaki Innovation Campus

Innovation theme plays to Tamaki's strengths

Dr Jacqueline Beggs says New Zealand's isolation means it has a unique place in the biodiversity and biosecurity world.

The newly introduced innovation theme of Biodiversity and Biosecurity at the Tāmaki Innovation Campus plays on its already considerable strengths.

The theme creates access to The University of Auckland for external partners, researchers, staff and students, and fits with the global growth of interest in biodiversity and biosecurity and corresponding research and interventions.

The School of Biological Sciences and School of Environment form the academic core of the innovation theme, enhancing closer relationships with on-campus expertise through the Centre for Biodiversity and Biosecurity, Landcare Research and the Ministry for Primary Industries' Investigation and Diagnostic Centre, as well as the Pacific Invasives Initiative and the Regional Pacific Office of the International Union for Conservation of Nature's Invasive Species Specialist Group (ISSG).

Dr Jacqueline Beggs, Director of the recently established Joint Graduate School in Biodiversity and Biosecurity, said the theme is more relevant now than ever before. "Increased trade and travel are contributing factors to border pressures, but New Zealand's isolation and recent population, compared to the rest of the world, means it has a unique place in the biodiversity and biosecurity world."

Protecting the quality of the natural environment also has an impact on the country's economy, image and export potential. In turn, this concerns both government and business that have keen interest in the triple outcomes from the theme: that of conservation of organisms and ecosystems, threats from invasive species, and ensuring the border controls repel new biological invaders.

New Zealand holds an international position as a leader in biodiversity and biosecurity research, with a significant component of this research capability located at the Tāmaki Innovation Campus.

Dr Beggs says the increased focus will encourage more innovation in the sector and more partnerships, particularly with a commercial aspect either as end users of the research or from companies grappling with biosecurity issues where research can play a pivotal role in creating new tools and applications.

The goals arising from the new emphasis will include a knowledge driven core of biodiversity expertise, improved biosecurity outcomes, products and services, and greater links with regional and national government agencies and commercial interests in biodiversity and biosecurity.

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Message from Pro Vice-Chancellor Tāmaki Innovation Campus

Dear colleagues

It is with great pleasure that I recently announced a new theme at the Tāmaki Innovation Campus, Biodiversity and Biosecurity Innovation. The more recent announcement from the Vice-Chancellor about the University wishing to focus its development on a site in Newmarket will affect the long-term future of the campus. However, the implementation of this possible development is still some years away and we will be continuing at the Tāmaki Innovation Campus with business as usual for the near future. This includes continuing to foster strong innovative research at the campus.

As you will be aware, over the last three years, the strategic development of the campus has been based on the theme of innovation. This theme was chosen to bring focus to the campus, to create a portal into the University for external partners, researchers, staff and students, and is centred on strengthening the interface with the business world and the community. Two initial themes, Materials Innovation and Health Innovation, were identified as having a substantial presence at Tāmaki, and much of the recent change at the campus has been driven by and centred on groups associated with these themes both on and off the campus.

The establishment of Biodiversity and Biosecurity Innovation as a theme at Tāmaki is a logical and strategic step for The University of Auckland, to highlight and grow existing capability, foster the latent innovation within it, and create stronger links and a focus point for the important and complementary fields of biodiversity and biosecurity.

The high quality of the New Zealand environment and the special character of its biota are vital advantages to the New Zealand economy and key components of the New Zealand brand globally. As a result, New Zealand has considerable interests and investments in biodiversity and biosecurity through businesses, government and non-government agencies, iwi, research organisations, and community activities.

I would like to thank my colleagues Professor Grant Guilford (Dean of Science), Professor Gillian Lewis (Head of the School of Biological Sciences), Professor Mick Clout, Dr Jacqueline Beggs and Dr Bruce Burns (School of Biological Sciences Tāmaki) for proposing this innovation theme and helping with its formation at the Tāmaki Innovation Campus.

Thank you to all those who have contributed to this issue of the Tāmaki Update, as once again it demonstrates the vast array of impressive activities taking place on campus. And, I am always pleased to see stories about students, their passion and what drives them. At the start of this year a new feature was introduced profiling students and their research activities. In this issue we meet, James Wu, a PhD student with the Hybrid Polymers group, who was drawn to return to his studies after ten years working in industry.

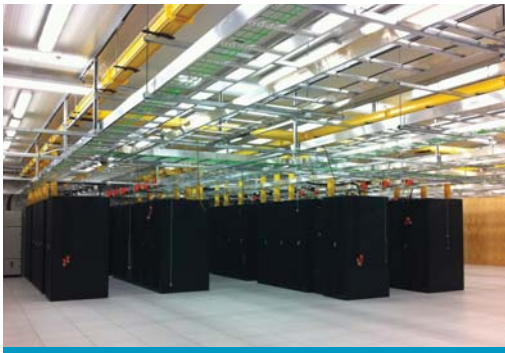
Best wishes

Professor Michael C.R. Davies
Pro Vice-Chancellor Tāmaki Innovation Campus

New data centre ‘go live’

The Tāmaki Innovation Campus Data Centre is now live and operational. While it might look like a concrete box on the outside, it conceals a state of the art operation.

This project has been a successful collaboration between Property Services, ITS and the Tāmaki Innovation Campus with the goal of providing a basis for the growth of exciting opportunities particularly for eResearch.



The Tāmaki Data Centre offers researchers new supercomputer opportunities.

The Data Centre will act as a disaster recovery backup to the City Campus data centre, as well as housing supercomputers for the New Zealand eScience Infrastructure (NeSI), a nationwide supercomputer network designed to support cutting edge research.

The complexity of the project has seen a series of commissioning and testing phases, from fire suppression, security and access systems, and state of the art cooling systems through to backup generators being put through their paces.

The Data Centre is regarded as encapsulating best practice and its high capacity links between the City and Tāmaki campuses will not only support people growth but will also future proof the University’s computing capacity with increased data speed on the fibre network.

Housing high-tech equipment imported from Italy, Spain and the USA, it puts The University of Auckland at the forefront of IT infrastructure in New Zealand, growing an ever larger computational environment for researchers.

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More needed for vitamin D research

Professor Robert Scragg is calling for more participants to make up the final target of 5,100.

More than 4,500 interviews have been completed so far during the Tamaki Innovation Campus study investigating whether vitamin D has an effect on cardiovascular and respiratory disease event rates. But, principal investigator, Professor Robert Scragg, is calling for more interviewees and asking for assistance from colleagues and associates to spread the word.

The study is well supported by the younger age group, particularly Europeans, but there are gaps in Europeans aged 70-84 years, as well as a need for more Māori, Pacific and South Asian participants aged 50-84 years.

The criteria are that participants must not be taking prescribed vitamin D or have renal stones. Professor Scragg's group is approaching more GP clinics as well as Rotary groups to gain the additional participants required to achieve the final target of 5,100.

The Health Research Council funded study is two years into its five year term, but it is still too early to predict any outcomes; the code won't be broken until 2016.

Professor Scragg's group is working alongside Sport and Exercise Science, using equipment never before used in this type of study.

"We are looking at the GaitRite device, an electronic mat to measure walking speed and balance, and a force plate to help determine if there is benefit for muscular function, as some early evidence from other studies suggests that vitamin D may help maintain muscle strength," says Professor Scragg.

"We are also very excited about a new device from a local company, Pulsecor, that measures arterial stiffness and function by recording the pressure wave in the arteries produced by the heart when it contracts."

Ultimately, the study has significant implications from a government and national health perspective, potentially leading to the support of a national health strategy on vitamin D supplements or fortification, if vitamin D proves to be beneficial.

Able to help widen the net? Contact 0800 843 211, or email vida@auckland.ac.nz.

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"This is part of a $12 million upgrade of our data centres and our core IT network over the next three years," says Director of ITS, Liz Coulter. "We need a second data centre for disaster recovery back up. There is a smaller one in Symonds St nearby the main one at OGGB on the City Campus. This is too close to OGGB and it is also running out of generating power and needs upgrading."

Backup generator being delivered in July 2012.

The Tāmaki Data Centre will replicate the activities of the main university services currently on the City Campus, with each system capable of taking over from the other in an emergency.

Tāmaki also hosts New Zealand's National eScience Infrastructure (NeSI), enabling the growth of infrastructure that researchers need for supercomputing, science challenges and genomics. Its standard servers, storage infrastructure, and high performance computing meet NeSI's requirements, with potential to double in size to meet future requirements.

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Cell regeneration focus of polymer research

James Wu returned to academia after ten years working in industry.

James Wu is in the fortunate position of doing something that feeds his passion; so much so that the prospect of working in the Hybrid Polymers group focusing on biomedical applications of antimicrobial polymers pulled him out of industry and back into academia.

His interest, he says, stems from his undergraduate supervisor Associate Professor Allan Easteal, who subsequently became his PhD supervisor, and he was also helped early in his life by his parents both of whom worked as dental technicians.

"I'm researching applications of a multifunctional polymer which is free-radical scavenging, electrically conductive and antimicrobial. While there are various applications, my main focus is on the biomedical area."

James is currently working on a multifunctional fibre-scaffold, with properties such as antioxidant capacity, electrically conductive, antimicrobial and biocompatible. Previous studies have shown these properties can assist cell regeneration independently, by reducing oxidative stresses on cells, enhancing dendritic growths, reducing chances of infection and encouraging cell attachment. His work asks whether these properties will work cohesively to enhance cell regeneration for tissue engineering applications.

The fibre-scaffolds are prepared using an electro spinning process, drawing polymer solutions into submicron to nanoscale fibres, under an applied electric field. Live cells are then deposited onto these fibre-scaffolds and placed in standard testing conditions to promote growth.

Preliminary work shows that the fibres are biocompatible, and cells attach and proliferate on the fibre-scaffolds as expected. Characterisation of these fibres show they are electrically conductive and have antioxidant capacity, which leaves antimicrobial properties yet to be characterised. For future work, James hopes to see if cell growth could be enhanced by electrical stimulations, or if cells' deaths could be reduced when exposed to oxidative stresses or bacterial attacks.

James completed his Bachelor of Technology in Materials (Hon) in 1999 from The University of Auckland, focusing on polymer materials in his fourth year. He then worked in the chemical industry for about ten years, mainly on surface coatings and medical devices, covering roles from polymer resins R&D, quality assurances, regulatory compliances, and industrial and architectural coatings R&D.

He says returning to academia has been an interesting experience. "There are many changes to the University, and especially the School of Chemical Sciences. I kept saying to myself, 'Wow, that wasn't here before!' or 'Oh, where is that old instrument now?' Over the past ten years, Chemical Sciences has gone through a major facelift and become a great place to work. Various research groups have formed, with more specific focus on applications, rather than the traditional organic, inorganic, physical, analytical and food."

"Similarly, Tamaki Innovation Campus has also gone through various changes and I have found myself sharing the same lab with chemical engineers, mechanical engineers and environmental engineers, which is a new experience for me."

James says he enjoys the diversity and the collaboration and ease of access to wide ranges of testing instruments and was pleasantly surprised at how self-sustaining Tāmaki is.

The challenges he's faced along the way include changes in returning from commercial work to academic research and learning the art of writing scientific discussions. However, the completion of his first major manuscript has been a significant success, as has poster presenting (he recently won an award at the Chemical Sciences Research Showcase).

Looking forward in his career, he is balancing New Zealand versus overseas, postdoctoral research and the likelihood of the right job, choosing where he needs to go, rather than vice versa.

Taiwanese-born, he studied at Pakuranga College and The University of Auckland, and, with his wife (and soon to be, new baby) calls New Zealand home.

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‘Phase change material’ huts find new home

Professor Mohammid Farid’s research could see energy savings for New Zealand commercial and residential buildings.

Tamaki Innovation Campus is home to an experimental facility that forms part of a wider research programme on passive thermal energy storage. The outcomes could see significant change in energy management in New Zealand buildings with corresponding energy savings. Already, valuable data is being gathered for use in the design of larger commercial and residential buildings.

The stand-alone single room buildings, known to the Department of Chemical and Materials Engineering as ‘huts’, have recently relocated to Colin Maiden Park from the other side of the campus.

The huts are being used to research the thermal performance of phase change material (PCM) in the building envelope, assisted with funding from the Ministry of Business, Innovation & Employment.

PCMs are organic or inorganic materials which absorb and release large amounts of energy as they melt and solidify. They have particular use in thermal management systems in buildings, industrial cold stores, and cooling of electronic devices.

The research is headed by Professor Mohammed Farid, who holds a personal chair, assisted by Research Fellow Sam Behzadi and assistant collaborator Professor John Chen, with a number of PhD, masters and undergraduate students using the facilities.

Professor Farid explains the background to his work. “In summer we can use the relatively low temperature at night to prevent overheating of buildings during the day, minimising the use of air-conditioning. In winter, we capture solar radiation passively and help shift heating load from high peak to low peak load periods.”

Results so far have indicated that using PCMs in the building envelope could assist with minimising energy needs, depending on how and where in the building envelope PCM is incorporated for maximum energy saving. Initially, PCM was incorporated into all internal walls and ceilings, however simulation results suggest, as expected, that only some of the walls will benefit from PCM incorporation.

The overall project aims include enabling production of PCM from sustainable materials, waste products and natural lipids via esterification. They can be produced from renewable fatty acid and fatty acid esters derived from local feedstock such as beef tallow, or from waste biomass, used paraffins and plastics waste.

With the assistance of UniServices, the group is intending to create a spinout company, as well as communicating with several local and international companies to create commercial partnerships for large scale production.

According to Professor Farid, commercial partners would vary with the type of PCM. “For example, PCM for building would be suitable for companies creating building insulation and gypsum panels such as Fletcher Construction, while for electrical and cool storage it might be a company like Fisher & Paykel.”

Professor Mohammed Farid is a world leader in phase change energy storage and has provided significant contribution to the field worldwide. His research expertise also includes innovative food processing, biofuel and waste management.

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Focus on Pacific Health has many strands

Dr Teuila Percival (middle) with nurses and doctors in Apia, Samoa

Several projects within the School of Population Health focus on the health of Pacific peoples, and particularly on children, under the leadership of Dr Teuila Percival. Dr Percival who often works in the Pacific supporting medical colleagues, recently returned from a paediatric medical attachment in Samoa.

As Director of the Pacific Health section, Dr Percival cites limited resources and geographical isolation as dominant features of medical practice in the Pacific, with doctors relying heavily on their clinical skills and judgement.

With limited treatment options and patients presenting late with advanced disease, clinical work in the Pacific is challenging.

"Conditions, rarely or never seen in New Zealand such as severe malnutrition, tuberculosis, tetanus and malaria are still very prevalent in the Pacific region," she says.

Pacific Health has many strands and is working on a number of projects that are expected to make a significant difference in New Zealand and the Pacific.

TAHA Well Pacific Mother and Infant Service

TAHA received project funding from the Ministry of Health's Kete: Pacific Grant Fund, to develop an antenatal curriculum and innovative methodology of delivery for pregnant Pacific women with work commencing in 2013.

Challenges facing Pacific mothers include poor access to antenatal care, often with late booking or no care prior to delivery. Associated with this are high rates of still birth and pregnancy complications like gestational diabetes.

"Pacific women do not attend current antenatal education classes as the model often does not fit with the community and the TAHA initiative will take the lead on that along with infant and parenting information for the whole family," says Dr Percival. "It's crucial that information is shared with all family members and extended family as it is not only the mother involved in care of the infant."

TAHA also plans to use social networking and YouTube for youth friendly models of health information.

Pacific CHIP

Funded by the AusAid Knowledge Hub (an Australian Government initiative), Pacific CHIP is a Pacific Child Health Indicator project, assessing the appropriateness and functionality of global maternal and child indicators for the Pacific Region across 22 countries, it aims to measure better the health outcomes of children and mothers in order to assess the effectiveness of health interventions and progress towards the United Nations' 2015 Millennium Development Goals.

FANAU study

Thirty one children and their families have been recruited for the FANAU study and a further 31 into the control (Kids in Action) group. FANAU is a Pacific child obesity study, comparing a programme where parents are enrolled and become the agents of lifestyle change for their child and family, compared to Kids in Action which is child focussed. Preparation began mid-2011 and recruitment and intervention began this year.

Dr Percival says groups that have established relationships, for example parents from the same church, seem to develop a supportive group dynamic more quickly. The study has seen short term weight loss in both children and adults, and will be following the groups for six months after intervention. Recruitment is the most significant challenge facing the group, as intervention requires considerable time commitment by parents.

Health of Niue and Cook Island men

A project investigating the health of Niue and Cook Island men, and funded by the Health Research Council, is being undertaken by Dr Vili Nosa.

The study will compare men's health in the Islands against New Zealand-based Niueans. Initially, the focus will be on quantitative analysis of health information in New Zealand and the Islands using hospitalisation and primary care data, with the second phase involving interviews.

This study is a first for Niue and the Cook Islands, and the Pacific Health section has close links with both countries and expects they, and New Zealand, will benefit from the study outcomes.