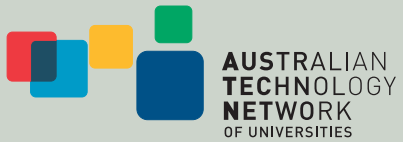
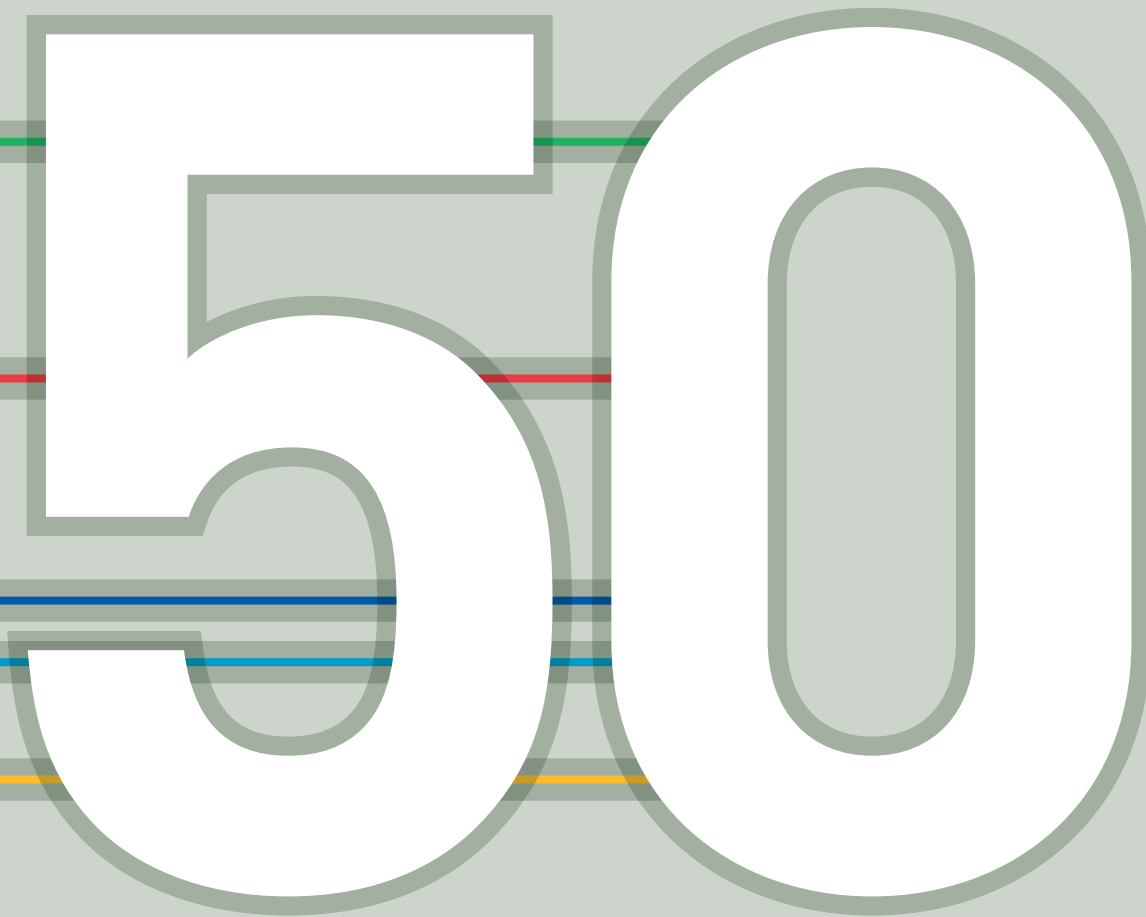


50

solutions that count



The Australian Technology Network of Universities (ATN) is a group of five innovative and enterprising Australian-based universities located in each mainland State capital – SYDNEY, MELBOURNE, PERTH, BRISBANE AND ADELAIDE.



50

Research is taking place in a group of Australian universities that has the power to save lives, boost economic development, create wealth, re-invent manufacturing and much more.

These universities are part of the Australian Technology Network of Universities, a group dedicated to delivering practical results through focused research.

Presented here are fifty examples of research outcomes generated by ATN member universities. They demonstrate the diversity of enquiry and the potential impact this work can have on both Australian society and indeed the world.

solutions that count

01

ATN UNIVERSITY
Curtin

CASE STUDY

Effective Tinnitus Treatment
Improves Health Outcomes

DISCIPLINE

Clinical Health

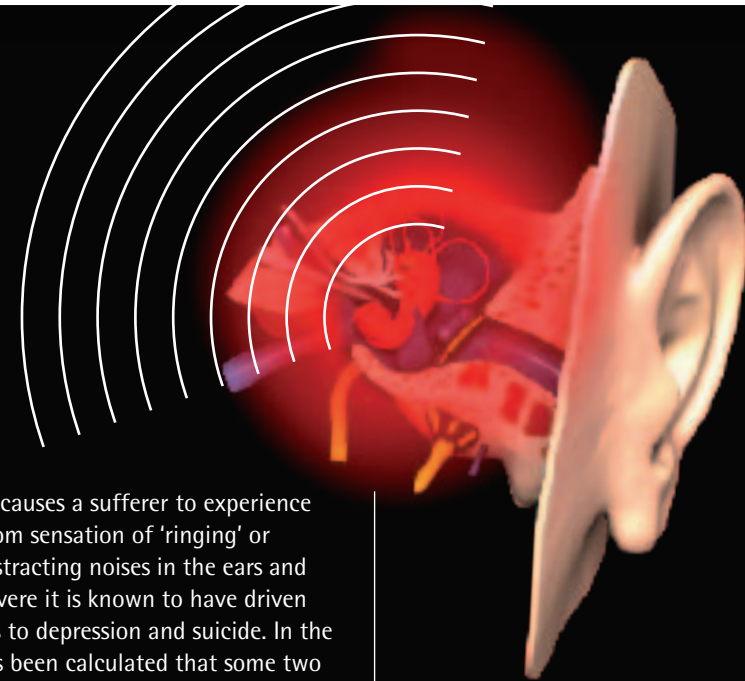
CREDITS

Associate Professor Paul Davis,
Neuromonics Pty Ltd

To date some 4,200 people have been treated, including 1,200 returned military personnel.

Effective Tinnitus Treatment Improves Health Outcomes

The world's first clinically proven treatment for Tinnitus – Neuromonics Tinnitus Treatment – has been developed by audiologist and Adjunct Associate Professor Paul Davis at Curtin University's School of Speech and Hearing Science.



Tinnitus causes a sufferer to experience a phantom sensation of 'ringing' or other distracting noises in the ears and when severe it is known to have driven sufferers to depression and suicide. In the US it has been calculated that some two million people suffer from Tinnitus, with between 30 and 50% of returning military personnel affected.

Tinnitus is now the most commonly claimed disability from overseas military service. Until the Curtin research, doctors have often advised that little could be done to manage the debilitating condition.

To date some 4,200 people have been treated, including 1,200 returned military personnel. The clinical trials have averaged an 84% success rate which is defined as a 40% or greater improvement in the condition.

The treatment is delivered through a device, the Oasis, which resembles a music MP3 player. It emits precisely engineered sounds accompanied by relaxing music to the user. Exposure to those waveforms

is tailored to the exact nature of an individual's hearing disorder and retrains and desensitises the ear's processing systems so they stop producing the phantom Tinnitus sensation. Patients listen to the sounds daily and receive a course of one-on-one professional counselling at the same time.

The treatment has been shown to be more effective and have a faster onset of relief than other forms of treatment (none of which are clinically proven). The Australian Department of Veterans' Affairs and the US Department of Defence have commissioned studies into the treatment's effectiveness, with the US Department of Defence contributing more than \$1 million in grants.

Noise Cancelling Work



**The technology
was first tested on
a Perth industrial
site in 2005.**



Noise Induced Hearing Loss (NIHL) is one of the industrial world's most common occupational health conditions.

An innovation which reduces its risk was developed at the West Australian Telecommunications Research Institute (a joint venture between Curtin University and the University of Western Australia).

The new technology enables people to wear hearing protection yet still be able to hear when spoken to in noisy environments, even those with noise greater than 85 decibels; the threshold for hazardous noise. This removes one of the most significant issues confronting NIHL – the need for workers to remove their hearing protection regardless of damaging industrial noise levels to be able to have a conversation, hear an instruction.

The technology was first tested on a Perth industrial site in 2005 and has now been refined until it is small enough to be incorporated in earmuffs

and earplugs as well as hard hats. The protective earplugs are particularly welcome for use by workers in noisy hotels or entertainment venues who have been particularly vulnerable to NIHL as they are unable to wear suitable protection and still hear patrons. The devices will also soon have Bluetooth integration that allows wearers to use mobile phones while wearing the protection.

An important aspect of the research is its ability to assist those workers already affected by NIHL as it can enhance their hearing of any speech in all noisy environments – not just at work.

Sensear Pty Ltd has been set up to commercialise the NIHL products and has attracted \$2 million in investment capital and an AusIndustry grant of more than \$1 million.

02

ATN UNIVERSITY

Curtin

CASE STUDY

Noise Cancelling Work

DISCIPLINE

Public Health

CREDITS

Professor Sven Nordholm,
Dr Siow Yong Low

03

ATN UNIVERSITY
Curtin

CASE STUDY

Acoustics Use in Marine
Environmental Management

DISCIPLINE

Environmental Management

CREDITS

Dr Robert McCauley,
Dr Alec Duncan,
Dr Alexander Gavrilov,
Dr Christine Erbe



Acoustics Use in Marine Environmental Management

**This research
focusses on
the assessment
and mitigation
of marine noise
and best practice
noise surveys.**

Research by Curtin University's Centre for Marine Science and Technology is providing new knowledge about the issue of introduced sound in marine environments and the effects of oil and gas exploration processes, which will lead to more efficient environmental impact assessments.

With marine activities multiplying worldwide, shipping ever increasing, the oil and gas industry moving to deeper waters and international regulations becoming increasingly outdated, the benefit of new scientific technology is becoming increasingly critical in effective environmental management decision making.

The research is critical to Australia because much of the available knowledge is largely based on data from the US where seabeds are quite different. This research focusses on the assessment and mitigation of marine noise and best practice noise surveys. The work combines technical expertise in physics and engineering with environmental fieldwork. Innovative marine technologies which include next-generation underwater recorders to accurately pinpoint and track sound sources have been developed.

Chevron is funding projects to characterise the marine soundscape and the sound transmission on Australia's Northwest Shelf – an area of significant exploration activity for the company.

A key aim is understanding how to minimise the impact of noise and the various sources and intensities of the different sounds created by humans, their industry and equipment, on the local marine environment. An example is the research into the underwater noise of marine pile driving, a necessary process for installing foundations for offshore structures.



Residential Drug Centre Assessment

Substance misuse among Australian adolescents is increasing.

While there are a number of residential services offering detoxification and rehabilitation for young people wanting to overcome or control the abuse, there has been a lack of knowledge about how successful the costly and in-high demand residential services actually are.

Professor Sherry Saggars of Curtin University's National Drug and Alcohol Institute is leading a project funded by the Australian Research Council to provide front-line alcohol and other drug workers, clinicians and policy-makers with a meaningful measure of residential treatment success.

The research captured and analysed the experiences of young people using such residential services across Australia. It applied a "narrative inquiry" and found that the personal perceptions of journeys through drug treatment proved a good resource for providers needing to understand what they are accomplishing with their clients.

The decision to utilise a "narrative inquiry" was motivated in part by the increasing recognition in health research that their clients understand their health issue in the context of their social life and that those personal understandings can provide useful insights for service providers and policy-makers. It would enable the development of an assessment tool residential staff can use on admission, on completion and at six-month follow up.

This tool was enabled by the research's narrative accounts revealing that the drug-taking trajectory can be conceptualised along five stages from feeling removed from normality through to returning to self and "being normal" again.

It has enabled the research team to determine what characterises progress for young people using residential services and provide a tool for measuring treatment success.

The research captured and analysed the experiences of young people using such residential services across Australia.

“



04

ATN UNIVERSITY
Curtin

CASE STUDY
NDRI Drugs

DISCIPLINE
Health Sciences

CREDITS
Professor Steve Allsop,
Professor Tanya Chikritzhs,
Professor Dennis Gray,
Professor Simon Lenton,
Dr Nyanda McBride,
Professor David Moore,
Associate Professor Ted Wilkes,
Professor Sherry Saggars

ATN UNIVERSITY
QUT

CASE STUDY

VitroGro®ECM: Modern Wound Care Technology Helping People with Chronic Wounds

DISCIPLINE

Human Pharmaceutical Products

CREDITS

Professor Zee Upton,
Associated Professor David Leavesley,
Professor Sean McElwain,
Associate Professor Damien Harkin

The economic cost of a diabetic foot ulcer is between A\$7,000 and A\$10,000.

VitroGro®ECM: Modern Wound Care Technology Helping People with Chronic Wounds

It costs Australia \$2.6 billion in health care costs to manage the chronic wounds of an ageing population.

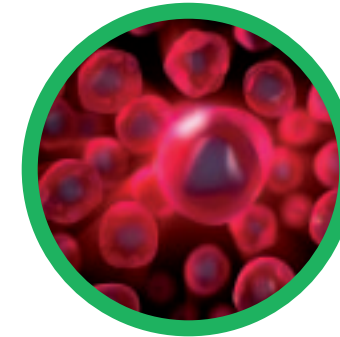
Add that chronic wounds in diabetics – a fast-escalating disease of the middle-aged in the western world – make up some 30% of the total disease's treatment costs, and the burgeoning cost to the community of dealing with chronic wounds such as leg and foot ulcers becomes all too apparent.

In ground-breaking research by tissue engineering and protein experts, the Queensland University of Technology's Institute of Health and Biomedical Innovation (IHBI) has developed an innovative wound care technology VitroGro®ECM specifically to deliver successful treatment of chronic wounds. Following successful large scale manufacturing and clinical trials, the treatment will be available for sale once CE Mark is granted by the British Standards Institute.

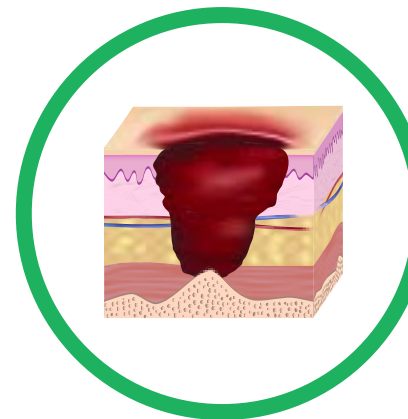
The researchers' aim was to urgently find a cost-effective and safe therapy that could be used for chronic wound treatment in primary care settings such as the patient's home. The new liquid technology reduces treatment time and cost and restores the normal wound healing process by creating a scaffold over the chronic wound. This allows normal skin attachment and cell growth in the affected area.

Until the IHBI discovery, chronic wound treatment had only been moderately effective.

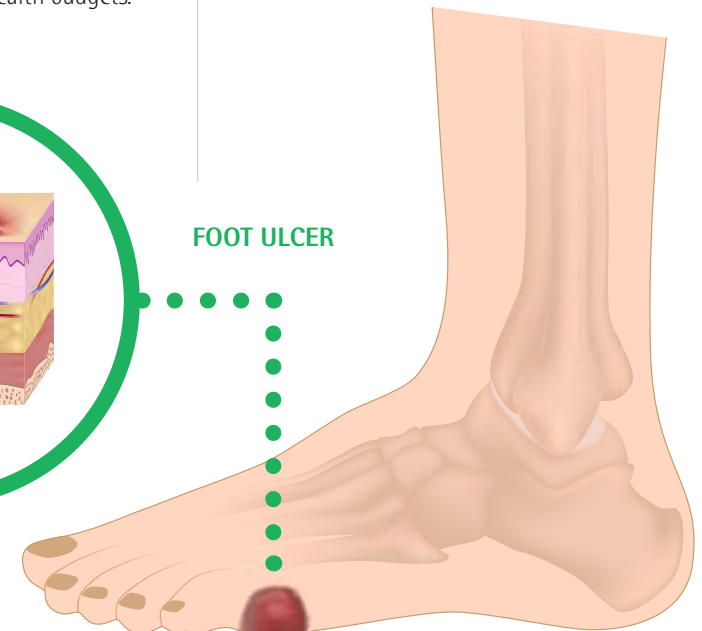
Patient outcomes have been poor and this lack of successful treatment has increasingly been impacting on health care budgets. The economic cost of a diabetic foot ulcer is between A\$7,000 and A\$10,000. If healing becomes complicated and amputation is required, this cost increases to A\$65,000. In Australia there are 3,500 such amputations a year. Globally there is one every 20 seconds. The IHBI product is expected to have significant national and international impact for both patients and health budgets.



THE NEW LIQUID TECHNOLOGY ALLOWS NORMAL SKIN ATTACHMENT AND CELL GROWTH IN THE AFFECTED AREA.



FOOT ULCER



Critical Biosecurity Research Enables the Development of Australia's Largest Resource Project



Chevron's Gorgon \$64 billion project represents the largest ever single resource investment in Australia. It is located on Barrow Island, some 60 kilometres off the West Australian coast.

The island is a nature reserve, and therefore the project is subject to stringent Federal and State environmental and quarantine standards to preserve the island's unique ecology.

A condition of project approval was that a system be set up to detect any incursions of non-indigenous invertebrates, vertebrates and plants, and that system must have at least 80% statistical power to detect.

The required biosecurity surveillance system was developed by QUT researchers in a project that spanned 2007–2012. The system was required to:

- ▶ develop methods for statistical modelling tools for use in biosecurity surveillance systems
- ▶ develop methods for identifying different risks in non-indigenous species and population subgroups based on risk-based analysis
- ▶ statistically evaluate methods and tests currently used in multi-element surveillance systems
- ▶ assess alternative sources of available data that may improve the design power of the surveillance system

The novel aspects of the system's design are that it achieves a specific power of detection in a cost-managed system, while acknowledging different risks, and classifying the area to target surveillance. The design also uses a variety of surveillance methods such as formal scientific surveys, trapping methods and incidental sightings by non-biologist observers.

The system is now successfully deployed. It is considered inevitable that the environmental and quarantine conditions placed on Australia's Gorgon project will become more common and this novel surveillance design method is robust enough to be adapted in these and other applications.

The QUT researchers are now applying this in the development of an integrated systems approach for pest risk management in South East Asia.

06

ATN UNIVERSITY
QUT

CASE STUDY

Surveillance Systems
on Barrow Island

DISCIPLINE

Pest, Disease and Exotic
Species Control

CREDITS

Professor Kerrie Mengersen,
Dr Peter Whittle,
Dr Susan Barrett,
Dr Frith Jarrad,
Dr Justine Murray

**The system is
now successfully
deployed.**

ATN UNIVERSITY
RMIT

CASE STUDY
Bushfire Community Safety

DISCIPLINE
Natural Hazards

CREDITS
Professor John Handmer

Bushfire Community Safety

RMIT research is shaping bushfire community safety policy and Government decisions on bushfire management around the world.

In 2003 RMIT's Professor John Handmer recognised gaps in both policies and knowledge and began the first major Australian research project specifically on bushfire community safety, and on the Australian approach of "prepare, stay and defend, or leave early".

With "prepare, stay and defend, or leave early" the centrepiece of Australia's bushfire community safety, Professor Handmer and his research group saw there was actually little available evidence to guide or support the approach. In general, bushfire community safety policies were inadequate because they lacked an appropriate evidence base due to lack of research data.

The findings and recommendations from the RMIT research have informed and changed bushfire response, shaping the new fire index and warning systems. The research also formed a core part of the evidence during the Royal Commission into Victoria's 2009 Black Saturday bushfires.



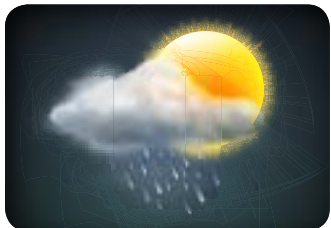
Now with a strong evidence base Government can shape and support their bushfire prevention policies and procedures including those on sharing responsibility and vulnerabilities.

Internationally the research has been used by numerous bodies to influence their bushfire-related policies; including the UN Global Fire monitoring Centre, UN University in Bonn, the European Environment Agency and the University of California. The US and Greece have both utilised the research when reviewing their bushfire risk management.



Internationally the research has been used by numerous bodies to influence their bushfire-related policies.

Improving Weather Forecasting and Climate Modelling for the Australian Region Using GPS Radio Occultation

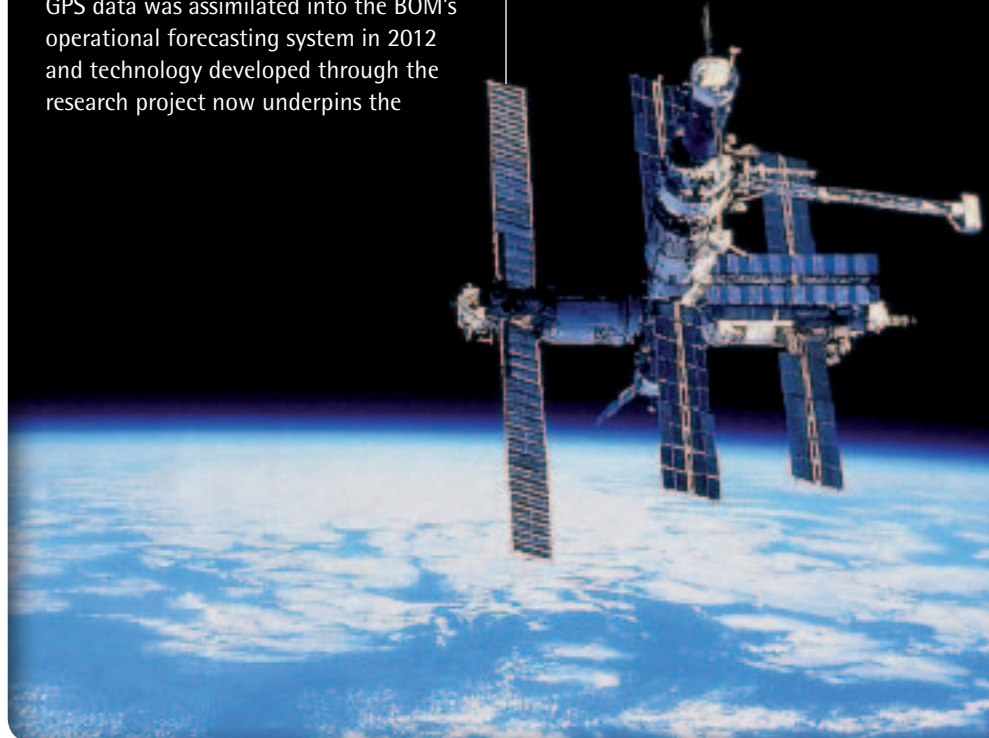


More than 22 million people working and living in the Australian region have benefited from weather forecasting's accuracy threshold being improved by up to 10 hours.

The increased accuracy and the timeliness of this forecasting information is as a result of a joint research project between RMIT and the Bureau of Meteorology (BOM). The research introduced for the first time ever the use of data for weather forecasting and climate monitoring from Global Positioning Systems (GPS) and the next generation Global Navigation Satellite Systems (GNSS). RMIT and the BOM worked together to develop practical applications for the GPS and GNSS data.

GPS data was assimilated into the BOM's operational forecasting system in 2012 and technology developed through the research project now underpins the

BOM's forecasting and modelling. The BOM is the Australian body responsible for providing national warnings on fires, heatwaves, floods, cyclones and severe storm activity. Its ability to deliver this information with more accuracy and earlier, benefits the industry, tourism, mining, agriculture, emergency services and transport sectors as well as every person requiring data to assist in their own decision making.



08

ATN UNIVERSITY
RMIT

CASE STUDY

Improving Weather Forecasting and Climate Modelling for the Australian Region Using GPS Radio Occultation

DISCIPLINE

Atmosphere and Weather

CREDITS

Professor Kefei Zhang,
Dr Robert Norman,
Dr Falin Wu,
Dr Xiaohua Xu,
Mr Erjiang Fu

Weather forecasting's accuracy threshold being improved by up to 10 hours.

ATN UNIVERSITY
RMIT

CASE STUDY

Lab-on-a-chip project

DISCIPLINE

Microplatforms

CREDITS

Professor Arnan Mitchell,
Dr Francisco Tovar

The research was aimed at overturning the long-held belief that blood clotting was chemical.

Blood Clotting

Knowing if blood will clot or not can be a matter of life and death – if it won't clot you could bleed to death.

If it does clot you could stroke. Therefore, being accurate about what a person's blood will or won't do is critical for patient outcomes.

Getting that accuracy has been advanced by the research of Professor Arnan Mitchell of RMIT who heads the University's Microplatforms Research Group. The group was asked by the Australian Centre for Blood Diseases to replicate a precisely engineered version of a crushed artery so that the clotting action of a single drop of blood could be identified as it is pumped into a funnel, accelerates down a tube and decelerates through a second tunnel – a journey just 30 microns long, or less than the width of a human hair.

Professor Mitchell and his team came up with a chip which would slide under a microscope. As he describes it, his team was simply (cleverly) using cast-off technology that came out of the small and precise computer technology. Professor Mitchell is enthused by the use of this technology saying there is an unlimited amount of breakthroughs you can achieve because the precision and control are unparalleled.

The research was aimed at overturning the long-held belief that blood clotting was chemical. Funded by Australia's National Health and Medical Research Council and published in *Nature* the process has been patented and is about to be commercialised through a company led by the Australian Centre for Blood Diseases.



Remediation



When a solution later creates its own problems another solution is urgently required.

The remediation technologies of UniSA's Centre for Environmental Risk Assessment and Remediation (CERAR) have dramatically improved the capacity of Australia's Department of Defence to conduct sustainable management of its contaminated sites.

The Department of Defence owns a number of sites across Australia which have been contaminated by past and current military action.

Those sites had used aqueous film forming foam (AFFF), an effective and efficient fire-suppressing agent used against hydrocarbon fuel fires. The foam was developed in the US in the 1960s and has been widely used by the US military and for civilian applications ever since.

But some of the AFFF components have been phased out after being labelled "toxic" as "persistent organic pollutants" and a major environmental threat under the Stockholm Convention; leaving a number of Australian sites with added environmental issues and leaving a need for analysis of the effects of AFFF and site remediation.

UniSA's CERAR has developed the analytical tools, generating new knowledge on AFFF toxicity and enabling the use of toxicity data to choose a suitable replacement for particularly hazardous and environmentally persistent AFFF products. CERAR continues to assist the Department of Defence in managing the contaminated sites, lowering the AFFF risk to people, reducing environmental contamination. Its research has also reduced the costs associated with such remediation.

The remediation technologies of UniSA's CERAR have dramatically improved the capacity of Australia's Department of Defence to conduct sustainable management of its contaminated sites.

10

ATN UNIVERSITY

UniSA

CASE STUDY

Reducing the Harmful Effects of Aqueous Film Forming Foam (AFFF): Evaluation of Environmental Toxicity, Development of Monitoring Tools and Remediation Technology

DISCIPLINE

Defence

CREDITS

Megh Mallavarapu,
Ravi Naidu,
Venkat Kembala,
Victor Arias Espana

ATN UNIVERSITY

UniSA

CASE STUDY

Successful Translation
of Research into Medicines
Management Improves
Patient Outcomes and
Lowers Healthcare Costs

DISCIPLINE

Health and Support Services

CREDITS

Professor Andrew Gilbert,
Associate Professor Libby Roughead

Successful Translation of Research into Medicines Management Improves Patient Outcomes and Lowers Healthcare Costs



10%

**WILL SUFFER AN ADVERSE
REACTION TO MEDICATION**



Problems from medication, whether incorrect prescription, dosage or adverse effects are the most common preventable health care problem in the Western world.

In Australia over any six month period, 10% of the population will suffer an adverse reaction to medication and at least 400,000 GP visits a year are required to manage such reactions.

UniSA's Quality Use of Medicines and Pharmacy Research Centre (QUMPRC) is committed to research to improve patient outcomes and lower health costs related to medication management. The Centre's research is identifying the scope of the problem, the contributing factors, and the feasibility and effectiveness of new models of pharmacy practice.

The Centre has become a research leader in this field with outcomes such as establishing the nature and extent of the problem. This has led to national goals and targets for medication safety; the development and implementation of higher national standards for all consumers purchasing medication from pharmacies and the establishment of the Veterans Medicines Advice and Therapeutics Education Service which has resulted in lower hospitalisation in Australia's community of 250,000 war veterans.

The Centre has become a research leader in this field with outcomes such as establishing the nature and extent of the problem.

Extracting Greater Value from our Natural Resources

For almost two decades the Ian Wark Research Institute (The Wark™) at the University of South Australia (UniSA) has been a part of finding business solutions for mining leaders such as Rio Tinto and BHP Billiton, and major corporates including Dow and Unilever.

A flotation model developed at The Wark that can be applied to increase the recovery and quality of minerals from both fine and coarse particles is one of the most significant advances in minerals processing worldwide.

Flotation is the most extensively used method worldwide to separate minerals from mineral resources. With more efficient flotation, more valuable minerals can be extracted from the ore.

To extract the minerals using flotation, finely crushed ore, with water added to form a slurry, is transported to separation tanks where it is vigorously agitated and aerated to create a froth. Chemicals are added to stabilise the froth, while other chemicals selectively coat the minerals, making them hydrophobic or water repellent. This causes the minerals to collide and attach to the bubbles in the separation tank and float to the surface of the tank, where they overflow into collection launders, while the residue or tailings sink to the bottom for disposal.

The recovered minerals are then filtered to remove most of the water before being dried for transportation.

Even small improvements of one or two per cent can equate to millions of dollars in savings, depending on the size of the operation and value of the mineral recovered.

Indeed, an independent study to evaluate the benefits from this research since its inception showed that AU\$318M value add was delivered to the minerals industry, via successful technology transfer of research outputs, leading to measured, and verified commercial industry benefits. The report also identified AU\$118M in expected value, and AU\$412M in future opportunity value. A second study to assess the additional impact of the Project on industry balance sheets from 2007 to 2012, demonstrated a further expected value of AU\$155M – thus a total industry benefit exceeding \$1 billion has been derived from this research.

**A total industry
benefit exceeding
\$1 billion has been
derived from this
research.**

12

ATN UNIVERSITY

UniSA

CASE STUDY

Mineral Flotation – Sustained
Benefit for Mineral Processing

DISCIPLINE

Minerals Processing;
Surface Chemistry

CREDITS

Laureate Professor John Ralston,
Professor Stephen R. Grano,
Associate Professor Daniel Fornasiero,
Professor Bill M. Skinner,
Dr Max Zanin,
Professor Roger St. C. Smart,
Professor Clive Prestidge

ATN UNIVERSITY
UniSA

CASE STUDY
A World First Plastic
Automotive Mirror

DISCIPLINE
Manufacturing

CREDITS
Associate Professor Peter Murphy

A World First Plastic Automotive Mirror

The mirrors are also being exported & are seen as an exemplar of Australian research & engineering collaboration & innovation.



The world's first lightweight robust plastic automotive mirror has been developed by UniSA. The mirrors are now in production at SMR Automotive (the project's industry partner) which is one of the largest manufacturers of rear view mirrors for passenger cars.

The mirrors are also being exported and are seen as an exemplar of Australian research and engineering collaboration and innovation.

Until the UniSA breakthrough there had been many unsuccessful attempts around the world in the past decade to introduce plastic alternatives for automotive mirrors and windows. They failed because of uncompetitive pricing or technical limitations that rendered the final product inferior to the conventional glass alternative.

The impetus to develop such a product remained considerable given a simplified product assembly process and improved safety, plus reduced greenhouse gas emissions per kilometre travelled. UniSA's successful development has delivered a mirror with performance attributes superior to that of glass, using an engineered multi-layer thin film coating system on the front mirror surface.

Evaluating the Impact of the Extended Medicare Safety Net

Research by The Centre for Health Economics Research and Evaluation (CHERE) at UTS has shaped policy outcomes and directly benefited many Australians.

The research relates to the growth in out-of-pocket costs associated with medical services provided in Australia by Medicare. The Federal Government in 2004 had introduced an Extended Medicare Safety Net (EMSM) to address the out-of-pocket cost concerns. The policy was designed to provide additional financial relief to patients with high out-of-pocket costs, in particular those with complex or chronic conditions.

CHERE researched the impact of the EMSM using substantial data sets which had been collected for administrative purposes and surveys, but which had been underutilised for research. Its results demonstrated how this data on both individual out-of-pocket costs and government subsidy can be used to analyse how changes in a policy setting can shape decisions and affect patient and provider outcomes, and ultimately the taxpayer.

The research report directly influenced the 2009–2010 Federal Budget measures to cap EMSM benefits for a number of high expenditure items. This has benefited many Australians through controls on EMSM expenditure resulting from the caps. Two CHERE reviews of the EMSM have now been conducted with both receiving extensive media coverage and being critically appraised by stakeholders in health care policy.

The policy was designed to provide additional financial relief to patients with high out-of-pocket costs

medicare

14

ATN UNIVERSITY
UTS

CASE STUDY

Evaluating the Impact of the Extended Medicare Safety Net

DISCIPLINE

Health and Support Services

CREDITS

Dr Kees Van Gool,
Professor Elizabeth Savage,
Associate Professor Rosalie Viney,
Dr Meliyanni Johar,
Professor Marion Haas,
Ms Stephanie Knox

ATN UNIVERSITY
UTS

CASE STUDY

Water, Sanitation and Hygiene
Advocacy in International
Development

DISCIPLINE

International Relations

CREDITS

Dr Juliet Willetts,
Ms Naomi Carrard,
Associate Professor Mick Paddon,
Professor Cynthia Mitchell,
Dr Kumi Abey Suriya,
Monique Retamal

The ISF is recognised
for its research
leadership in aid
effectiveness

Water, Sanitation and Hygiene Advocacy in International Development

Millions live without the basic human rights of water, sanitation and hygiene (WASH). In 2010 UNICEF reported 2.6 billion people do not have access to toilets and 884 million do not have access to safe water.

Research by the Institute for Sustainable Futures (ISF) at UTS convinced the Australian Government to allocate \$300 million to water supply and sanitation, ensuring one million people in developing countries received access to safe water and toilets during 2009. Its work has elicited a further Government commitment of \$433 million over four years for similar projects.

The ISF is recognised for its research leadership in aid effectiveness. It provides knowledge and

know-how to support technical, economic, environmental and social sustainability.

It has developed economic analysis and sustainability assessment methods to inform infrastructure decision-making and support service delivery. It provides research expertise in integrating gender equality and has developed measures to assess the effectiveness of WASH approaches in developing countries.



**2.6
billion**

**PEOPLE DO NOT HAVE
ACCESS TO TOILETS**

**884
million**

**PEOPLE DO NOT HAVE
ACCESS TO SAFE WATER**



Australasian Legal Information Institute (AustLII)

16

The Australasian Legal Information Institute (AustLII) provides a national free access legal database. Until its creation there was no free public access to legal information in Australia.

It has also played a leading role in promoting free access to law internationally and has been instrumental in the establishment of free legal access systems in the UK, Pacific, Hong Kong, New Zealand, Cyprus, India, Southern and Eastern Africa and Liberia. It also operates a number of international portals.

AustLII's research pioneered the use of the internet to enable access to legal information. Its system is used by the legal profession, government, courts, education institutions and the public. The novel software and search approaches, the unique ability to cross reference, and many other technical advancements such as mark-up tools were produced from the group's research and have enabled a robust and sustainable model of on-line free access to legal information.

It has shaped public policy so there is now a general acceptance of the right of free access to public legal information including legislation, case law, treaties, law reform, legal scholarship and other publicly created legal documents. The AustLII system currently contains more than 520 databases that include full texts of decisions from nearly all Australian and New Zealand courts and Tribunals.

AustLII is a joint research initiative of the law faculties at UTS and the University of New South Wales.

ATN UNIVERSITY
UTS

CASE STUDY

AustLII – Australasian Legal Information Institute

DISCIPLINE

Law and Information Services

CREDITS

Andrew Mowbray (UTS)
A joint project with the University of New South Wales

FREE
ACCESS

The AustLII system currently contains more than 520 databases that include full texts of decisions from nearly all Australian and New Zealand courts and Tribunals.



ATN UNIVERSITY
UTS

CASE STUDY

What Makes People Happy

DISCIPLINE

Quality of Life

CREDITS

Dr Terry Flynn

What Makes People Happy

Survey responses indicated that poor health and sleep quality were each associated with large decreases in quality of life, while income had little impact on overall quality of life when viewed in isolation.

Discovering what makes people happy, makes them believe they have quality of life, has been pinpointed through research carried out by the Centre for the Study of Choice at UTS (CenSoc).

Quality of life surveys were conducted with 5000 Australians by researcher Dr Terry Flynn (an international expert on quality of life research) and his team, with the results used to develop a set of numerical values that can be applied to a range of life events, such as marriage and bereavement, which people view as having the capacity to impact how they feel about their lives.

The research outcomes are proving invaluable in demonstrating the link between good emotional health or perceived quality of life, and the range of factors which affect that perception. The work carried out by Dr Flynn is influential in the development of public policy in health care, urban planning and sustainability.

Survey responses indicated that poor health and sleep quality were each associated with large decreases in quality of life, while income had little impact on overall quality of life when viewed in isolation. However relative wealth did allow for quality of life being enhanced such as through good health and the ability to live in a good area. Divorce was shown to have a much more negative effect on men than women. The survey also showed that the effects of lack of trust and political disenfranchisement vary between cities. The research is used by government in Australia and the UK to influence policy and budgetary decisions.



Manuka Honey as an Effective Treatment for Chronic Wounds

Combination of medical-grade Manuka honey (Medihoney) with antibiotic rifampicin to treat skin and chronic wound infections.

Manuka honey (a New Zealand native honey) used with antibiotics could be a new weapon in the fight against drug-resistant bacteria such as the superbug MRSA (golden staph).

Researchers at UTS, led by Professor Liz Harry have used a combination of medical-grade Manuka honey (Medihoney) with antibiotic rifampicin to treat skin and chronic wound infections. The combination has been shown to improve the effectiveness of the antibiotic and can prevent the emergence of resistance.

The research showed MRSA did not become resistant to the honey, and using the combination of the honey and the antibiotic can be seen to be more effective in killing MRSA than the antibiotic alone. It also delivers a reduction in the effective dose of rifampicin which reduces possible side effects.

While honey has been seen as somewhat of an 'alternative' medical approach the research provides solid evidence for the use of medical grade manuka honey specifically, as a first option in the treatment of chronic wounds.



MEDICAL-GRADE
Manuka Honey



18

ATN UNIVERSITY
UTS

CASE STUDY

Manuka Honey as an Effective Treatment for Chronic Wounds

DISCIPLINE

Wound Treatment

CREDITS

Professor Liz Harry

ATN UNIVERSITY
QUT

CASE STUDY

Creative Industries Mapping:
Establishing the Significance
of the Size and Scope of the
Creative Economy

DISCIPLINE

Communication and
Media Studies

CREDITS

Distinguished Professor
Stuart Cunningham

Creative Industries Mapping: Establishing the Significance of the Size and Scope of the Creative Economy

The new mapping is being used in the UK, Australia and New Zealand.

When the UK Government introduced a “Creative Industries” strategy it required mapping to establish the significance of the creative economy.

Major problems identified with existing UK mapping of the sector were that they lacked a rigorous rationale for what was included in it, and didn't establish or clarify the relationship between “creative industries” to the rest of the economy (an answer to the oft-repeated criticism that aren't all industries creative?).

The QUT research addressed this through a new mapping methodology – the ‘creative trident’.

The model provides policy makers and industry with the means to make informed decisions and apply resources effectively. A creative business benchmarker has also been developed is now benefiting small business in the sector by giving them timely feedback to their relative positioning.

The new mapping is being used in the UK, Australia and New Zealand.



Efficient Dye-Sensitised Solar Cells: New Cathodic Materials and Systems

Its aim is to
maintain and
enhance Australia's
position as a market
leader in the field.

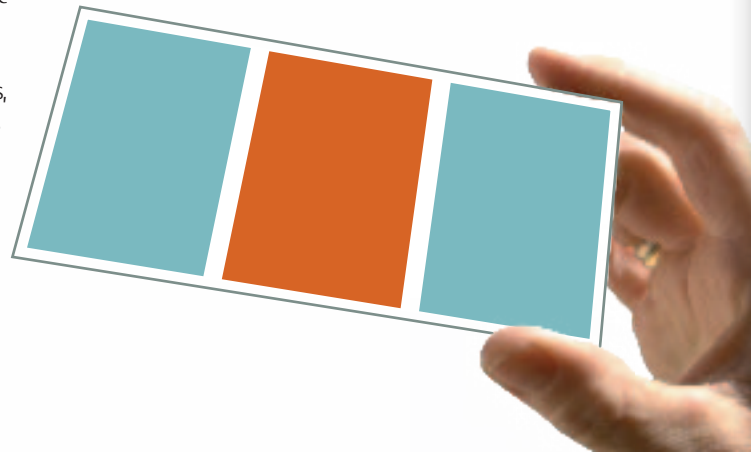
Australia leads in the field in cost-effective dye solar cell technology.

Dye-sensitised solar cells have significant performance impacts on energy conversion technology, and therefore the cost. The project is addressing commercial challenges by developing new materials and systems which will lead to improved performance and new applications for dye-sensitised solar cells.

Its aim is to maintain and enhance Australia's position as a market leader in the field through both scientific and commercial outcomes, including opening up new markets and exporting products and technical solutions.

EXPORT

**DYE-SENSITISED
SOLAR CELLS**



20

ATN UNIVERSITY
QUT

CASE STUDY

Efficient Dye-Sensitised Solar
Cells: New Cathodic Materials
and Systems

DISCIPLINE

Materials Engineering

CREDITS

Professor John Bell,
Dr Hongxia Wang,
Associate Professor Geoff Will

ATN UNIVERSITY
UTS

CASE STUDY

UTS has its Fingerprints
All Over Forensic Technology

DISCIPLINE

Forensic Technology

CREDITS

Dr Brian Reedy,
Adam Brown,
Daniel Sommerville

The thermal finger print developer uses heat to develop the finger print in a matter of seconds.

Thermal Finger Print Technology

The thermal finger print developer is a simpler, safer and more economical method of developing finger print images and has been discovered by Adam Brown and Daniel Sommerville and then further developed by Dr Brian Reedy and his team at the Centre for Forensic Science.

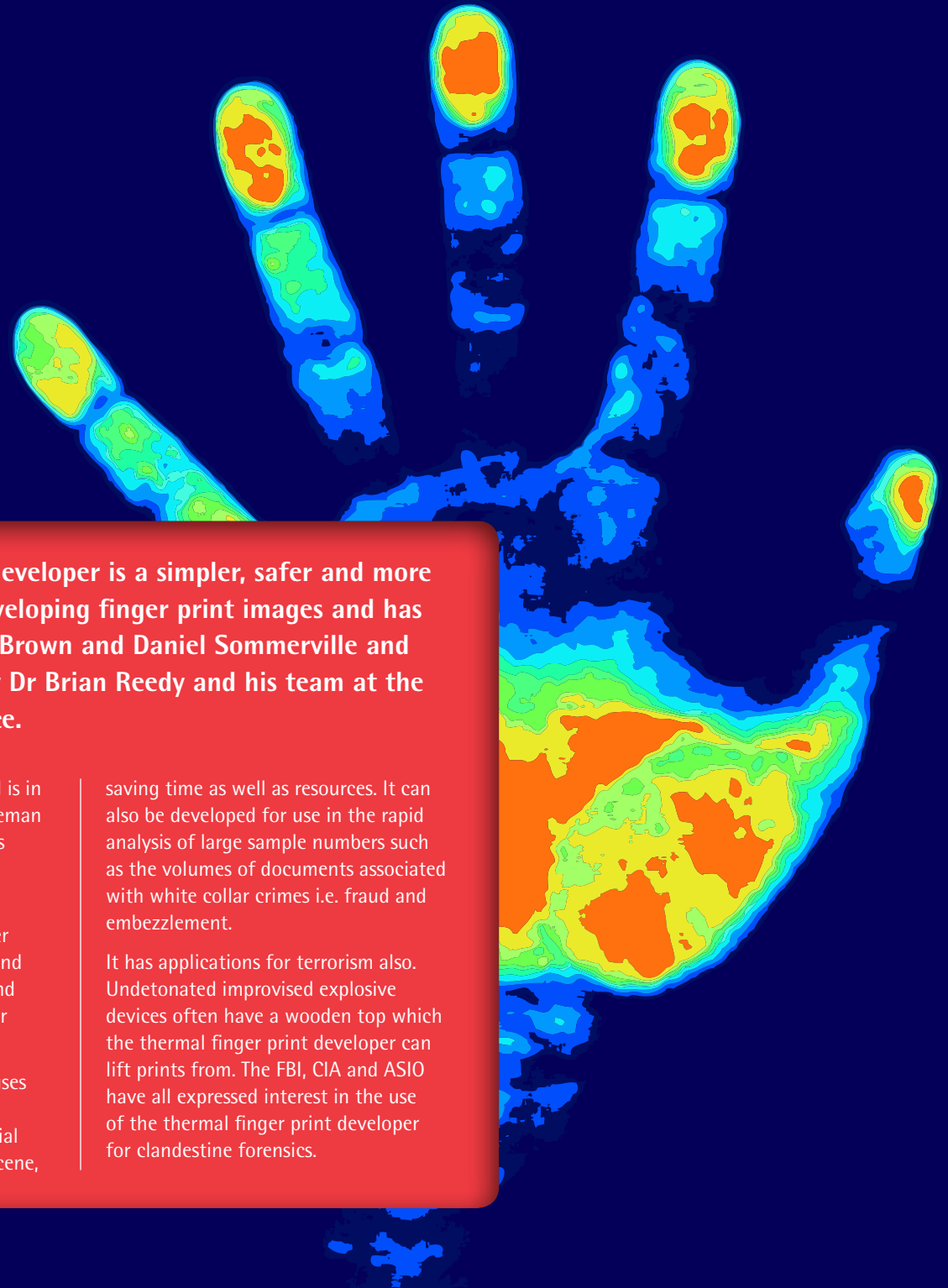
It has now been commercialised and is in use in the UK through Fosters & Freeman which supplies scientific instruments to international police and forensic laboratories.

Current methods of visualising finger prints on paper are labor intensive and time-consuming, using toxic dyes and chemicals to stain the fingerprints or make them fluorescent.

The thermal finger print developer uses heat to develop the finger print in a matter of seconds. It has the potential to be used immediately at a crime scene,

saving time as well as resources. It can also be developed for use in the rapid analysis of large sample numbers such as the volumes of documents associated with white collar crimes i.e. fraud and embezzlement.

It has applications for terrorism also. Undetonated improvised explosive devices often have a wooden top which the thermal finger print developer can lift prints from. The FBI, CIA and ASIO have all expressed interest in the use of the thermal finger print developer for clandestine forensics.



Airports of the Future



A unique study has resulted in an 80% reduction in the passenger waiting times at Brisbane airport security points, taking them from 20 minutes to 3.9 minutes.

This has increased passenger throughput from 260 passengers an hour to 340 – something unheard of at an Australian International airport.

Increased focus on airport security has come at the expense of timely passenger flow. Airport security causes bottlenecks and heightens stress for passengers and staff. It impacts both passenger experience and commercial operations of an airport.

Opportunities have now been identified to simplify the complex systems by this cutting edge study viewing the problem in totally

different way. The project analysed airports as a whole rather than seeking to address the airport security issue in isolation; which has been the traditional and unsuccessful method.

It is the first study ever to bring together airports plus Australian Federal Police, the Australian Customs and Border Protection Service, and the Department of Infrastructure and Transport.

The project used a multidisciplinary team to look at the total design management and operation of today's and tomorrow's airports. Several intelligent surveillance prototypes have been developed within the project, including the capability to track persons of interest, detecting anomalies and counting people.

Improved productivity and financial savings for airports have been identified via the project by researching the complexities of how every aspect of running and using an airport is linked to plane scheduling and passenger movement and the commercial outcomes of those systems while at all times ensuring security levels are robust.

Current costs have been reduced by 20% with no impact on security. This is seen as a critical outcome given airport operators are facing enormous growth pressures which only compound security point throughput issues. The project has the potential to positively impact airport operations worldwide.

**20
minutes**
WAITING TIME



**3.9
minutes**
WAITING TIME



**The project
has the
potential to
positively
impact airport
operations
worldwide.**

22

ATN UNIVERSITY
QUT

CASE STUDY
Airports of the Future

DISCIPLINE
Aerospace Transport

CREDITS
Professor Prasad KDV Yarlagadda,
Dr Clinton Fookes,
Professor Ashantha Goonetilleke,
Professor Vesna Popovic,
Professor Michael Rosemann,
Professor Sridha Sridharan,
Dr Paul Barnes

ATN UNIVERSITY
QUT

CASE STUDY
High Vis Night Worker Wear

DISCIPLINE
Clinical Health

CREDITS
Professor Joanne Wood,
Dr Mark King

High Vis Night Worker Wear



**Incorporated into
an Australian
standards for high
visibility safety
garments.**



Pedestrians are seven times more likely to be fatally injured by traffic at night. This is particularly relevant for road work sites where workers operating in the dark are exposed to oncoming traffic.

Research has identified that high visibility vests alone are not the best way to ensure such worker safety. Instead night workers wearing retroreflective strips positioned on their moveable joints – ankles, knees, wrists and elbows – are considerably easier to see.

The retroreflective strip positioning creates the phenomenon known as biomotion when the worker moves, enabling rapid and accurate recognition of the human form by on-coming traffic.

The research also demonstrated the positive effects of the strip positioning regardless of driver age, headlight glare and visual clutter (such as equipment) surrounding the worker.

The Queensland Government has legislated the retroreflective strips for all night workers and the biomotion configuration has now also been incorporated into an Australian standards for high visibility safety garments.

Industry Transportation

Transportation from mines has become one of the worst industrial bottlenecks in Australia.

The delays cost mining companies millions of dollars in compensation payments each month.

Research involving the comprehensive formulation and implementation of sophisticated mathematical and computer models can now be applied to achieve considerable savings in mining transportation costs.

These intelligent transportation systems are recognised as a key tool in dealing with the commodity price downturn and the effect of this on company bottom line.

The research focused on expanding the implementation of scheduling theory and applying it to industrial situations. Better scheduling algorithms have been developed and also more realistic models to reflect real life scheduling environments. These have now been successfully applied in railway transportation and more broadly in the mining industry. This has led to significant efficiency improvements and has made Australia a leader in transport logistics.

This has led to significant efficiency improvements and has made Australia a leader in transport logistics.

24

ATN UNIVERSITY
QUT

CASE STUDY
Industry Transportation

DISCIPLINE
Mining and Mineral Extraction

CREDITS
Professor Erhan Kozan,
Professor Paul Corry,
Dr Robert Burdett

Glove Gripping Power

Dr Patrick Clifton's research has ensured certain gloves cannot be worn by Australian Football League players (AFL) during the 2013 season and beyond – ending a competitive advantage for players who chose to wear the gloves while playing in dry weather.

The research results have ramifications for other sports which have allowed gloves.

Interestingly the research showed that there was no improved player grip from gloves in wet weather when a bare human hand was found to be better.

The research was commissioned by the AFL which was concerned about competitive advantage for players who chose to use gloves, given that glove technology had significantly increased in the past decade. Some players also wore them for medical reasons such as lacerations and the need to ensure their hands did not leave blood on the ball.

10 glove models were tested including Nike, Grays, Gilbert and Rawlings plus the one AFL specific glove, the Franklin Football glove. The gloves were laboratory tested using AFL football leather fixed to a forced plate, replicating dry and wet conditions.

The marking action of players was then replicated by dragging the glove across the leather at a constant velocity to measure grip. This grip was then compared to bare hand movements allowing the researchers to assess potential competitive advantage.

The results that six of the 10 glove models from across seven brands that were tested, provided grip above that of a bare hand in dry conditions, led to a recommendation to the AFL that certain types of gloves not be used during AFL games. The AFL has since regulated against their use.

Research showed that there was no improved player grip from gloves in wet weather.



THE AFL HAS REGULATED AGAINST THE USE OF CERTAIN TYPES OF GLOVES

Sustainable Manufacturing of Sports Shoes and Clothing in Asia

A research contract with global sporting giant Adidas is advancing sustainable manufacturing of sports shoes and clothing in Asia to ensure the ongoing competitiveness and leadership of the Adidas brand.

Led by Professor Aleksandar Subic, Head of the School of Aerospace, Mechanical and Manufacturing Engineering, the project aims to generate new knowledge and manufacturing methods and establish a series of improvement projects across the total Adidas supply chain beginning with the Adidas suppliers in Indonesia.

Professor Subic's team which has a strong reputation for its sports engineering research, was appointed after a global search by Adidas, and brings together researchers in sports technology and sustainable manufacturing,

sustainable development, sustainable energy and supply chain management and textiles.

With the first phase concentrated on Indonesian suppliers, the second phase involves improvement projects to build supplier excellence and new sustainability strategies.

According to Adidas, the US\$207,000 contract was secured because of the University's strengths in engineering and its depth of understanding of sustainable manufacturing processes. The University's commitment to education in Asia (where there are campuses in Vietnam) was also integral to its being contracted.



The project aims to generate new knowledge and manufacturing methods and establish a series of improvement projects across the total Adidas supply chain beginning with the Adidas suppliers in Indonesia.

26

ATN UNIVERSITY
RMIT

CASE STUDY

Project with Adidas to Advance Sustainable Manufacturing of Sports Shoes and Clothing in Asia – Aleks Subic

DISCIPLINE

Sports Engineering Technologies

CREDITS

Professor Aleksander Subic

ATN UNIVERSITY
RMIT

CASE STUDY
Diabetes Prevention

DISCIPLINE
Exercise Metabolism

CREDITS
Professor John Hawley,
Professor Jiming Ye

Exercise and Diabetes Prevention



Professor John Hawley leads the Exercise Metabolism Research Group. It is one of only a few research groups around the world looking at the role of exercise in the prevention of obesity-related conditions such as Type 2 diabetes.

The team found that exercise was just as effective as insulin-sensitising drugs in treating Type 2 diabetes. Exercise is also the most natural and inexpensive way. But the question remained – Why does exercise work so well? The answer lay in the muscles.

The research shows that muscles are the control location for the whole body – and therefore where everything can start to go wrong. In a normal healthy person about 80% of the glucose load from a meal is taken up by the muscles but in obese people the glucose that isn't absorbed stays in the bloodstream and raises insulin levels.

It was discovered that the key difference was the levels of mitochondria. The more mitochondria in muscle cells the better they convert fuels such as carbohydrates and fat to useful energy. In effect it creates a better more efficient engine.

Aerobic exercise and to some extent resistance-based exercise programs increase mitochondria levels. Combining aerobic-type exercise such as walking, cycling or swimming with resistance training to increase muscle mass delivers the best results, but even small amounts of exercise can be enough to turn around insulin resistance.

The team found that exercise was just as effective as insulin-sensitising drugs in treating Type 2 diabetes.



Turbo Coding Technology (TCT): a Journey Towards a Laptop Size Global Mobile Satellite Communications

Research by the Institute of Telecommunications Research has delivered a satellite signal using a receiver the size of laptop. It has ensured mobility is now a reality for satellite communications.

The small receiver can be deployed in airplanes, small ships and vehicles, or carried around in a small suitcase. It has been a critical development for both civil and military uses and it has been made possible through the development of turbo coding technology (TCT) which has enabled rapid and low error transfers of data.

Command and control military systems demand reliable scalable on-the-move 24/7 high speed transfer of large volumes of data over secure and wide area networks. A satellite based network is the only solution that can meet all those requirements when small mobile satellite terminals are available. TCT has achieved this goal and it has now been commercialised.

The advent of TCT has also reduced significantly – some 50% – the power requirements of a satellite services provider. This has led to significant cost savings in space hardware and allows for an increased number of users on the system.

SAME SIZE AS A LAPTOP



This had led to significant cost savings in space hardware and allows for an increased number of users on the system.



28

ATN UNIVERSITY
UniSA

CASE STUDY

Turbo Coding Technology (TCT):
a Journey Towards a Laptop
Size Global Mobile Satellite
Communications

DISCIPLINE

Satellite Communications
Networks

CREDITS

Associate Professor Adrian
Barbulescu, Brendan Beahan,
Colin Biggs, Prof Bill Cowley,
Colin Earl, Dr Wade Farrell,
Dr Brett Gordon, Dr Andrew
Guidi, Dr Paul Gray, Doug
Johnson, Jeff Kasparian, Dr Paul
Koufalis, Professor Michael
Miller, Alan Modra, Dr Steven
Pietrobon, Dr Mark Rice,
Vince Rose, Perry Roberts

Predicting Hamstring Injuries

Hamstring injuries (HSI) are the largest cause of injury in the Australian Football league (AFL). They are also the most prevalent non-contact injury in American football, rugby union, soccer and sprinting.

"Doing a hammy" is so common in the AFL it is part of the national lexicon.

It is an injury that can cost many months of rehabilitation and even surgery, and incidence rates have not declined in recent times. It is also an injury that recurs at a high rate and one where the exact causes remain unknown.

What is known is that hamstring weakness, or low levels of hamstring strength, does contribute to the injury.

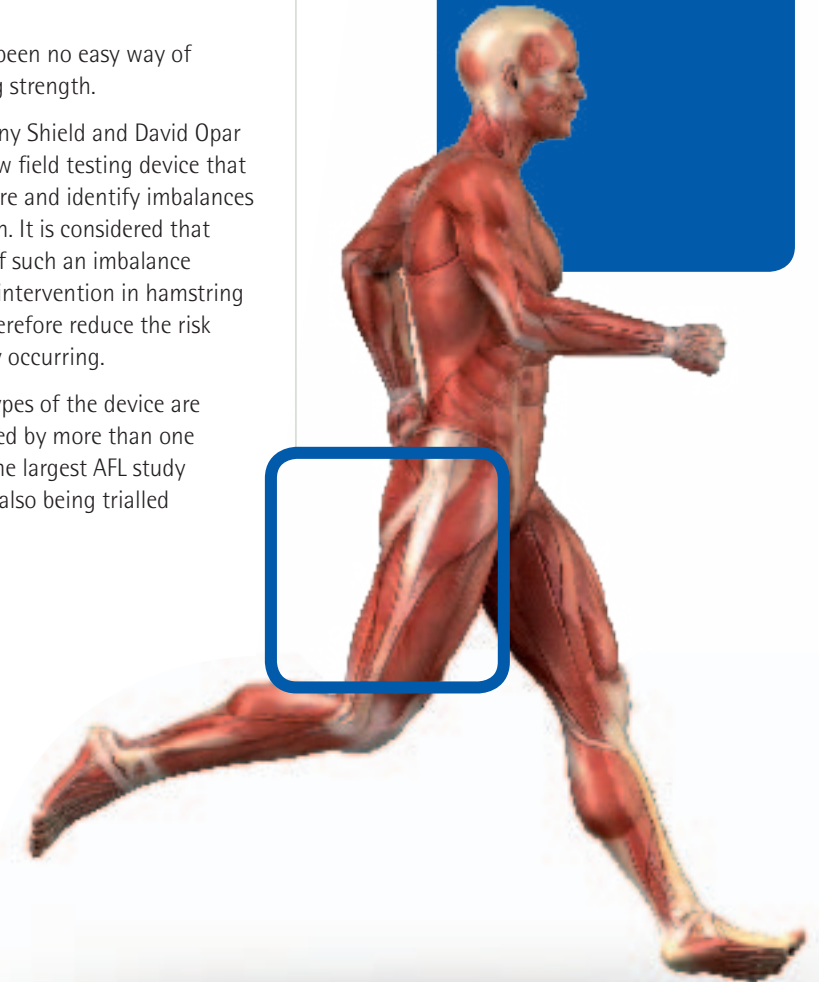


Until now there has been no easy way of measuring hamstring strength.

Researcher Dr Anthony Shield and David Opar have developed a new field testing device that is intended to measure and identify imbalances in hamstring strength. It is considered that early identification of such an imbalance could lead to earlier intervention in hamstring management and therefore reduce the risk of a hamstring injury occurring.

Experimental prototypes of the device are currently being trialled by more than one third of AFL teams, the largest AFL study ever conducted. It is also being trialled in rugby union.

"Doing a hammy" is so common in the AFL it is part of the national lexicon.



Improvement of Classroom Learning Environments



Many teachers involved in the research have continued to use the tools.



The learning environment in classrooms is being transformed around the world by this comprehensive research program.

The aim has been to create classroom environments that are more stimulating, productive, equitable and student-centred.

Such research involves a long timeframe and it has been in process since 1992, with a huge number of individual studies using tens of thousands of students. A valid and economical methodology for assessing subtle but important characteristics

of classroom learning environments has been developed using straightforward questionnaires to measure students' perceptions, such as achievement and satisfaction.

The questionnaires suit specific learning environments including laboratories, field trips, on-line learning, outcomes-focussed classrooms etc and they have been translated into Chinese, Arabic, Spanish, Indonesian and Korean.

Books, book chapters and conference publications that address educational practice and practitioners have been developed as well as the questionnaires. Many teachers involved in the research have continued to use the tools provided at the time to assist them deliver better outcomes from the learning environment for each new group of students they teach.

30

ATN UNIVERSITY
Curtin

CASE STUDY

Improvement of Classroom
Learning Environments

DISCIPLINE

Schools

CREDITS

Professor Barry Fraser,
Professor Darrell Fisher,
Associate Professor Jill Aldridge

ATN UNIVERSITY
UniSA

CASE STUDY

Community consultation for
building design and construction
in remote areas

DISCIPLINE

Cultural Understanding

CREDITS

Mr David Morris,
Professor Gini Lee

Community consultation for building design and construction in remote areas

**WELCOME
TO MIMILI
POPULATION 300**

The Remote Area Design and Construction Research Group at UniSA (RADCRG) was established in 1993, and undertakes research to ensure the acceptable design and delivery of architecturally designed buildings for remote indigenous communities across Australia and the Asia-Pacific.

Consultation with the buildings' future users is paramount with the recognition that western approaches to architecture and house construction are not appropriate for such remote communities.

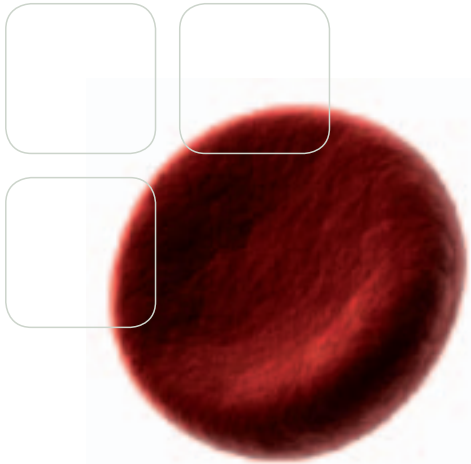
While there is a need for high-quality, user-specific, culturally-specific, fit-for-purpose buildings in remote areas, climatic extremes, isolation and cultural distinctions make acceptable delivery complex to achieve. In South Australia RADCRG is assisting the State Government achieve its goal of wellbeing for

indigenous communities through housing delivery.

RADCRG research has delivered single men's housing for the remote Mimili Aboriginal community in South Australia. The research process involving the community itself, discovered previously undescribed cultural requirements for housing in this community and then facilitated the construction of a unique and culturally appropriate building with local elders and public officers endorsing both the process and the building.

**RADCRG research
has delivered single
men's housing
for the remote
Mimili Aboriginal
community in SA.**

OMX Microscopy



**It was OMX
that recorded
the first ever
3D images
of a malaria
parasite
invading a
red blood cell.**

Microbiology research in an industry partnership with GE Healthcare is paving the way for a new generation of antibiotics. The research is leading the field in new advances.

The cutting edge imaging facilities at UTS are boosting Australia's capacity in biotechnology, health, biological and physical sciences as one of the world's first commercial sites for GE's Delta Vision OMX super resolution microscope. It was OMX that recorded the first ever 3D images of a malaria parasite invading a red blood cell.

The UTS work on OMX then assisted GE to develop OMX Blaze which can record dynamic cellular activity at near-video rates, capturing for the first time images of bacterial cell division in action. These Blaze images demonstrated that the bacteria division process within the body was significantly different to the structure microbiologists had previously theorised and

it is this discovery that is enabling a new generation of antibiotics.

Blaze has turned medical science on its head. The research has been assisted by a joint \$400,000 investment with the NSW Government.



32

ATN UNIVERSITY
UTS

CASE STUDY
OMX Microscopy

DISCIPLINE
Microscopy

CREDITS
Associate Professor Cynthia,
Dr Lynne Turnbull

ATN UNIVERSITY
UTS

CASE STUDY
Big Data

DISCIPLINE
Data Analysis

CREDITS
Professor Longbing Cao



Big Data

A novel data mining technique, known as 'domain driven data mining', has been developed to help organisations strengthen their business practices and enhance their fraud detection and risk management capabilities.

The research is seen as critical at a time when more and more organisations are conducting their financial transactions over the internet, and with fraud as a growing problem.

The technique can outsmart even the most sophisticated mainstream financial systems, and its use can save businesses and Governments hundreds of millions of dollars a year related to fraud and risk issues as it helps predict and detect on-line fraud and criminal activities.

The research has several industry partners including AMP, Centrelink, HCF, Westpac and the Australian Taxation Office who all require tailored data mining solutions.

Westpac trialed the on-line banking fraud detection system, which detected fraud that would otherwise not have been picked up by its mainstream banking systems. A series of projects for Centrelink assisted the Government agency strengthen its systems including fraud prediction and recovery, realising significant savings.

The research is seen as critical at a time when more and more organisations are conducting their financial transactions over the internet, and with fraud as a growing problem.

Patient Experience

Patients can have as many as 250 different communications with clinical staff.

An unmistakable connection between care failures in hospital emergency departments, and a breakdown of communication between patients and doctors, nurses and other emergency workers, has been established through a series of studies following the experiences of 82 patients.

Such communication breakdowns are responsible for a high proportion of adverse patient events in hospitals around the world.

The research looked at points of vulnerability, or moments during a patient's journey through an emergency department, where miscommunication was likely to occur.

In the process it was discovered that patients can have as many as 250 different communications with clinical staff while in an emergency department. In each communication there was a point where, if communication was not successful, adverse events had the potential to occur.

The research team's major report, which sought ways to identify how communication processes could be better managed to ensure patients have a positive experience, has now been released. It identified a need for explicit communication protocols, and makes the point that while doctors will often say there is no time to develop a rapport and empathy with the patient, if this was developed, a much more efficient diagnosis can be made far more quickly, and adverse events reduced.

The report also concluded that more patient input was also required, with patients encouraged to actively participate in conversations about their health.

34

ATN UNIVERSITY
UTS

CASE STUDY
Patient Experience

DISCIPLINE
Health Communications

CREDITS
Professor Diana Slade

Acoustic Microfluids

Ways to improve inhalers to enable drugs and vaccines to be delivered to the lungs with much greater efficiency are being devised using surface acoustic waves (SAWs) to manipulate tiny droplets of fluid.

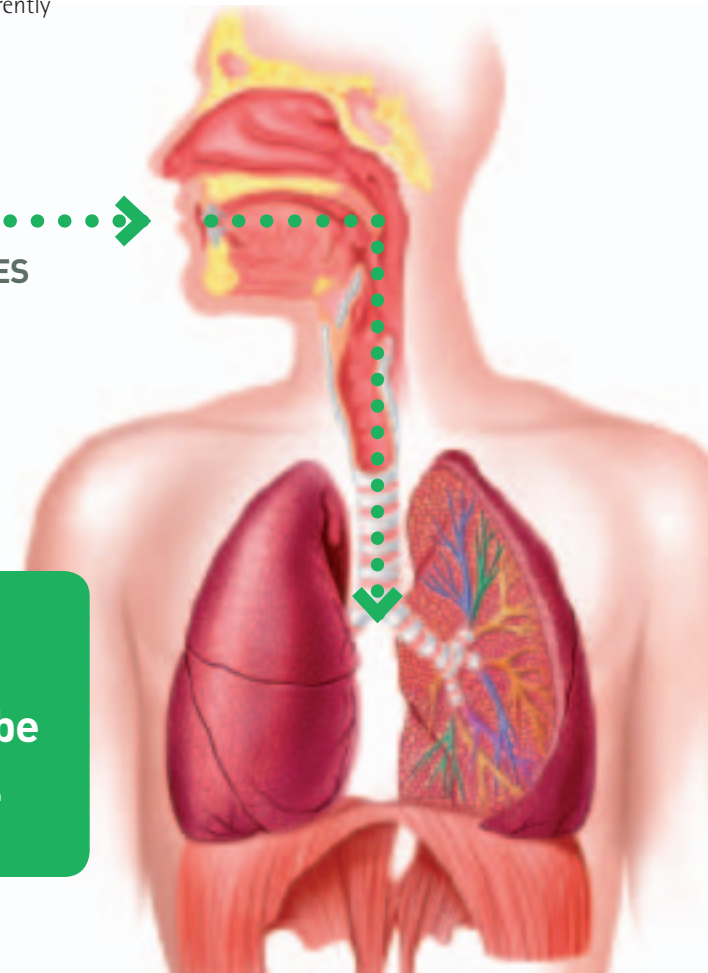
The research has been driven by the fact normal inhalers produce a wide range of droplet sizes with the result that much of the drug ends up wasted because many droplets are too large to reach deep lung tissue. Using SAWs it is possible to tailor droplet size precisely, to as little as a few microns – small enough to penetrate all the way to the lung.

Having tested a SAWs asthma inhaler successfully on sheep, the research team is now exploring a similar approach to vaccines using an inhaler. This approach is particularly suited for developing countries where there are sanitation problems and lack of reliable electricity which mean injectable vaccines have a sterilisation and therefore infection problem.

The research into using SAWs to deliver vaccines in the form of a mist of particles to be absorbed by the lungs, has positive benefits also for those patients with chronic illnesses that currently require daily injections.

SURFACE ACOUSTIC WAVES ASTHMA INHALER

The research into using SAWs to deliver vaccines in the form of a mist of particles to be absorbed by the lungs, has positive benefits.



Safety Bottle Light

It comprises
a proprietary
LED light source
assembled with a
translucent drink
bottle which is
compatible with
most pre-existing
bicycle mounted
bottle cages.

A bottle-illuminating light has been developed to decrease the risk of vehicle accidents for cyclists on the road in poor light.

The light increases visibility of the bicycle significantly from a range of side-viewing angles; something that currently available forward and rear-facing bicycle lighting cannot deliver.

It comprises a proprietary LED light source assembled with a translucent drink bottle which is compatible with most pre-existing bicycle mounted bottle cages.



36

ATN UNIVERSITY
UniSA

CASE STUDY
Safety Bottle Light

DISCIPLINE
Safety Design

CREDITS
Mr Sandy Walker

ATN UNIVERSITY

Curtin

CASE STUDY

Fighting obesity with dairy

DISCIPLINE

Health and Nutrition

CREDITS

Dr Wendy Chan She Ping Delfos

Fighting obesity with dairy



Benefits include greater weight loss and significant improvements in the risk factors for cardiovascular disease and diabetes.

Curtin research has shown that a higher intake of dairy products while on a reduced calorie diet can help fight obesity.

Benefits include greater weight loss and significant improvements in the risk factors for cardiovascular disease and diabetes.

As part of her PhD research, Dr Wendy Chan She Ping Delfos, from Curtin's School of Public Health, compared three serves of dairy with five serves of dairy within a reduced calorie diet prescribed to overweight participants over a 12-week weight loss trial.

The study found that participants who consumed five serves of dairy as opposed to three had:

- ▶ higher mean levels of weight loss
- ▶ higher mean levels of fat mass loss
- ▶ greater drop of systolic blood pressure and
- ▶ greater total percentage abdominal fat loss.

The study was funded by the ATN Centre for Metabolic Fitness and Diabetes Australia.



Foamed bitumen for road infrastructure

Cheaper and faster road construction that is also far more environmentally friendly because it allows for the use of recycled materials, has been made possible by the development of "foamed bitumen".

The foamed bitumen, which is a mix of air, water and hot bitumen, can be combined with existing road material, or, bound with recycled granular material to lay new surfaces and repair damaged surfaces.

It takes less than one-tenth of the construction time of normal methods, and it also has the advantage of in-situ recycling of existing materials, meaning far less disruption to traffic.

This research and development project has responded to a world-wide shift in construction approaches, with Governments and industry seeking more environmentally responsible and less expensive solutions to road construction.

This has been particularly pertinent in Australia with its road network the seventh longest in the world, and with its construction and maintenance currently costing more than \$16 billion a year.

It takes less than one-tenth of the construction time of normal methods.

**air
+
water
+
hot
bitumen
=
solution**
**CHEAPER, FASTER &
ENVIRONMENTALLY
FRIENDLY**

38

ATN UNIVERSITY
Curtin

CASE STUDY
Foamed bitumen for
road infrastructure

DISCIPLINE
Construction

CREDITS
Professor Hamid Nikraz

ATN UNIVERSITY
Curtin

CASE STUDY
International eyes on Scanalyse

DISCIPLINE
Mining Technology

CREDITS
Dr Jochen Franke

International eyes on Scanalyse

It is a development which improves costings and maximises project efficiency.

Laser scanning technology for mining processing operations is monitoring the wear and tear of equipment in a development that has gained International acclaim.

The two different products, MillMapper and CrusherMapper, which have been developed by a team of spatial scientists exemplify industry-engaged applied research.

MillMapper combines laser scanning with 3D modelling and advanced software, to track and forecast wear on mill liners. This provides mine maintenance staff with information that can improve mill performance by extending liner life cycles, optimising liner design and preventing liner failure.

CrusherMapper delivers detailed condition monitoring of crushers. The foundation of both products is a software suite that can provide accurate measurement of liner thickness, weight, and condition of the surface of ore mills, and the forecasting and wear rate modelling on gyratory crusher mantles and concave liners.

It is a development which improves costings and maximises project efficiency.

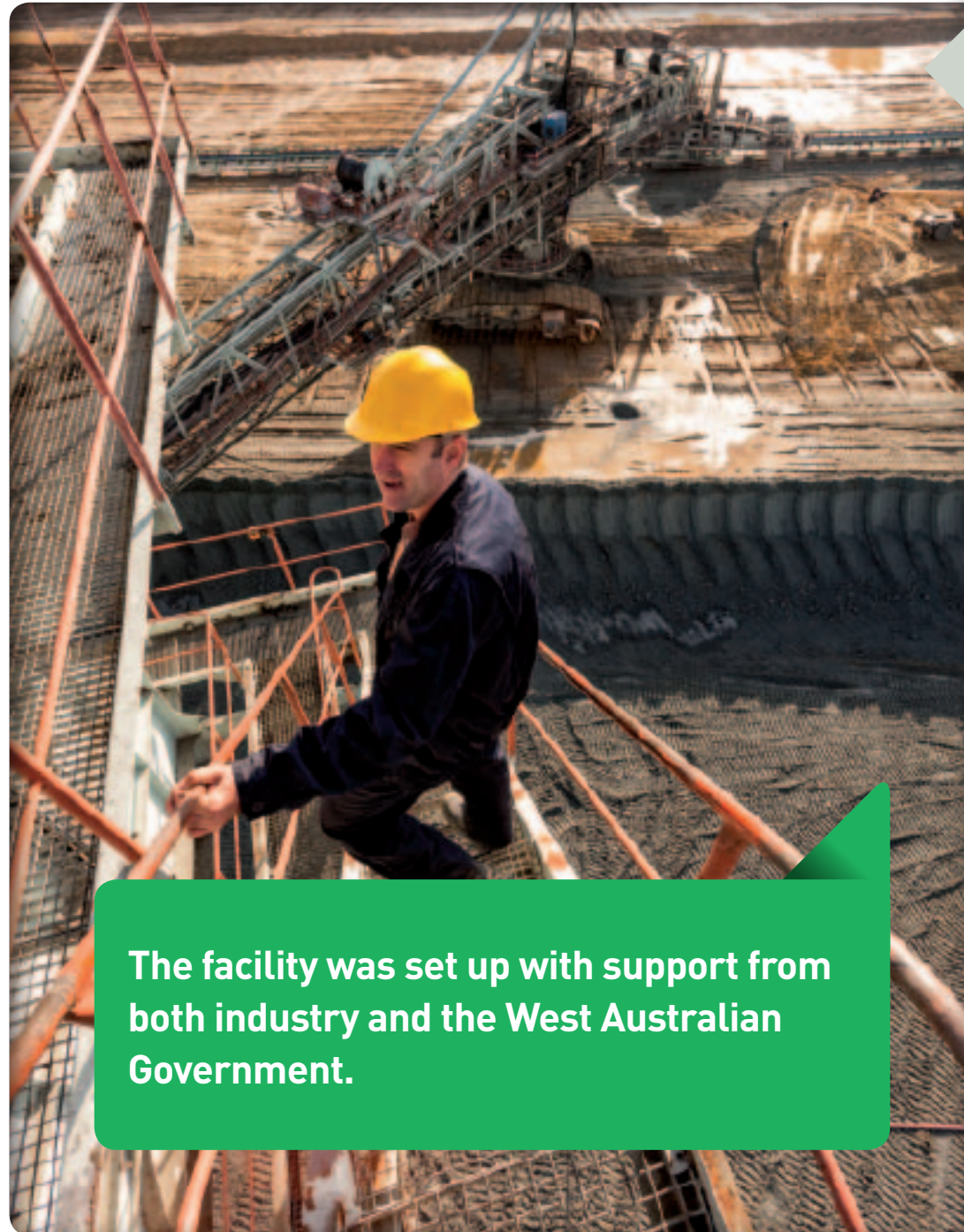
A dynamic testing facility for mine safety

A dynamic test facility has been developed for mine site operations.

The test facility team assesses the testing of rock bolts and other mine supports. The facility is capable of subjecting reinforcing and support systems to standard impact loadings.

The facility has enabled the development of practical energy absorption guidelines for reinforcing systems, face restraint and surfacer support systems used both in Australian mines and Internationally.

The facility has a wide range of industry partners including Harmony, Newmont and Placer Dome and was set up with support from both industry and the West Australian Government.



The facility was set up with support from both industry and the West Australian Government.

40

ATN UNIVERSITY
Curtin

CASE STUDY

A dynamic testing facility for mine safety

DISCIPLINE

Mining Safety

CREDITS

Professor Ernesto Villaescusa

ATN UNIVERSITY
Curtin

CASE STUDY
Seafood products

DISCIPLINE
Food Manufacturing

CREDITS
Dr Janet Howieson

Seafood products

Research biologists have been collaborating with a Japanese company to develop dried seafood products for Asian markets in a move that has the potential to greatly expand the sale of dried seafood products in the region.

The advanced food-drying technology uses a machine that takes only four hours to dry seafoods, compared with the traditional four weeks of drying by sun.

The research, which has recently produced a commercially successful product from West Australian crabs, involves determining which drying 'profile' ensures the optimum quality of the product, and also whether it can enable an extended shelf life.

The research has also been assessing the chemical, sensory and aesthetic quality of a range of potential products for Asia.

As well as Japanese industry partner Kingsun the research is funded by the Australian Seafood Cooperative Research Centre and the Fisheries Research and Development Corporation.

asia

australia

The advanced food-drying technology uses a machine that takes only four hours to dry seafoods.



Fortified Bananas

Supported by a \$10 million grant from the Bill and Melinda Gates Foundation, Australian biotechnology research is increasing the nutritional content of bananas to improve the health of East African nations.

These countries rely on cooked bananas as a staple food, with Ugandans each consuming an average of one kilogram of bananas a day. Some 30 million people in 2013 rely on bananas to stay alive. Without the use of 'biofortification', the technique which uses knowledge of the banana's DNA structure to maximise nutritional content, the bananas remain low in vital nutrients such as iron, vitamin E and pro-vitamin A.

The research has now expanded its footprint to India, in a \$2.8 million partnership with the Indian Government's Department of Biotechnology. This project aims to stamp out iron-deficiency anaemia in India where bananas are also a staple food, particularly in the south of the country. Iron-deficiency anaemia in India is a major cause of maternal death during childbirth.

The research is aimed at developing a widely available iron-rich variety of banana for the Indian market.

Australian biotechnology research is increasing the nutritional content of bananas to improve the health of East African nations.

42

ATN UNIVERSITY
QUT

CASE STUDY
Fortified Bananas

DISCIPLINE
Biocommodities

CREDITS
Professor James Dale

ATN UNIVERSITY
UTS

CASE STUDY
Assistive Robotics

DISCIPLINE
Robotics

CREDITS
Professor Hung Nguyen

Assistive Robotics

Smart wheelchair technology involving "assistive robotics" has been ranked third in a top 100 listing of Australian innovations.

The Centre for Health Technologies which developed "Aviator", is committed to research solutions that can assist people with illnesses and disabilities to achieve greater independence and enhance their lives through greater participation in the community.

The Aviator intelligent technology overcomes the issue of people with physical disabilities being unable to use a powered wheelchair. The system directs and controls the chair's navigation by reading a user's head movements and brainwaves.

The research was challenging, involving work into human machine interaction and robots' sensing and perception of human cues.

It is considered that getting a device or robot to work and interact with people is more difficult than getting a robot to work autonomously. Working with an industry partner, Greystanes Disability, the aim is now to use the same technological approach to other disability aids applicable to different types of disability.

The system directs and controls the chair's navigation by reading a user's head movements and brainwaves.



WHEELCHAIR NAVIGATION
THROUGH HEAD MOVEMENTS
AND BRAINWAVES



RESEARCH WILL
ASSIST PEOPLE WITH
ILLNESSES AND
DISABILITIES TO
ACHIEVE GREATER
INDEPENDENCE

Sitting Pretty

It is Australian research and development that has driven the seat design of the American Tesla Model S high performance electric vehicle.

In partnership with Futuris Automotive (which designs automotive interior components) the Applied Optimisation Group developed a highly efficient computer model that allowed for more than 25,000 simulations; work which normally would have been carried out by time-consuming manual calculation and prototyping until an acceptable solution was found.

The computer model allowed the entire project to be completed in a few weeks – including Futuris building a physical seat model and confirming the optimum result, one 15% more efficient than previous seat system designs, and one providing a competitive advantage for Futuris.

Critical to the modelling was designing the sliding rails which the electronically powered Tesla seats move on. The motors and gearboxes that drive the Tesla seat movements are heavy, and the weight posed a considerable problem to be overcome, so that the resulting design could deliver the movements required by the seat without compromising a high level of comfort, safety and functionality.

Futuris have described the computer model as enabling it to provide novel, difficult and time-consuming developments that it otherwise would not have had the resources, including intellectual resources, to deliver.

The computer model allowed the entire project to be completed in a few weeks including Futuris building a physical seat model.



44

ATN UNIVERSITY
RMIT

CASE STUDY
Sitting Pretty

DISCIPLINE
Automotive Design

CREDITS
Dr Martin Leary

ATN UNIVERSITY
QUT

CASE STUDY

Driver impairment

DISCIPLINE

Public Policy

CREDITS

Emeritus Professor Mary Sheehan,
Professor Barry Watson,
Professor Jeremy Davey,
Dr James Freeman,
Dr Gavan Palk,
Dr Mark King

Driver impairment



**The research
has its emphasis
in influencing
and informing
Government policy
development
through key
strategies.**



Alcohol remains a contributing factor in fatal road crashes, even despite a long-term reduction in its role.

On-going and extensive research into the factors underpinning drink driving and strategies to deal with the problem continue. The research has its emphasis in influencing and informing Government policy development through key strategies.

This has directly contributed to improvements in the policies and practices used by Australian State Governments to continue to reduce drink driving. It is seen as having led to a decline in

the contribution of alcohol in Queensland road fatalities since 2008.

The comprehensive research has led, for example, to the progressive impoundment of vehicles as a sanction for high-range repeat drink drivers in two Australian States; the introduction of alcohol ignition interlocks; an expansion of licence-based sanctions; enhanced random breath testing. Through the research an offender rehabilitation program has also been developed.



Protecting Children

The legal duties of teachers reporting child sexual abuse has differed across Australia.

Research has been undertaken to better understand which reporting methodology and framework works best to enable early detection of child sexual abuse. The research also set out to understand what teachers knew of their legal responsibilities and if they complied with them.

It found a significant failure to report suspected cases and deficiencies in legislation, policy and training which impeded effective detection and reporting. As a result of the research recommendations for law reform, policy and teacher training were developed and many adopted.

Teacher training in two Australian States was reshaped and a training program produced as a way to better protect children and facilitate early intervention in cases recognised, and then reported, by teachers. A survey instrument for teacher reporting was also developed and adopted in Malaysia as well as Australia.



Research has been undertaken to better understand which reporting methodology and framework works best to enable early detection of child sexual abuse.

46

ATN UNIVERSITY
QUT

CASE STUDY
Protecting Children

DISCIPLINE
Law

CREDITS
Dr Ben Mathews,
Dr Kerryann Walsh,
Professor Des Butler,
Professor Ann Farrell



Farming smarter with AgBots

Robots can save the Australian wheat industry \$620 million a year in crop weeding alone.

With industry partner Swarm Farm, robotics R & D has already developed the AgBot, a light-weight golf buggy-sized robot that costs \$20,000, and which can navigate around a 4000-hectare wheat farm using low-cost sensors, targeting weeds while they are still very young plants.

Able to enter fields immediately after rain, which tractors cannot do, the AgBot's ability to eradicate such small weeds leads to the use of far less chemicals, and so can deliver significant savings both financially and environmentally.

Additional research funding of \$3 million from the Queensland State Government

will be used to develop solar-powered farm robots fitted with technology that can tell a farmer, for example, how ripe their crop is. This development will provide significant assistance when planning the harvest.

It is also intended to develop robotic 'scarecrows' to manage the problem that up to 80% of some horticultural crops can be destroyed by birds. Using robotic scarecrows the birds can be tracked and shepherded away from crops.

The advancement of robotics in farming will also allow farmers to save on the labor costs which comprise some 40% of production costs in some farming sectors.

The advancement of robotics in farming will also allow farmers to save on the labor costs which comprise some 40% of production costs in some farming sectors.

Timber Bridges



World leading research into the structural condition of ageing timber bridges is saving Australian Local Governments millions of dollars, while extending the life of many such bridges through a far more reliable assessment of bridge condition than had previously been available.

Local Government is responsible for the operational management and maintenance of more than 20,000 bridges with 80% of them comprising of ageing timber.

The research has led to a novel low cost and simple procedure to provide reliable information on safe load capacity and bridge conditions. This minimises unscheduled costly emergency repairs and overall maintenance costs. Importantly, it has also enabled an understanding of the causes of why deterioration occurs and its rate.

Reliable assessment of a bridge's state requires not only a discovery of damage, but also the determination of the effects of the damage on structural integrity. The research accomplishes both.

Traditional load testing had cost some \$5000 a bridge span and with uncertain results on a bridge's safety. The new procedure costs some \$850 a span with significantly increased safety reliability. This is allowing bridge life extension by targeted repairs at 10–20% of bridge replacement costs.

This minimises unscheduled costly emergency repairs and overall maintenance costs.

48

ATN UNIVERSITY
UTS

CASE STUDY
Timber Bridges

DISCIPLINE
Transport

CREDITS
Emeritus Professor Steve Bakos,
Professor Keith Crews,
Professor Bijan Samali,
Associate Professor Jianchun Li

Novel Contact Lens

Myopia – being short-sighted – is a common visual disorder. In developed countries, myopia is currently the fifth most common cause of registered blindness.

The risk of myopia increases if parents are myopic; and with the amount of near work done. Ethnicity also affects myopia risk; with Asians have significantly higher rates of myopia than Caucasians.

In simple terms myopia is the result of the eye growing too long, with the result the images of objects are focussed in front of the retina rather than on it.

Wearing contact lenses has not been successful for many sufferers of myopia. Confined to wearing hard contact lenses which for many has created eye irritation

and so cannot be used, this has negatively impacted the ability to play a range of sports as well as affecting other lifestyle factors.

A novel contact lens has now been developed that overcomes issues of the hard lens and is successful in managing myopia. Researchers have discovered the relationship between near work, the forces applied to the eye by the eyelids and myopia. The developed contact lens includes a region that disperses forces applied to the eye by the eyelid. This controls the eye growth responsible for myopia by removing the forces which cause it.

In simple terms myopia is the result of the eye growing too long, with the result the images of objects are focussed in front of the retina rather than on it.

Counting the homeless

Helping the homeless, a national and international issue, requires knowing who and how many there are.

Before 1999 in Australia there was no such information. By the 2006 census it was revealed that on any given night there were 105,000 homeless across Australia.

Research has since used the census information to assist the Australian Bureau of Statistics provide trend analysis of the size and characteristics of the homeless population. Without such information Governments and welfare agencies cannot provide appropriate support or develop the required policies to assist the situation.

The research has established local information on the social characteristics and geographic spread of the homeless. It has had a significant positive impact on the quality and quantity of services offered.

The research is used by every Australian State and Territory to guide the allocation of services, such as better housing and support for homeless youth aged between 12 and 18. The work is recognised for being partly responsible for a decrease in youth homelessness and for the early intervention programs now delivering support. Its results also guide Government policies that set targets to reduce homelessness.

Research has since used the census information to assist the Australian Bureau of Statistics provide trend analysis of the size and characteristics of the homeless population.

50

ATN UNIVERSITY
RMIT

CASE STUDY
Counting the homeless

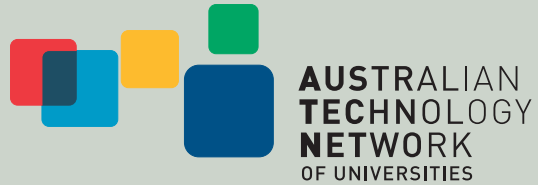
DISCIPLINE
Community Service

CREDITS
Professor Chris Chamberlain
(Director, Centre for Applied
Social Research)
Associate Professor
David MacKenzie
(Institute for Social Research,
Swinburne University)

BY THE 2006 CENSUS IT WAS REVEALED THAT ON ANY GIVEN NIGHT THERE WERE

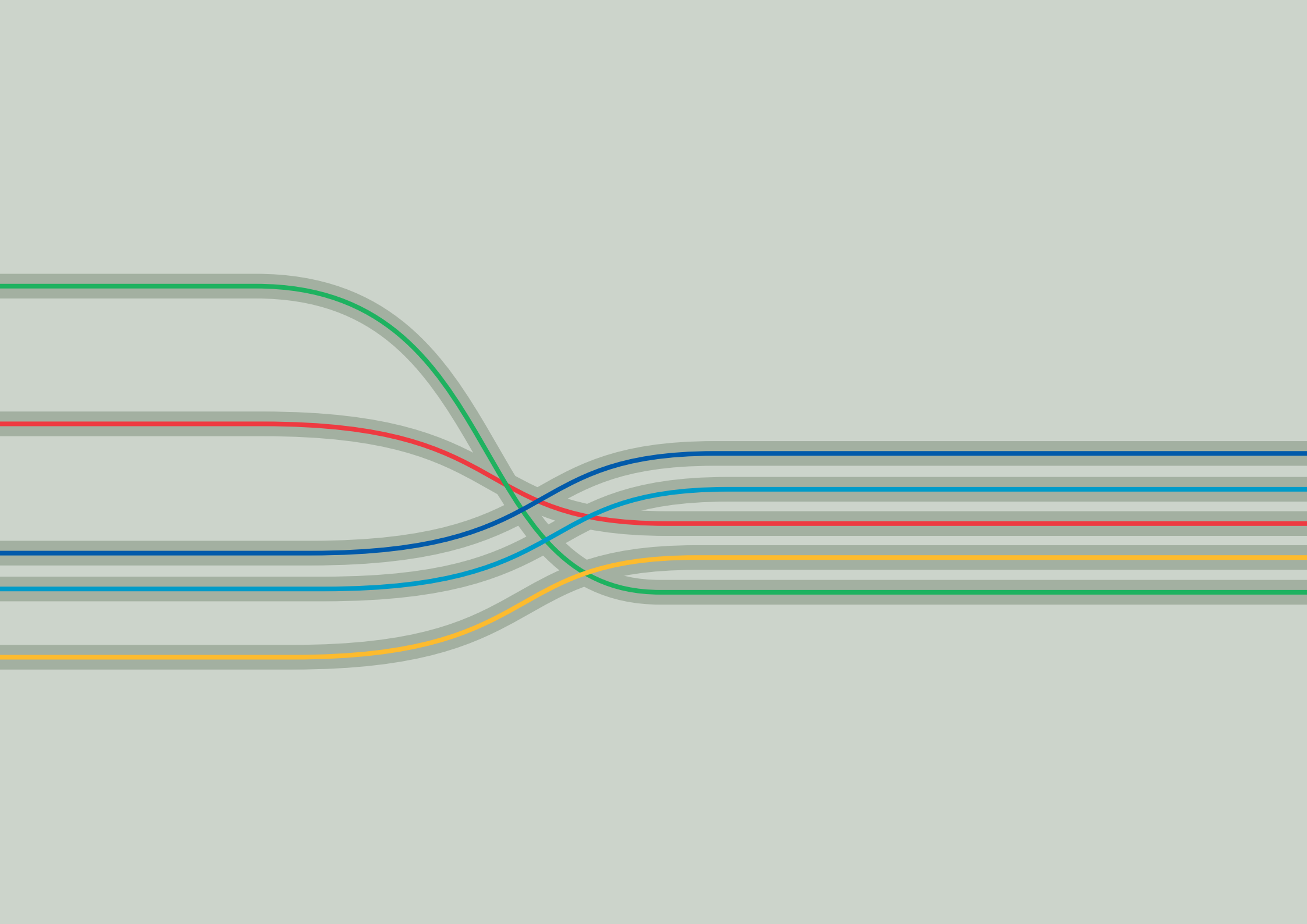
105000

HOMELESS ACROSS AUSTRALIA



The Australian Technology Network of Universities brings together five of the most innovative and enterprising universities in the nation: Curtin University, University of South Australia (UniSA), RMIT University, University of Technology Sydney (UTS), and Queensland University of Technology (QUT).

ATN universities teach over 200,000 students, or almost 20% of Australia's student population. With 1 in 4 international students choosing to study at an ATN university, we are also the largest provider of international education, both with our onshore and offshore students.





FOR MORE INFORMATION

www.atn.edu.au
telephone – 61 8 8302 9107
email – vicki.thomson@atn.edu.au
Australian Technology Network of Universities
GPO Box 2471, Adelaide 5001
South Australia

