



KAREN Compendium 2008

eResearch and Education in New Zealand

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About this document

This inaugural KAREN Compendium covers the first two years of KAREN's operation, from December 2006 to December 2008. This document will be released every 6 months as a companion to the KAREN Members Technical Report. You can find these documents at www.karen.net.nz/publications/

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Introduction

The Kiwi Advanced Research and Education Network (KAREN) has been live for over two years now. Core members, New Zealand's universities, Crown Research Institutes and the National Library, have connected at different times through this period and have varied levels of use and uptake. Our experience has shown that the level of uptake depends on a number of factors including research cycles, infrastructure and equipment procurement cycles, professional development and training, project funding, and awareness, time and motivation to adopt new technology. At this early stage the examples of use, case studies and progress we are observing is encouraging.

REANNZ actively supports capability and community building through a range of activities. The Government's Capability Build Fund has largely been distributed toward a range of eResearch projects and support for smaller events and travel opportunities. A component has been set aside for institutional capability building and developing a network of active KAREN Champions across our core members.

KAREN's membership base expanded during 2008 with institutes of technology and polytechnics connecting through the KAREN Experience Programme and schools participating in the National Education Network trial.

Content and Service providers are being approached on an opportunistic basis as connections are made between KAREN community members and their content and service needs.

REANNZ has ongoing communications programmes through the KAREN website, wiki, newsletter, outreach activities and events.

This document showcases exemplar projects and activities happening throughout the KAREN community around the use and development of KAREN enabled information and communication technologies for education research and innovation.



Summary

New Zealand's education, research and scientific community has made steady and stable progress in integrating KAREN into their activities over the last two years and are beginning to realise the benefits of this investment.

The case studies in this document show that KAREN enabled tools, techniques and services are being used to conduct new and experimental science, extend existing research, and undertake work that could not be done otherwise. And the follow-on benefits? From leading scientific inquiry, attracting and retaining talent and improved productivity, these opportunities are bringing increasing value to our members and indeed the country.

From an application perspective, high definition video conferencing is by far our members' most popular KAREN tool. Users from the smallest, most remote school to the largest research institute are using a wide variety of desktop and stand-alone video conferencing solutions to engage with international science collaborators, share scarce resources and exchange ideas with peers. Uptake and value continue to grow as the community of video conferencing users thickens.

Our second birthday in December 2008 brought with it a new milestone for KAREN when total traffic volume on the network reached 730 Terabytes for the month (the equivalent of 175,000 DVDs). This record high was the culmination of a general trend in traffic growth over KAREN – a trend that is continuing into 2009 as our community expands and members further embed KAREN into their activities.

We look forward to bringing you new and exciting case studies of KAREN use in the next edition of the KAREN Compendium.



Case studies

Science and Research

Sheep gene mapping programme (AgResearch)



AgResearch's role in the International Sheep Genomics Consortium (ISGC) has been strengthened through their ability to participate on an equal footing with international research partners using KAREN. Researchers at AgResearch are sequencing and assembling the sheep genome creating a database of over 100GB of raw

sequencing data, for the purpose of creating healthier and more productive sheep. Prior to KAREN, each organisation had to keep separate databases. Now, a single database, hosted by AgResearch, is possible, making data available to international researchers in an accessible and consistent format. Trends toward international consortium based research like ISGC make KAREN essential for high capacity data transfer between researchers around the world.

"The scale of the ISGC collaboration has brought significant cost savings to all organisations involved, largely due to reductions in the duplication of efforts and resources. And as new technology comes onboard, as KAREN did for us recently, we will see the costs of genome sequencing dropping even further," AgResearch Senior Scientist, John McEwan has commented. For more see www.karen.net.nz/sheep-gene-map/

Collaborative electron microscopy (AgResearch)

AgResearch is using KAREN to enable remote use of its transmission electron microscope (TEM), facilitating the same kind of successful, efficient and task-specific dialogue that occurs when a user and machine operator sit in front of an instrument together. Remote users and research collaborators will be able to access real-time high-quality digital microscope images, while conversing naturally with the TEM operator using video and voice systems on their desktop. They will also be able to use a shared whiteboard.

Remote diagnostics for biosecurity (Plant and Food Research)

Dr David Teulon, entomologist at Plant and Food, received a grant from the REANNZ Capability Build Fund to develop biosecurity systems to deploy over KAREN for real-time remote identification of invasive pests and diseases. This innovative application will enable real-time identification of potential biosecurity threats and collaborative knowledge sharing between New Zealand and international experts.

PulseNet Asia Pacific portal (ESR)



Researchers at ESR are taking a leading role in microbiological research in the Asia Pacific through hosting an Asia Pacific portal for common bacterial diseases. Having the ability, through KAREN, to participate in the international microbiology laboratory network, PulseNet Asia Pacific, means access to international expertise, data and resources and the potential for funding from international research funds.

A parallel New Zealand Microbiological portal is being established by ESR researchers, making use of the same architecture, activities and resources. This portal will focus on training and education for New Zealand researchers and students, and stimulate collaborative projects within New Zealand. For more see www.karen.net.nz/esr-pulse/

Seismographic information service (GNS Science)

GNS Science's collaboration with Victoria University of Wellington to share seismographic information over KAREN will benefit teaching and research in this area. This project will provide access to around 3.5 GB per day of continuous high-quality seismographic data through a flexible service-oriented architecture. Researchers and educators, both locally and internationally, will be able to interpret New Zealand's seismographic data over KAREN, with unprecedented speed, volume, and reproducibility.

OneGeology (GNS Science)

GNS Science is contributing to the international OneGeology project, over KAREN. OneGeology will create a dynamic geological map of the world and provide geological information to anyone over the web. This project uses a

distributed data model – dynamic geological map data is stored on a national basis and displayed via a web portal located in France. The local storing of data simplifies issues of data ownership, updating and quality. The high-speed international connectivity provided by KAREN and other research networks is essential for this distributed model, enabling a quality user experience of the map from almost anywhere in the world. For more see www.wiki.karen.net.nz/index.php/GNS_Science

Oceans and Climate Change Research Centre (University of Otago)

This centre being established at the University of Otago will conduct national and international research partnerships in ocean and climate research to provide support training in the Marine Sciences in New Zealand. The centre will utilise KAREN enabled tools and services to share resources and data between the geographically distant centre partners.

Plant Pathogens Group (Plant and Food Research)

Plant and Food Research and University of Auckland scientists collaborating over plant pathogens research are experiencing high speed exchange of 1 terabyte spectrometric files enabled by KAREN.

Bioinformatics Databases (Plant and Food Research)

KAREN provides the high bandwidth capacity needed for bioinformatics researchers to refresh their databases directly from outside collaborators efficiently and cost effectively, in ways that were not practicable in the past.

High Performance Computing (Industrial Research Limited)

Through the MacDiarmid Institute, IRL is a partner in the BlueFern Supercomputing Facility at the University of Canterbury. KAREN enables IRL to move large datasets quickly and easily between BlueFern and desktops at IRL to research functional surfaces, advanced materials and nanotechnology. Such access enables more frequent and larger scale use of supercomputing facilities to support more complex and ground-breaking scientific discoveries and innovations.

SCENZ-Grid (Landcare and GNS Science)

Landcare and GNS Science are working together on the SCENZ-Grid project. Led by Landcare this project will create tools and architecture to provide spatially integrated geoscience information. KAREN has enabled large national





geospatial datasets to be shared across institutions allowing researchers to analyse, model and visualize them using new and innovative technologies. Trends in geoscience research have seen increases in observational data resolution, data volumes and computational needs. These trends inevitably lead to demand for high bandwidth capacity provided by KAREN.

This national collaboration is assembling the building blocks for wider international collaborations through BestGrid at Auckland University, SEEGRID/Auscope in Perth, Australia and GEONGRID in the USA.

Early Warning System for Weather (NIWA)

NIWA's EcoConnect initiative is an integrated environmental forecasting and information system built on advances in physical system simulation models, better use of real-time observing systems, and the power of high performance computing. EcoConnect will rely on KAREN's high capacity bandwidth to deliver forecasts to end users via web services and applications.

High capacity data transfer (Scion)

Scion's researchers rely on being able to share large data sets over KAREN and are investigating projects to take advantage of being able to analyse real-time data and images. Projects relying on KAREN's high capacity bandwidth include data modelling and Nuclear Magnetic Resonance imaging used in biomaterials engineering.

Scientists at Scion are able, using the University of Canterbury's Bluefern over KAREN, to perform image processing on hundreds of gigabytes of wood image data. Processing by BlueFern was completed in two computer days (a task which would have taken three months standard computer time) saving Scion time and money. The high data throughput needed for this high performance computing task would have been difficult on first-generation networks, due to traffic costs and speed restrictions.

Radio Astronomy (Auckland University of Technology)



Radio astronomy receiver

Researchers at AUT's Centre for Radio Physics and Space Research involved in real-time radio astronomy research have been using KAREN to test high volume data transfer that is essential to their research. Radio astronomy needs very high speed data communications, massive data storage,

advanced data processing methods, and ultra precise timing systems - all enabled by KAREN. AUT's researchers are testing the data throughput required between their radio telescope and the New Zealand Supercomputing Centre in advance of their live radio telescope link up with their Australian counterparts in the next couple years. For more see www.karen.net.nz/evlbi/

Virtual collaboration environment for gene mapping (Scion)

Gene mapping researchers at Scion are establishing a virtual distributed organisation between KAREN members. This virtual organisation, MapNet, will be used to develop new research methods, computer-based simulation and prediction tools. Scion researchers will develop a customised eResearch collaboration portal for video conferencing, virtual whiteboarding, data exchange and sharing protocols to improve collaboration between MapNet participants.

BlueFern Supercomputer (University of Canterbury)

KAREN provides the connectivity needed for researchers from New Zealand's tertiary and research institutes to use the BlueFern supercomputer, just as if they were on site at Canterbury. The portfolio of research projects and institutions being supported by the BlueFern is testament to the benefits gained through the quick exchange of large volumes of data and easy access to large scale national infrastructure. For more see www.karen.net.nz/canterbury-supercomputer/

BeSTGRID – eResearch ecosystem (Massey University, University of Auckland and University of Canterbury)



Collaboration at its best - this exemplary project enabled by KAREN, operates as a collegial community drawing research and technical expertise from Massey, Auckland and Canterbury universities to provide leadership in building and maintaining an eResearch ecosystem in New Zealand. BeSTGRID is delivering mechanisms, methods and tools to facilitate collaboration on shared information, sharing of computational resources and online visualisation of instruments and experiments. For more see www.karen.net.nz/bestgrid

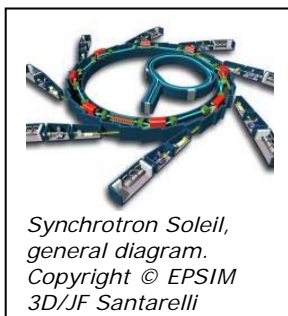


Massey has responded to international trends in scientific research involving large data sets by facilitating access to the Massey computing cluster through the BeSTGRID portal. This computing facility, alongside an array of other high performance computational and data analysis tools, is providing more options for researchers and is speeding up the research timeline.

BeSTGRID partners are creating a BeSTGRID gateway at Victoria University. In response to demands from Victoria's School of Biological Science for access to the Bioportal, part of the BeSTGRID project, a process for sharing resources is being developed – allowing Victoria's staff and students ready access to a toolkit of common bioinformatics tools like BLAST and MrBayes over KAREN.

Researchers from the Department of Statistics at the University of Auckland are undertaking computationally intensive analysis of whole genome association tests. KAREN is currently being used to efficiently and securely transport data between their processors and the BeSTGRID data storage facility. Improved access to BeSTGRID and the sophistication of its infrastructure through KAREN means that the research team will soon be utilising the Auckland BeSTGRID cluster to do more complex and data-heavy analyses.

Shared resources (Massey University)



Massey's investment in the New Zealand Synchrotron Group means its researchers will soon be able to use the Australian synchrotron's beamlines programmed for remote and robotic operation, over KAREN. A key part to harnessing the capabilities of the synchrotron is having the bandwidth capacity to enable real-time, direct access to its facilities and to the data generated from experiments. Using KAREN, the concept of real time manipulation of biotechnology or materials science experiments from a Massey desktop is not far away.

Spatial visualisation and eResearch tools (Lincoln University)

Researchers at Lincoln University are currently working on a project using high resolution laser scanning for spatial visualisation of scale model braided rivers – KAREN enables the researchers to send and receive large datasets to do this. Researchers investigating the spatial yield of tourism are also

evaluating the use of collaboration environments, such as EVO, to support their research. Others in the areas of agricultural sustainability and ecosystems are working with the Lincoln eResearch Steering Committee to identify eResearch tools to enable them to undertake faster, better and different research.

Webcasting science (Te Papa Museum of New Zealand)



Te Papa will deliver high definition streaming webcasts of events of national and international significance over KAREN. Te Papa is home to the world's only complete Colossal Squid and is webcasting activities around the preservation and display of the squid. KAREN enables greater participation from the research community. Over KAREN national and international researchers can contribute knowledge and engage in research to enrich our understanding of amazing creatures like the Colossal Squid. Te Papa's education team also plan to share their many resources with schools and connect with them through high definition video conferencing.

NZ Genomics Ltd (consortium led by the University of Otago)

In September 2008 the government announced funding of \$40million for NZ Genomics Ltd to further develop New Zealand's genomics research capability. Other members of the consortium are Auckland and Massey universities and AgResearch. The funding will support the purchase of state-of-the-art genomics and computational equipment. This level of investment and kind of activity would not be possible without KAREN. Using the capability of KAREN, researchers will be able to capture large amounts of genomic data and then make available the equipment, computer processors, storage and software packages needed to analyse this data. For more see www.otago.ac.nz/nzgl/

Genomics databases (University of Otago)



Otago researchers are accessing, sharing and storing genomic information sourced from repositories around the world in a way that was not possible prior to KAREN. Data is continuously poured into these international databases, then copied or mirrored to individual countries or institutions. Currently the

international 'biomirror' of sequence databases contains ~500 Gb of dynamic data – this data is now able to be downloaded quickly to the University of Otago and mined for key pieces of information. Otago's researchers are using KAREN's international reach to combine human genetic databases from across the world to aid their role in the global enterprise of understanding the human genome and its role in disease, particularly cancer and genetic disease. Resources and services developed as part of this activity are available at the Integrated Genomics portal at Otago. The team also installed the Galaxy sequence manipulation and analysis tool which is available to others over KAREN. For more see www.karen.net.nz/human-genome/

Global lightning observations (University of Otago)



Otago's Physics Department is using KAREN to collect real-time global lightning observations. Researchers at Otago are operating one of the two central processing computers in the World Wide Lightning Detection Network to provide low-cost, real-time global lightning coverage. KAREN is used to send the arrival times of the radio pulses from lightning, to any of the 30 receiving sites on the network. The arrival times from at least 5 receiving sites is combined to determine the true occurrence time of the lightning, as well as its location on the Earth providing incredibly accurate and rich data for research into the effect of storms on the upper atmosphere. For more see www.karen.net.nz/catching-big-lightning/

Bioinformatics Institute – decreasing the distance of data (University of Auckland)

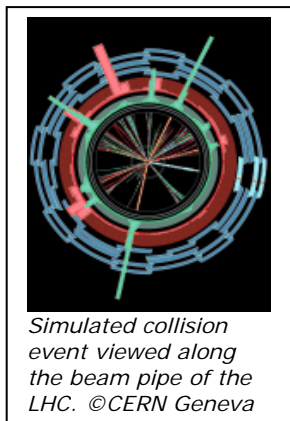
University of Auckland is home to the centre of research excellence in bioinformatics, the Bioinformatics Institute, where timeliness and access to international data sources has been accelerated through KAREN's international connectivity. Vital databases of genetic information, protein structures and biodiversity are being accessed in real-time allowing faster, different and better bioinformatics research to take place at Auckland University. Researchers at the university say that prior to being connected to KAREN their access to the international community was limited and costly, meaning limited or no access to critical databases, as well as to opportunities for collaboration. For more see www.karen.net.nz/bioinformatics-institute/



Earthquake engineering (University of Auckland)

KAREN is making it possible for University of Auckland earthquake engineers to take an active role in earthquake simulation and research being conducted by the USA-based George E Brown Jr Network of Earthquake Engineering Simulation (NEES). This research will inform that design of buildings to reduce the human and financial cost of earthquake damage. KAREN gives the engineers in Auckland University the ability to participate in and remotely direct real-time experiments by NEES in the US through telepresence technology. The University of Auckland earthquake engineering group is participating regularly in videoconference meetings with international colleagues in the UK and US thereby gaining global recognition for their research. For more see www.karen.net.nz/earthquake-engineering/

High energy physics (University of Auckland)



Reversing the brain drain – The University of Auckland is attracting and retaining experts in their field now that they have the ability to participate in international collaborations, using equipment like the Large Hadron Collider at CeERN, remotely from their Auckland base. KAREN is enabling University of Auckland high energy physics researchers to join with Australia to become a joint “Tier-2” computing centre – importing and storing data within hours of it being recorded at CERN in

Geneva. This opportunity is enabling University of Auckland researchers to be equal partners international experts from the 60 other counties who are members of CERN in the search for new particles. For more see www.karen.net.nz/high-energy-physics

OptIPortal - Visualization wall (Victoria University of Wellington)



In 2008, Victoria University built a visualisation facility consisting of 12 LCD rear-projection screens combined in a 4 x 3 display for research and teaching. Transport of large data sets for projection on this screen is enabled by KAREN. Staff are investigating use of the OptIPortal for:

- biological sciences, e.g. confocal microscopy, protein and gene network

- analysis, and sea floor mapping
- earth sciences, e.g. hydrological modelling
 - chemical and physical sciences, e.g. nanotechnologies
 - humanities disciplines like Art History and Classics where visual identification and examination are crucial for research and education.

This scale and definition of visualisation allows researchers to make quicker and more accurate scientific decisions by being able to see and compare multiple data sets. For more see

<http://ecs.victoria.ac.nz/EResearch/OptIPortal>

International collaboration in education (University of Auckland)

Auckland University has created a website for an international eResearch project using the Sakai Virtual Research Environment. The site allows the secure sharing of manuscripts, inventories, and datasets to support international research in education. Researchers in several countries (e.g., Canada, Cyprus, Holland, Mexico, Spain, Israel, Hong Kong, Taiwan, South Africa, Indonesia, & USA) have accessed data and questionnaires over KAREN about students' and teachers' conceptions of assessment without clogging up email accounts or security gateways. Having the project site has enabled quicker dissemination of research to more researchers and allowed the development of international collaborations.

Global Lake Ecological Observatory Network (University of Waikato)

Waikato University is leading a lake ecosystem restoration project to understand the role of toxins in creating the harmful blue-green algae growth in New Zealand's lakes. Large sensor datasets from lake monitoring buoys are stored at Waikato University and accessed by international research collaborators working on similar ecology projects including the Global Lake Ecological Network over KAREN.

Computer science / data transfer (Victoria University of Wellington)

Researchers in statistics, ecological modelling, astrophysics and geosciences are using Victoria's GRID computing facilities for large scale data processing and analysis tasks. Victoria is experiencing the advantages of being a founding member of the BlueFern, University of Canterbury's supercomputer, with staff and students from physics, economics and the McDiarmid unit having ready access to supercomputing time over KAREN.



Next generation teleconferencing (HIT Lab NZ at the University of Canterbury)



Canterbury and the HITLab are champions of advanced video conferencing over KAREN. Video conferencing enriches research collaborations by making it easy for research teams to have regular, low cost, informal meetings. Access Grid and advanced video technologies at Canterbury are being used for research project team meetings, training staff, professional development and teaching.

KAREN has also enabled the HIT Lab NZ to undertake research into bandwidth intensive next generation teleconferencing. For example the 3D plug-in for Access Grid which will allow researchers to share and manipulate 3D models over KAREN providing greater communication between members of a research team distributed over different locations.

Mapping poverty in China (University of Waikato)

Researchers from Waikato's Economics Department and Business Management School are working with teams from the Chinese Academy of Sciences, Stanford and the University of Southern California to spatially map poverty in China. The project team is collaborating using EVO conferencing tool over KAREN. KAREN enables collaboration between partners and access to geographically distributed data, tools and expertise. For more see www.karen.net.nz/nine-mil-pics/

Education

Linking science and education through KAREN (Scion)

Scion has taken an innovative role in linking science and education through its Forests of Life programme. This cross-curricula programme uses an inquiry teaching philosophy to integrate technology into science learning. School students undertake their own scientific research supported by a CRI using advanced video conferencing and collaboration tools enabled by KAREN. The educational model developed by Scion will be available to all CRIs, science providers and high schools over KAREN.

Virtual worlds for education (University of Otago and University of Canterbury)



An avatar at a University of Auckland created meeting space in the ONGENS Virtual World

University of Otago have created a virtual world to investigate the potential of Web3.D and virtual environments for education and research. The virtual world, which makes use of Grid architecture, is hosted on servers at Otago and Canterbury universities, and connected over KAREN.

Access over KAREN means users experience improved performance compared with other virtual world services access over the internet. Better performance means a more immersive experience and more realistic interactions, and as a result better educational outcomes. This initiative also allows NZ researchers and students to take a leading role in the development of Web 3.D technology.

Sign language service over KAREN (Auckland University of Technology)

Using Access Grid technology over KAREN, Auckland University of Technology provides a unique sign language interpretation service to the University of Otago for students who are deaf. KAREN makes the sharing of scarce resources such as sign language interpreters possible, and enables students who are deaf to participate fully in the classroom.

Internationalising education (Massey University)

Massey University's unique collaboration with Singapore Polytechnic has seen the establishment of a campus in Singapore for teaching the final two years of

a Bachelor of Food Technology. Most of the teaching will be conducted by Massey staff using video conferencing technology over KAREN.

Pacific Studies (Victoria University of Wellington)

New Zealand Pacific Post-Graduates are using Access Grid technology at Victoria University for fortnightly interactive video conferencing and collaboration sessions. For the first time Pacific students and staff are able to hold regular virtual meetings to maintain an academic and social network, discuss methodologies and research. Pacific students are experiencing cultural benefits through regular connections to their peers. For more see <http://ecs.victoria.ac.nz/EResearch/VUWCaseStudies>

Education provision expands with video conferencing (University of Canterbury)



The University of Canterbury has been quick to see the benefits of being able to combine expertise with other institutions using advanced video conferencing techniques over KAREN to create exciting new courses. The seafood industry course, run in collaboration with University of Otago, is a good example of how high quality video conferencing can enrich course material by drawing on the resources and expertise of multiple institutions and

providing direct access to industry leaders. For more see www.karen.net.nz/seafood-course/

Canterbury is also the only university in NZ where students can major in Russian. Canterbury is capitalising on their niche position by running a Russian language course using video conferencing to meet demand from Auckland University. This innovation enables universities to share scarce resources and removes barriers based on location, creating richer educational opportunities for students in both islands of the country. For more see www.karen.net.nz/russian-vc/

Midwifery development project (Christchurch Polytechnic Institute of Technology and Otago Polytechnic)

Christchurch Polytechnic Institute of Technology and Otago Polytechnic are collaborating on a project which will use KAREN to support the delivery of a

midwifery programme offered to students throughout the South Island. They will use video conferencing over KAREN to hold regular, informal, low-cost meetings between tutors and midwives for course development. Video conferencing is also being employed to deliver the course, enabling students from remote sites to participate. Collaborative research is another feature of this project which will see Christchurch and Otago polytechnics participating in international midwifery research via online collaboration tools.

Extending service reach (National Library of New Zealand)



The National Library is extending the reach of its services to schools through video conferencing. The library has a wealth of resources and is using video conferencing to share these resources with the National Education Network schools. Video conferencing allows the library to address resource gaps and meet the needs of remote schools that may not otherwise be accessible. For

more see www.karen.net.nz/books-nat-lib/

New Zealand heritage online (National Library of New Zealand and Wellington College)

KAREN is bringing the National Library's digital resources, such as the Manuscripts and Pictorial and Discover websites, to life and making these available as real-time resources for use in the classroom. The speed and reliability of KAREN mean that Wellington College History teachers are exploring the potential of these digital resources to support inquiry-based learning.

Networked services project (Nelson Marlborough Institute of Technology)

Nelson Marlborough Institute of Technology are trialling video conferencing tools for roll-out in 2009 to support the shared delivery of new Diplomas to partner institutes in China. KAREN facilitated links and multi-party bridging capability will greatly reduce the capital and operational expenses. It will also greatly enhance the quality and timeliness of the relationships between institutes, and reduce travel costs. Video conferencing and other real time virtual classroom tools also will be used for distance education to students across the Nelson Marlborough region. Such tools will enhance NMIT's ability



to provide teaching expertise based in Nelson to remote locations across the region and to bring external expertise into NMIT classes.

Moodling across the Pacific (Waikato Institute of Technology)

Waikato Institute of Technology is integrating high definition video conferencing over KAREN into their participation in monthly NZ/US Moodle forums. The focus of these international collaborative forums is to improve teaching and learning using the learning management system Moodle. Wintec's participation in monthly best-practice meetings will be enriched through utilising video conferencing in combination with other tools such as presentations, multi media and virtual whiteboards. For Wintec this activity is the beginning of a drive to build ongoing capability for international video conferencing over the KAREN.

Panopto CourseCast (Waikato Institute of Technology)

Wintec is a member of the Socrates project, a collaborative programme testing lecture capture technology developed at Carnegie-Mellon University at Pittsburg. Because of KAREN, Wintec will be able to participate as an equal partner in this project, sharing high quality best-practice presentations over advanced video conferencing. They will also be able to retrieve and share captured lectures and other learning resources from other Socrates members, enriching the pool of learning resources available to New Zealand students and taking our country's content to the world.

Collaborative multimedia sharing (Unitec New Zealand and University of Otago)

Unitec is collaborating with the University of Otago in developing and sharing podcasts and vodcasts (video) as part of a contemporary music programme. Students will record, share and critique each other's weekly original recordings reflecting on music and interviews with local musicians. This content will be shared on multiple platforms available over KAREN (including iTunes U hosted at Otago University). Students will learn production techniques and build skills in remote collaboration. KAREN will enable the sharing of rich media at a speed and on-demand approach previously impossible without the bandwidth that KAREN provides.





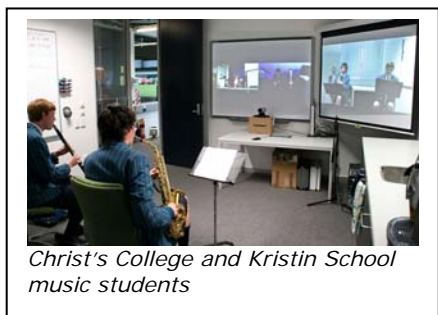
Cross-institution professional development (University of Otago)

Advanced video conferencing and access grid technology is being used by the Higher Education Development Centre at the University of Otago for research into educational approaches and for professional development purposes. The technology gives Otago researchers quick and easy access to their collaborators at Victoria, Canterbury and Christchurch Polytechnic Institute of Technology (CPIT) to discuss case studies on inquiry based learning.

Extending educational boundaries (Kristin School)

Kristin School is utilising KAREN to enhance the education and learning opportunities they offer their students. They are carrying out a number of activities including accessing resources (images, video and people) from universities in New Zealand, Australia, and the United States; showing maps and satellite footage to Geography classes using Google Maps; and collaborating via high definition video conferences with other students around the world. Kristin is also exploring opportunities for professional development, by linking into expertise in overseas schools via video conference.

musicGrid project (Christ's College, Kristin School and University of Canterbury)



Christ's College and Kristin School music students

Christ's College joined with Kristin School and the University of Canterbury collaborative music lessons to demonstrate the benefits of high definition video conferencing. Students from each school participated in a lesson then gave a collaborative performance. Using KAREN

Christ's and Kristin are able to easily access remote resources to provide university-level tutoring and learning to high school students.

Virtual rock concert (Appleby and Hunterville Schools)

Students from Appleby School in Nelson Bays and Hunterville Consolidated School in Manawatu are exploring video conferencing to learn from each other and share stories. Appleby's well-renowned student rock band played a concert for Hunterville students. The students then talked about musical instruments and what it was like to be in a rock band, and also shared stories about their schools. Using KAREN schools are able to expand students' access to novel and exciting learning opportunities.

School science swatting (University of Auckland)

The Liggins Institute at the University of Auckland is extending its schools outreach programme. The Institute ran a seminar series linking students with leading scientists, teachers and their peers to help students prepare for a biology scholarship examination. The series was broadcast to schools via satellite TV and over KAREN to two Wellington National Education Network schools. A wiki, chatroom and conference calls provided the participatory element of the series, enabling the students to ask questions of the scientists. Plans are underway for the next seminar series, which will see real-time interaction between KAREN schools and scientists.





Advanced Video Conferencing

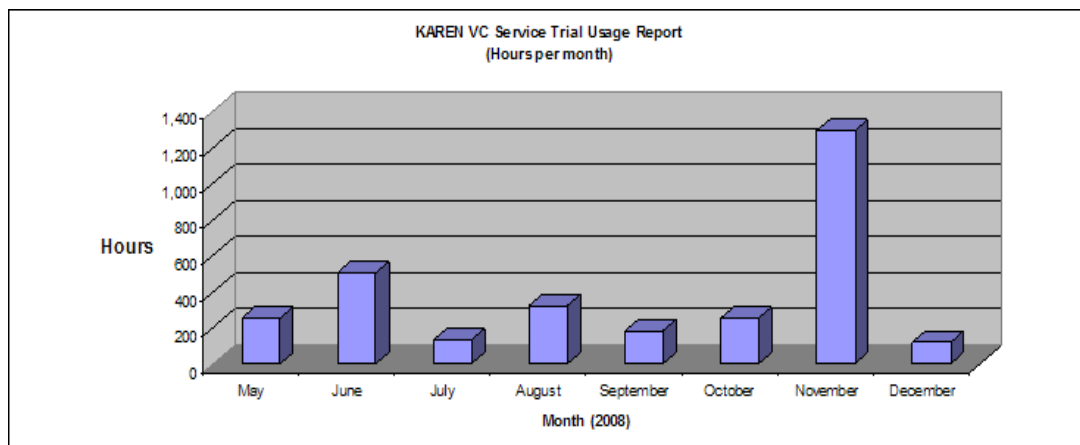
One of the first and most common advanced networking applications taken up by members is high quality video conferencing. Video conferencing brings immediate cost benefits to business-as-usual activities through the reduction of travel costs. Video conferencing tools are also relatively easy to install and operate.



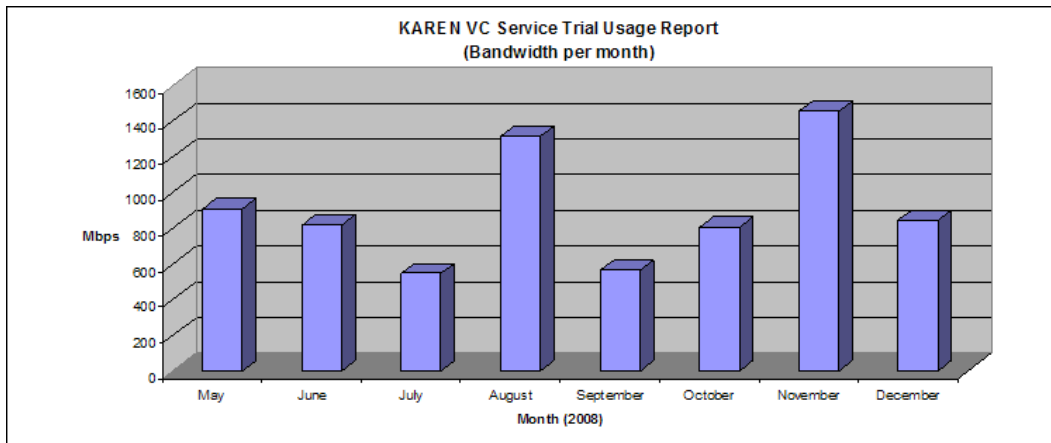
In response to member demand, REANNZ instigated a video conference bridge service trial in 2008. The bridge simplifies video conferencing by enabling video conference tools of various brands and specifications to speak to each other while maintaining the best quality experience

for each participant. The bridge also expands collaboration by allowing multiple parties to meet.

Since testing ended in June, the bridge has been utilised for remote participation in meetings, seminars, and lectures for over 1,850 hours (or 77 days worth).



Bandwidth utilisation continues to grow following early testing. This is a result of increased video conferencing hours but also reflects the increasing number of users, inclusion of content streams in video conferencing sessions and improved tuning of video conferencing tools to make the most of KAREN's capabilities.



KAREN members are using video conferencing to enhance their business-as-usual activities:

Conferencing technology development (GNS Science)

GNS Science is exploring ways to enrich collaborations through developing an automatic installation package for 'evo' (desktop collaboration system) along with a standard webcam package (camera, headset) to allow easy installation of video conferencing tools on staff PCs.

Whole of organisation approach to video conferencing (Industrial Research Limited)

Currently, IRL have two Life Size "Trial" videoconferencing units installed at their Lower Hutt office. IRL will be installing more of these videoconferencing units at their Auckland and Christchurch offices within the year. Their Management and Business development group to utilise videoconferencing as a cost-effective alternative to local and international business travel IRL is also planning to provide videoconferencing desktop software for selected scientists currently engaged in high-end domestic and international collaboration projects.

Accelerating eResearch tool uptake (NIWA)

NIWA is trialling desktop video conferencing tool EVO and other KAREN-enabled eResearch tools. A late starter on KAREN, NIWA is fast-tracking their adoption of eResearch tools by visiting a number of other KAREN users to learn from their experiences. NIWA are investing significant time and resources in developing EVO software to suit their collaboration needs.

VC enriching research collaborations (Scion)

Scion is using video conferencing over KAREN for staff meetings, seminars and research collaborations. Video conferencing enriches research collaborations by making it easy for research teams to have regular, low cost, informal meetings. Scion is also currently sourcing and testing a number of different web cameras to be used in conjunction with EVO for desktop video conferencing options.



Innovation

Network measurement research (Endace)

Endace is a world leader in network traffic monitoring technology. The partnership between Endace, REANNZ and the WAND group from Waikato University provides New Zealand with an opportunity to innovate and advance the boundaries of network performance measurement worldwide. Endace's KAREN partnership enables them to collaborate more effectively in research and development with leading universities and national research institutes.

Multimedia content for education (e-cast education)

e-cast education is a KAREN content and services partner that provides real-time and recorded video content for education. Being connected to KAREN has revitalised e-cast's offering to the education sector and enabled members to easily access video resources to enrich teaching and learning.

IPTV (TelstraClear)

TelstraClear has launched New Zealand's first multi-channel multicasted IP television service over KAREN. This service uses KAREN's speed and advanced technology to make over 20 free TV and radio channels available to KAREN members. Multicast is a superior mechanism for streaming media in that it delivers only the chosen content stream to the user, freeing up bandwidth for other applications. TelstraClear designed the IPTV Proof of Concept because of its partnership with KAREN, specifically for KAREN members.

