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//////////////////////////////////// KIWI ADVANCED RESEARCH AND EDUCATION NETWORK //////////////////////////////////////  
//////////////////////////////////// ISSUE 03 // JUNE 2007 //////////////////////////////////////

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Whilst advanced connectivity is our core focus, KAREN will only become essential infrastructure for an innovative New Zealand when it carries compelling content and services.

This is why the National Library's membership of KAREN, signed on 22 May, is so exciting and important. KAREN will enable the National Library, and potentially all the libraries of New Zealand, to bring Kiwi global knowledge networks to every citizen and, importantly showcase New Zealand digital content and New Zealand stories to the world.

The National Library today has far more virtual customers than physical ones. Rich digital content is rapidly

supplementing text as a knowledge format - and far outstripping it in terms of data volumes. Without the unrestricted bandwidth that KAREN offers, sharing this knowledge would be almost impossible.

As the National Library also plays a leading role in many global collaborations and development, its KAREN connectivity will allow it to operate seamlessly with its international partners as never before. Knowledge is weightless - with KAREN the National Library can move as much as it wants, almost instantaneously, without usage charges.

For existing members, having the National Library as a member will mean lightning fast access to all of its current collections, archives and the content of the planned National Digital Heritage Archive.

Donald Clark  
Chief Executive



## KAREN on the leading edge

On 22 March REANNZ announced over \$2.6m for ten projects in the first round of the Working Group and Development Fund.

This fund is one of two arms of the Capability Build Fund (CBF) and is designed to help raise awareness and build up use of KAREN and advanced networking techniques.

"We received a great response to this first round of the fund which is a positive sign of the uptake and application of KAREN to support the ongoing development of leading edge research and education techniques," says Donald Clark.

"The successful projects embody the elements key to the future of research – national and international collaboration, and the use of e-research technologies and infrastructure to do this."

"The success of the first round of the Capability Build Fund demonstrates that KAREN members are wasting no time in taking advantage of the

huge increases in capacity and connectivity provided by this essential infrastructure."

In this issue of *hyphen* we have listed all successful projects and showcased two individual projects. Further projects will be included as case studies on our website over the coming months.

The Capability Build Fund is a \$4.5m fund provided by the Ministry of Research Science and Technology (MORST) over three years to 2009 to build KAREN members' capabilities to access and use the network.

Project Lead	Project Name
Professor Sergei Gulyaev, Auckland University of Technology	KAREN: a new window to the universe. real-time trans-tasman e-VLBI (Very-Long Baseline Interferometry)
Professor Allen Rodrigo, University of Auckland	NZ BioGrid - integrated bioinformatics analysis
Jack McKenzie, HortResearch	Who is KAREN and how can she enhance our research collaborations?
Mark Billingham / Nathan Gardiner / David Thorns, University of Canterbury	High quality video conferencing for advancing collaboration capabilities in Access Grid environments
Professor John Gibson, University of Waikato	Using high resolution satellite imagery for spatially integrated poverty mapping
Dr Chris Brown, University of Otago	Integrated genomics resources for health and disease
Cameron Walker, University of Auckland	Storage network planning for KAREN / BeSTGRID
Jason Ingham, University of Auckland	Earthquake engineering over KAREN
Dr Virginia Hope, Institute of Environmental Science and Research Ltd	New Zealand microbiology research and education network
Dr Jerry Cooper, Landcare Research	GeoSciences network – New Zealand node establishment

## Human genome analysis

**KAREN is fast-forwarding New Zealand's participation in world-leading human genomic research and analysis.**

Drs Chris Brown and Mik Black and their team of researchers from the University of Otago's Integrated Genomics Resources for Health and Disease project were recently awarded a grant of \$468,000 from the first round of the Capability Build Fund to utilise the speed and capacity of KAREN to share large amounts of human genomic data with researchers from around the world.

The team decipher genomes. They aim to discover signals that control where and when genes are turned on or off and how this changes in cancer cells.

### Data Integration

The project employs a new integrated approach to decipher this regulatory information and will see variants of the human genomic sequence and related gene expression data combined from databases in the US and Europe utilising advanced networking.

This data will be integrated with NZ generated data, particularly from the Otago Genomics facility. It will be interrogated using techniques developed at Otago, then provided to the international medical and biotechnological research and education community, via the network.

"The easy transfer of large amounts of genomic data was not feasible prior to KAREN. KAREN will enable quicker, better and continuous access to international genetic databases," said Dr Brown.

Dr Brown says, through enabling better communication and data sharing amongst New Zealand scientists, KAREN will greatly enhance the contribution New Zealand researchers can make to the global enterprise of understanding the human genome and its role in disease, particularly cancer and genetic disease.



Dr Chris Brown and Dr Mik Black

### Middleware Development

The project will develop and implement middleware to enable processing of this critical human genetic data.

Dr Brown and his team will then share their expertise in using the technology, by creating virtual workshops featuring New Zealand and international researchers working in this field. These workshops will also provide exemplars of utilising the middleware for educational purposes.

### Bioinformatics

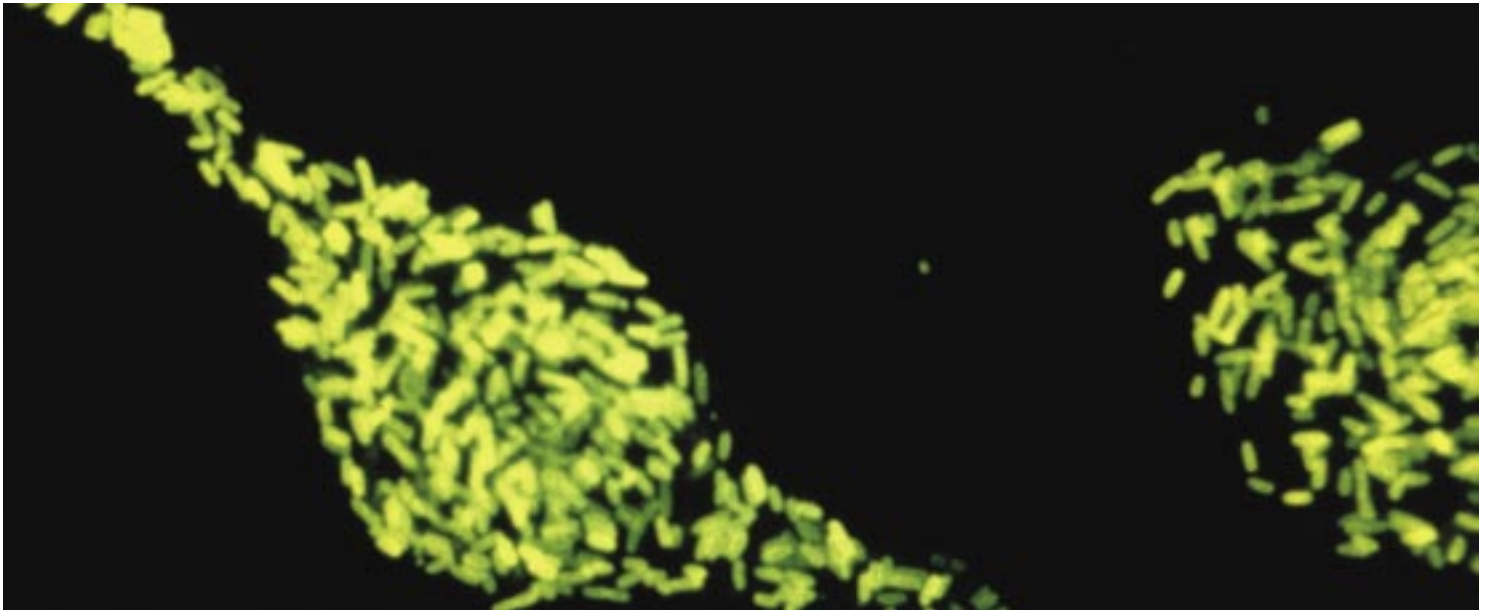
This project is taking place within the field of Bioinformatics – the science required to capture, store and comprehend large amounts of biological data, such as the three billion base sequence of the human genome. Bioinformatics is a discipline that occurs at the intersection of biology, mathematics and computer science

See <http://mrna.otago.ac.nz/Bioinfo/RegulatorymRNA.htm>



The Affymetrix machine (top) was recently installed and can analyse 500,000 individual variations from a sample of human DNA on a gene chip (bottom)

## ESR has finger on the pulse



Salmonella bacteria. Image courtesy of Centers for Disease Control and Prevention

### ESR (Environmental Science & Research) is taking a leading role in microbiological research in the Asia Pacific thanks to a Capability Build Fund grant.

Funding of \$320,000 has been awarded to ESR to assist them to establish portals for microbiology research and education in NZ and the Asia Pacific region.

#### Asia Pacific Presence

PulseNet Aotearoa New Zealand is initially focusing on the three most common notified bacterial diseases in New Zealand - *Campylobacter*, *Salmonella*, and *E. coli*.

Dr Virginia Hope, Programme Leader at the National Centre for Biosecurity and Infectious Disease at ESR and the project leader, says that the PulseNet Asia Pacific portal (PNAP) will connect New Zealand researchers to expertise at major international research laboratories.

"Our connection to PulseNet will enable New Zealand to research infectious disease in new ways. For example, we

will be able to undertake laboratory and computer analysis via live, interactive video microscopy, where analytical tests are performed under guidance of experienced scientists, rapidly and without compromising containment issues. We will also be able to consult in real-time across a number of sites on the next research steps and to transfer techniques and methods."

"Initially New Zealand was not able to be involved with the PulseNet Asia Pacific project due to poor connectivity. However with KAREN we now have the opportunity to be the hub for the Asia Pacific region. New Zealand researchers will be able to access the International PulseNet network, not only as an equal partner, but with a leadership role."

#### Collaboration at Home and Abroad

PulseNet will also mean access to international funding, including the possibility of direct funding from Asia Pacific participants of the PNAP portal and also through access to international research funds in USA, Europe, Japan and elsewhere.

At the same time, a parallel New Zealand Microbiological portal will be established making use of the same architecture, activities and resources. This portal will focus on training and education of New Zealand researchers and students, and collaborative projects within New Zealand.

"We have an amazing wealth of talent in New Zealand in the field of microbiological science. KAREN will enable us, through the New Zealand Microbiological portal, to tap into and share this talent much more readily," said Virginia.

#### More about Pulsenet

PulseNet is an important international microbiological laboratory network instigated by the US Centers for Disease Control (CDC) to develop worldwide regional networks providing early warning on food borne disease outbreaks, emerging food borne infections, and acts of food bioterrorism.

See [www.esr.cri.nz/capabilities/PulseNetAotearoa.htm](http://www.esr.cri.nz/capabilities/PulseNetAotearoa.htm)

## Profile: Dr Jim Watson, REANNZ Board Chair



Dr Jim Watson

**Jim's extensive experience in the research and innovation sector provides the strategic direction required to ensure the success of KAREN as essential infrastructure for an innovative New Zealand.**

Until recently Jim was the chief executive officer (CEO) of Genesis Research & Development Corporation - a position he held for 10 years. Jim is now in the process of establishing a new renewable energy company Biojoule Ltd. The

company is a spin off from the Genesis plant projects, projects that utilise shrubby willow to produce ethanol and unsulphonated lignin, the first of which is a carbon-neutral sustainable transport fuel that can easily be substituted for petrol, and the second provides a sustainable raw material for production of various high value resins and plastics.

It was Jim's experience in setting up new companies that made him a good choice as Chair of REANNZ. Jim joined REANNZ in August 2005, providing strategic leadership during the implementation of REANNZ and KAREN.

Jim recalls a defining moment for KAREN: "In 2003 the Director of the US National Science Foundation, Dr Rita Colwell, visited New Zealand to present at the Knowledge Wave conference. During her visit she took the opportunity to praise our great scientists and great science but at the same time criticise the lack of fundamental infrastructure to support science and research. Her comments struck the right chord at the right time and cemented the creation of our own advanced research and education network".

"The opportunities for New Zealand researchers and scientists are

limitless now that KAREN is live and able to be utilised. KAREN allows the international exchange of information and collaboration between large groups all over the world at a speed and capacity that was previously unprecedented in New Zealand."

"Almost all of our foundation members are now connected and are beginning to understand and use the tools and activities KAREN enables. The National Library's signing last month brings us another step closer to full core membership."

"The challenge now before REANNZ is to build the breadth and depth of user capability and implement new services to add value to our offering to ensure that uptake and use of KAREN continues to grow in an exponential way. As the Chair of the REANNZ Board I relish the opportunity to be actively engaged in challenging and setting strategy to ensure we achieve this."

Jim was previously a director of the Foundation for Research, Science and Technology, a member of the Growth & Innovation Advisory Board and President of the Royal Society of New Zealand. He is currently Chair of the National Science Panel of the Royal Society.

## Principals on tour

**On Thursday 8 March, Victoria University of Wellington hosted a group of 40 principals of secondary schools in the Wellington region on their second annual Innovation Tour. The theme for 2007 was *Creativity with Digital Media*.**

The tour included an Access Grid session with the University of Canterbury. Nathan Gardiner from Canterbury's HIT Lab gave a short presentation on the history of the Access Grid advanced video conferencing, and answered questions from the principals. Associate Professor Jenny Neale of the School of Social and Cultural Studies concluded

the session with a personal account of how the Access Grid has helped the Building Research Capability in the Social Sciences (BRCSS) network to collaborate with other sites across New Zealand.

The principals' tour also included the Malaghan Institute for Medical Research, local digital media companies CWA New Media and Sidhe Interactive, and Positively Wellington Business's Creative HQ incubator.

The tour concluded at Te Papa with the official launch of the Wellington Loop, a dedicated broadband fibre network for schools.



Nathan Gardiner from HIT Lab at the University of Canterbury talks to the principals in Wellington via the Access Grid

## The MUSHy future of New Zealand’s high speed networks

Chris O’Connell and his company RadaR Guidance are actively involved in encouraging broadband deployment. Chris believes the spread of open access fibre optic “MUSH” networks around New Zealand may provide the perfect “final mile” connection for KAREN members.

“Perhaps when the history of this digital decade is written, it will record how parallel strands came together in New Zealand’s ICT infrastructure. One of the most exciting but as yet unheralded trends is the deployment of open access fibre optic networks throughout the country by organisations such as local bodies, electricity lines companies and other organisations,” says Chris.

Collectively these are often referred to as MUSH networks, with MUSH representing the initial anchor tenants on such a network:

- M - Metropolitan (Local Government and utilities)
- U - Universities (including other tertiary institutions and research organisations)
- S - Schools and educational organisations
- H - Healthcare (including Hospitals and other health providers)

“What they have in common is a need for the fastest possible connections and vast data transfer requirements. The best way to achieve this is through open access fibre optic networks.



Chris O’Connell, RadaR Guidance

Traditionally, fibre networks have been expensive and scarce. That was often due more to telecommunications business models than the actual costs.

“New Zealand’s first open access network was started 11 years ago - Wellington’s CityLink; it has now been joined by networks including Auckland, Hamilton, Palmerston North, Nelson Marlborough and Christchurch. More networks are proposed for Whangarei, Bay of Plenty, Dunedin and Southland.

“I have helped drive the Nelson Marlborough initiative. This includes a strong relationship with our Economic

Development Agencies and with Nelson Marlborough Institute of Technology (our local tertiary institution.) Their need to link two campuses originally bought the network to my home region of Marlborough. This has now been extended by the formation of a local ‘Advanced Network Users Group.’ Their input has seen several Crown Research Institute locations included in the network build.

“Nelson Marlborough is the first regional network where KAREN members can now enjoy high-speed connectivity. We think it’s also a model for other regions.”

## Changing places

In what was a sad occasion for the KAREN community, REANNZ farewelled Development Manager, Charles Jarvie in April. As Development Manager, Charles was leading the charge in building relationships with other networks, government agencies, and user communities as well as identifying

### strategic middleware and other capability build projects.

Charles was implementation manager, then acting chief executive in the early days of REANNZ, and was instrumental in taking the project from its earliest conceptual stages through to successful implementation. Charles is now head of

Technology and Operations for Telecom’s international division.

The departure of Charles coincided with the coming of age of the operational phase of our organisation. With this in mind we have revisited the skills and knowledge of our team and are in the process of recruiting new staff.

## da Vinci notebooks online



Statue of da Vinci, Florence, Italy

**The British Library has digitised an impressive range of resources, collections and other valuable content making them accessible and available online as part of the Library's strategy to build a digital research environment.**

Two of the most fascinating additions to the Library's digital collection are Leonardo da Vinci's notebooks - the Codex Leicester and the Codex Arundel.

The notebooks are made available online via the British Library's application 'Turning the Pages', which allows you to move and turn the pages as well as zoom in and rotate them.

The notebooks and the Turning the Pages application are examples of the kinds of projects being enabled and online content being made available through advanced research and education networks.

The British Library's digital strategy is enhanced by JANET, the UK's advanced research and education network. The broad take-up of JANET in the UK (18 million end users) means the Library is able to reach an audience of unprecedented size.

Both notebooks are freely available at the British Library website for the next few months.

See [www.bl.uk/onlinegallery/ttp/ttpbooks.html](http://www.bl.uk/onlinegallery/ttp/ttpbooks.html)

## R&D co-operation boosted

Through REANNZ's international partnership with Taiwanese network, Taiwan Advanced Research and Education Network (TWAREN), and Singaporean Network, SingAREN, KAREN members now have improved access to their peers in these countries. KAREN recently signed Memoranda of Understanding with TWAREN and SingAREN confirming peering arrangements, and as a result widening the reach of KAREN and speeding up access to international collaboration partners in these countries.

Peering is an interconnection of separate networks or groups of networks allowing the exchange of traffic between network customers.

"We are so happy to see that the peering between us has been completed. The success of this first step is so encouraging. We are looking forward to having more collaborations including VoIP and measurement technologies in the future," said

Li-Chi Ku, Assistant Engineer, TWAREN National Center for High-performance Computing.

"SingAREN is pleased to peer with KAREN to facilitate seamless collaboration between researchers from the two communities as we move towards Global Research Collaboration," said Francis Lee, president of SingAREN.

"New Zealand has excellent trade and science relationships with both Taiwan and Singapore. For New Zealand researchers, the improved access to partners in both these important countries will support deeper collaborations that will help ensure this country stays at the leading edge," said Donald Clark.

KAREN is also currently peered with the following networks/institutions:

- AARNET (Australia's Academic and Research Network)
- ESnet (Energy Sciences Network)

- PNW Gigapop (University of Washington)
- Abilene (Internet2)
- GEMnet (Nippon Telegraph and Telephone Corporation (NTT) Service Integration Laboratories)
- National Lambda Rail
- Transpac (Indiana University)
- CSUNET-NE (California State University Network)
- CENIC (Corporation for Education Network Initiatives in California)
- CANARIE (Canadian Advanced Network and Research for Industry and Education)
- LosNettos (Los Angeles Regional Network)
- KREONet (Korea Research Environment Open NETWORK)

## Building KAREN Communities for Collaboration

### Event Update

2 -5 July 2007

**Building 109  
(General Library Lecture Theatre),  
Auckland University, Princes Street**

The heart of KAREN as essential infrastructure for New Zealand is the development of a cultural centre that supports knowledge communities collaborating and communicating across disciplines, distances and cultures. The July forum is the first national event designed to bring the heart of KAREN together and to host important international guests.

The KAREN community involves multiple and diverse partnerships among academia, industry and government; these sectors will be well represented at the forum. The programme has been designed to reflect the diversity of disciplines involved and provides plenty of time for special interest groups to meet for discussions. We are drawing from international experience as much as possible to keep up with activities and directions being taken in the world of advanced networking and adapting them to our unique situation.

International guests include ex-pat New Zealander and aptly named 'father of the Grid', Ian Foster, who will be elaborating on the notion of collaboration through discussing ideas underpinning grid technologies including those from distributed computing, object oriented programming, cluster computing, and web services. Other international speakers will cover co-ordination of shared resources, approaches to collaboration platforms, access to funding and benefits brought to institutions through advanced networks.

The focus discipline for this forum is bioinformatics and sessions have been designed for researchers and scientists in this area to progress discussions started at earlier gatherings. The alternate streamed session will cover general strategies to encourage KAREN



enabled projects and also the CineGrid "Grand Challenges" with potential application in the fields of professional media, remote collaboration, distance learning, live entertainment, scientific visualization, tele-medicine and telepresence.

Check out the full programme and list of speakers at <http://www.karen.net.nz/forum-programme/>. Our aim is to provide something for everyone with practical demonstrations of readily adopted techniques and applications.

If you would like to make a last minute registration, you can do so by emailing [julie.watson@reannz.co.nz](mailto:julie.watson@reannz.co.nz) detailing the sessions you would like to attend. Registration is a flat fee of \$100.



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## Events 2007

### June

**27 - 29 June**  
eResearch Australasia 2007,  
University of Queensland in Brisbane

### July

**2 - 5 July**  
Building KAREN Communities for  
Collaboration, Auckland

**10 - 13 July**  
QUESTnet 2007 Conference, Cairns

### August

**27 - 31 August**  
24th APAN Meeting, Xi'an, China

### September

**9 - 13 September**  
High Performance Computing Asia 2007,  
Seoul, Korea

**10 - 13 September**  
UK eScience All Hands Meeting,  
Nottingham, UK

### October

**7 - 9 October**  
Third International Conference on eSocial  
Science, Michigan, USA

**8 - 12 October**  
Australian Partnership for Advanced  
Computing (APAC) 07 Conference, Perth,  
Western Australia

**17 - 19 October**  
GridNets 2007, the First International  
Conference on Networks for Grid  
Applications, Lyon, France

### November

**8 - 9 November**  
IMS Global Learning Consortium,  
Queenstown

### December

**10 - 13 December**  
MODSIM 2007, the International  
Congress on Modelling and Simulation,  
Christchurch