

New safety tests for recycled water

With recent government regulations aimed at increasing the reuse or recycling of waste water, particularly by industry, it's important that businesses and their customers are confident of the water's safety.

To this end, a team of Macquarie University scientists is developing a suite of tools to rapidly and accurately identify potentially dangerous

pathogens or micro-organisms in a range of waste water sources.

Dr Belinda Ferrari leads the Water Pathogen Team at Macquarie, which comes under the umbrella of the multi-organisation Environmental Biotechnology Cooperative Research Centre (EBCRC).

Traditional contamination detection relies largely on laboratory-based

methods which are too slow and too expensive for routine use in the field.

"Our aim is to get rapid, one-day turnaround, results targeting specific organisms," says Ferrari. "Our focus so far has been on *Cryptosporidium* and *Giardia*, and we're developing the platform technologies to those organisms, and then we should be able to adapt them for any other pathogens that are out there."



Already a prototype is being developed for the first of these tests - a simple dipstick test for the bacteria *E. coli*, which will take less than half an hour. More complex, but still rapid, laboratory-based tests will help users get an idea of what numbers are present and whether they have the potential to be dangerous to humans.

These second-tier tests use a range of new biotechnologies, including nanotechnology, flow cytometry and quantum dots.

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Education expert urges delay on tests

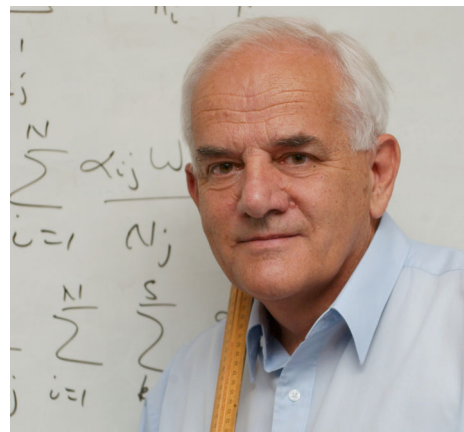
An education expert from Macquarie University believes the Federal Government should delay the introduction of its new national testing regime in schools by 12 months to ensure its quality.

Professor George Cooney of the Australian Centre for Educational Studies at Macquarie recently prepared a report for the NSW Government, looking at its current system of assessments.

"The purpose of the national reform of literacy and numeracy testing is to achieve greater curriculum consistency in what is taught and assessed and in

how student achievement is reported," Cooney says. "My concern with the national reform agenda is not with what is occurring but with the process. The keys to any reform are adequate planning, adequate resources and adequate time for implementation, but current national initiatives have been developed in a piecemeal fashion.

"Best practice in test development is curriculum first, and then the test and reporting standards. With the current national initiatives, these have been developed separately by different groups, resulting in a lack of coherence between the three components."



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Brain imaging lab first of its kind

Australian researchers will gain new insights into how the brain works thanks to the world's first multi-million dollar Australian Research Council (ARC) funded child and adult magnetoencephalography (MEG) brain imaging laboratory, which will be housed at Macquarie University.

MEG measures brain activity by detecting the weak magnetic fields produced when groups of neurons in the brain fire electrical impulses. It allows direct, non-invasive measurement of both the intensity and location of brain activity, and will further research into schizophrenia, autism, dyslexia and auditory processing.

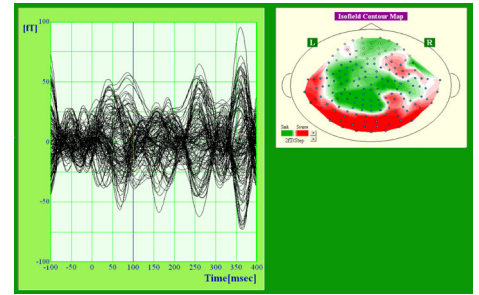
"The use of MEG in cognitive science is very new and a lot of basic behavioural research will be revisited

using this brain imaging technology," says psycholinguist and ARC Federation Fellow Professor Stephen Crain.

Crain's own research, which involves investigating whether children are born with an innate ability to learn language, will also be furthered by the lab.

"Using MEG we will be able to observe the brain's activity as a person is processing language in real time," he says. "MEG provides a very accurate measure of such activity."

Partner institutions involved in the lab include Japan's Yokowaga Electric Corporation and Kanazawa Institute of Technology, as well as local universities Newcastle, Swinburne, ANU, Melbourne and Auckland.



These images, taken with MEG, show (at left) the magnetic waves generated by millions of neurons acting in synchrony, recorded as a response to auditory input, and (at right) magnetic waves used to provide an indication of the source of magnetic activity in the brain. Images supplied by the Macquarie Centre for Cognitive Science.

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Research faces up to security problems

PhD student in the Department of Computing at Macquarie University, Arnold Zhao Zeng, is hoping to improve electronic security by developing a new authentication system that combines the traditional science of cryptography with the new research area of biometrics.

Biometric systems authenticate users by fingerprint, face or voice as opposed to PINs, passwords or ID cards.



Arnold Zhao Zeng (seated) and Dr Paul Watters.

"Biometrics can improve security because the person needs to be present at the place and time of authentication," Zeng explains. "Also, because it uses your fingerprint or face image, data can't be forgotten."

"Unfortunately, biometric systems like those currently used in airports still have their drawbacks. The data still needs to be stored in a database, which may be open to attacks, and people's fingerprints or face image can be stolen, leading to fakes."

Zeng and supervisor Dr Paul Watters have now come up with a proposed system whereby a person's whole face is captured in a series of images, and converted by a cryptographic key into stable binary form - making the data hacker proof - before being stored.

When the authorised user attempts access from then on, images of just one part of their face are taken, converted into binary using the same key and matched against the original template before access is granted.

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New Defence link

Australian Defence Force members can now complete postgraduate study at Macquarie University through the ADF Higher Education Advanced Standing Scheme (ADFHEAS).

Under the scheme, Macquarie offers postgraduate advanced standing to defence personnel who hold a Defence Graduate Certificate or Diploma.

Programs of special interest to Defence personnel have been identified across a range of the University's departments, and most are taught by distance or flexible block mode.

"This partnership also aligns closely with the new programs offered by our Policing, Intelligence and Counter-Terrorism Centre," says Deputy Vice-Chancellor Professor John Loxton.

More information: Visit www.defence.gov.au/dpe/adfheas/ and go to the 'Universities' section

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