



Australian Government

**Department of Innovation
Industry, Science and Research**

Industry House, 10 Binara Street
Canberra ACT 2601
GPO Box 9839
Canberra ACT 2601 Australia
Phone: +61 2 6276 1368
Facsimile: +61 2 6213 7000
Email: anne-marie.lansdown@innovation.gov.au
Web: www.innovation.gov.au
ABN: 74 599 608 295

Dear Stakeholder,

**Super Science (Future Industries) National Research Network (NRN) Project
- Overview Report Released -**

As part of the 2009 Budget Super Science (Future Industries) initiative \$37 million was allocated to extend and upgrade the Australian Research and Education Network (AREN) under the National Research Network (NRN) project.

In the first half of 2010, the Department engaged a consultant to work with research sector stakeholders and network infrastructure providers to determine a list of priority projects. The consultant provided the Department with a list of projects in May 2010 with the projected cost of implementing the list estimated at around \$100 million.

Following advice from the Australian eResearch Infrastructure Council, the Department has identified eight projects as priorities by considering the degree to which they:

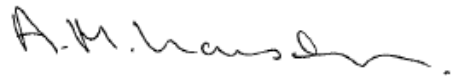
- contribute effectively to Australia's research infrastructure priorities, including Super Science initiatives and National Collaboration Infrastructure Strategy (NCRIS) capabilities, and
- are required to support the continued delivery of current levels of service to the AREN; or
- are essential for the extension of the AREN to support research needs.

The priority projects will be delivered under sub-contract with AREN service providers via a Super Science Funding Agreement between the Department and the University of South Australia as Lead Agent.

Paul Sherlock, Director Information Strategy and Technology Services can be contacted for further information on the NRN project by email paul.sherlock@unisa.edu.au or phone (08) 8302 3575.

An overview of the NRN project is also provided in the attached report. If you have any questions regarding the report, please contact Ms Clare McLaughlin, Manager eResearch by email clare.mclaughlin@innovation.gov.au or phone (02) 6213 6375.

Yours sincerely

A handwritten signature in black ink, appearing to read "A.M. Lansdown". The signature is written in a cursive style with a long, sweeping underline.

Anne-Marie Lansdown
Head of Division
Science and Infrastructure Division
30 July 2010

**Super Science (Future Industries)
National Research Network Project**

Overview - July 2010

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1 THE AUSTRALIAN RESEARCH AND EDUCATION NETWORK

On 20 December 2002, the Commonwealth announced support for the establishment of the Australian Research and Education Network (AREN). The AREN was initiated to address the bandwidth needs of the research and education sector and was delivered in a collaborative venture between the sector and the Commonwealth, State and Territory Governments.

The AREN now forms the backbone of all research collaboration infrastructure in Australia. Access to a high bandwidth research network makes collaboration between Australian and overseas researchers possible and is essential for the transfer of large data sets between Australian sites.

The Commonwealth has committed up to \$88 million since 2002 to contribute to the AREN's development including acquiring access to a high bandwidth trans-Pacific backbone for research and education.

At the establishment of the AREN it was assumed that there would be continuing investment in the network by all stakeholders, including governments and research institutions using the network, in order to maintain its capability to serve the national and international research infrastructure needs of the Australian research community.

The Commonwealth has consistently supported innovation and competitiveness in the AREN including the participation of multiple service providers. AARNet is the primary provider of international networks and interconnect agreements, backbone network and peering agreements and regional entry points for high-level services. Regional network operators also contribute to the AREN by providing local services to the education and research sector.

In order to ensure that the AREN operates as a truly national network from the perspective of users, the Commonwealth expects that all AREN service providers will collaborate to deliver interoperability and interconnection between their respective networks.

2 THE NATIONAL RESEARCH NETWORK PROJECT

The Commonwealth has shown its ongoing commitment to collaboration and continuing investment in the AREN with the strategic importance of high capacity research networks reaffirmed in the 2008 *Strategic Roadmap for Australian Research Infrastructure*.

Building on Roadmap recommendations, new funding of \$37 million from the Education Investment Fund (EIF) was announced in the 2009-10 Commonwealth Budget under the Super Science (Future Industries) initiative. The Commonwealth will provide funding for a variety of component projects to extend and upgrade the AREN under the National Research Network (NRN) Project.

In order to develop a priority list of component projects for funding, the Department of Innovation, Industry, Science and Research (DIISR) engaged a consultant to report on the considered views of organisations and research communities on high priority requirements that can be met from the extension of AREN infrastructure including:

1. The overall demand for the extension of the AREN, including capacity and location;
2. The supply options that exist to deliver against that demand, including the estimated aggregate cost; and
3. The information to support DIISR recommendations based around the Department's priorities, in light of likely network developments over the next 5 years, and the urgency of the various requirements.

DIISR engaged Mr Steve Black to conduct the consultation process. Mr Black has a background in telecommunications network planning and development, as well as executive and board level experience, including as Deputy Director General, Victorian Ministry of Finance.

2.1 Factors informing consultations

Factors informing the consultation process included that:

- 1 The budget for the NRN Project is \$37 million;
- 2 Funding from the EIF is only available for the creation and development of infrastructure and is not available to support recurrent expenditure;
- 3 All recurrent operating expenditure will need to be funded by the sector partners involved in each component project;
- 4 The Department of Broadband, Communications and the Digital Economy (DBCDE) National Broadband Network Regional Backbone Blackspots Program has the potential to provide substantial long term benefit to the AREN;

- 5 The Vocational Education Broadband Network (VEN) and the VEN Backbone Network (VBN) work being undertaken by the Department of Education, Employment and Workplace Relations (DEEWR) are separately funded;
- 6 The DBCDE and DEEWR projects are complementary to, and do not overlap with, the NRN project;
- 7 The NRN Project is focused on supporting the \$1.1 billion Super Science Initiative supporting critical areas of scientific endeavour, including space science and astronomy, marine and climate science, and future industries (including biotechnology and nanotechnology);
- 8 Existing National Collaborative Research Infrastructure Strategy (NCRIS) capabilities continue to be the focus for Commonwealth investment in research infrastructure; and
- 9 Organisations participating in the development of the AREN delivered through the NRN Project will be required to establish, operate and provide access to the AREN in accordance with the EIF principles:
 - Principle 1* Projects should address national infrastructure priorities.
 - Principle 2* Projects should demonstrate high benefits and effective use of resources.
 - Principle 3* Projects should efficiently address infrastructure needs.
 - Principle 4* Projects should demonstrate they achieve established standards in implementation and management.

2.2 Consultations

Education and research entities consulted include:

1. University sector:

- Sydney University
- University of Melbourne
- Deakin University
- Flinders University
- University of Western Australia
- Queensland University of Technology
- Monash University
- University of Adelaide
- University of South Australia
- University of NSW
- Victoria University
- Australian Catholic University
- University of Technology Sydney
- Go8 Digital Futures eResearch Group
- Macquarie University
- La Trobe University
- RMIT University
- Curtin University of Technology
- University of Tasmania
- Swinburne University of Technology
- Australian National University
- Murdoch University
- University of Queensland
- James Cook University
- University of Ballarat
- Central Queensland University
- Griffith University

2. Research institutions:

- Commonwealth Scientific and Industrial Research Organisation
- Bureau of Meteorology
- Geosciences Australia
- Geosciences Victoria
- Australian Antarctic Division

3. Major eResearch service providers:

- Intersect Australia Limited
- Victorian eResearch Strategic Initiative (VeRSI)
- Victorian Partnership for Advanced Computing (VPAC)
- eResearchSA
- Queensland Cyber Infrastructure Foundation (QCIF)
- iVEC (joint venture between CSIRO, Curtin University of Technology, Edith Cowan University, Murdoch University and The University of Western Australia)
- Australian Research Collaboration Service (ARCS)
- Monash eResearch Centre (MeRC)

4. Institutes generating significant research data:

- Australian Synchrotron
- Australian Square Kilometre Array Pathfinder (ASKAP)
- Victorian Life Sciences Computation Initiative (VLSCI)
- Australian National University National Computational Infrastructure (NCI)
- Pawsey High Performance Computing Centre for SKA Science
- Monash University Multi-modal Australian ScienceS Imaging and Visualisation Environment (MASSIVE)
- Murchison Widefield Array (MWA)

5. Specialised national research institutes:

- Australian Biosecurity Intelligence Network's (ABIN)
- Antarctic Climate and Ecosystems Cooperative Research Centre
- Integrated Marine Observing System (IMOS)
- Centre for Comparative Genomics Western Australia

6. ICT groups:

- Council of Australian University Directors of Information Technology (CAUDIT)
- Victorian University Information Technology Directors
- Queensland Regional Network Organisation and members
- Western Australian Regional Network Organisation and members

7. AREN service providers:

- AARNet Pty Ltd
- Nextgen Networks
- VERNet Pty Ltd
- SABRENet Ltd
- Aurora Energy Pty Ltd

8. Government Departments:

- Commonwealth Department of Innovation, Industry, Science and Research
- Commonwealth Department of Broadband, Communications and the Digital Economy
- Commonwealth Department of Education, Employment and Workplace Relations
- Relevant State agencies

3 IDENTIFIED PROJECTS

The consultation process with the education and research sector has resulted in the identification of a number of potential priority investments. Cost estimates were provided by the sector during consultations, with the total cost for all identified projects estimated to be in excess of \$100 million.

Identified Projects
<p>National: Backbone Capacity – Adelaide to Perth <i>A transmission link to complete the national AREN backbone network between mainland capital cities and enable high-end research connectivity between the East and West coasts.</i></p>
<p>National: Backbone Extension – Melbourne to Hobart <i>A transmission link to enhance connectivity between Tasmania and mainland Australia.</i></p>
<p>National: Backbone Extension – Toowoomba to Darwin <i>Improved connectivity for Darwin as part of the AREN. The NBN Regional Backbone Blackspots Program (RBBP) includes a network extension from Toowoomba to Darwin via Mt Isa and Tennant Creek.</i></p>
<p>National: Connectivity – Northern Territory, Tidbinbilla and Ceduna (Astronomy) <i>Requirements for connectivity within the NT and to Ceduna and Tidbinbilla were identified as priorities for astronomy research. Costs to connect sites in the NT will be substantially reduced when the NBN RBBP connection to Darwin is completed.</i></p>
<p>National: Innovation – ABIN Network <i>Secure connectivity for the Australian Biosecurity Intelligence Network (ABIN) including connectivity to and between 12 research sites.</i></p>
<p>National: Connectivity – Data Centre Interconnection <i>Details of the location of the Data Centres to be funded under the Super Science Research Data Storage Infrastructure project are yet to be finalised. However, each Data Centre will require a high bandwidth connection to the AREN and may also require dedicated networks between Storage facilities.</i></p>
<p>National: Resiliency – Shepparton to Adelaide <i>The AREN link between Melbourne and Adelaide does not currently have physical diversity. A new optic fibre link from Shepparton to Gawler via Mildura being built under the NBN RBBP program could be used to provide that diversity.</i></p>
<p>NSW: Connectivity – Sydney Metropolitan (Basin Lease Replacement) <i>Construction of replacement fibre to support the Sydney Basin network is an urgent requirement as the Uecomm lease will expire in 2012.</i></p>
<p>NSW: Connectivity – Sydney Metropolitan (Macquarie Diverse Loop) <i>The project would connect Macquarie University and extend the reach of the Sydney Basin network.</i></p>
<p>NSW: Connectivity – Sydney Metropolitan (Outer Basin Network) <i>The project will extend the reach of the Sydney Basin network to Penrith.</i></p>

<p>Qld: Capacity – Outer Metropolitan Network</p> <p><i>Linking of outer metropolitan and inner urban research sites via Ipswich including connections to the research precincts at Coopers Plains and Boggo Road.</i></p>
<p>Qld: Connectivity – Sunshine Backbone</p> <p><i>New connections from the regional backbone network from Brisbane to Cairns to provide additional capability to university campuses and related centres of education and research. An underground connection between the two AARNet PoPs in Brisbane was also identified as a requirement.</i></p>
<p>Tas: Connectivity –Regional Network</p> <p><i>The requirements to upgrade the regional WAN are currently under negotiation with the Tasmanian Government-nominated telecommunications carrier, Aurora. The proposed WAN includes connectivity between Burnie, Launceston, Hobart and Melbourne.</i></p>
<p>VIC: Innovation – Victorian HPC and Medical Research WAN</p> <p><i>Current constraints on capacity between the Synchrotron, VLSCI, Victorian universities and institutions in associated research precincts has been identified as a factor limiting research collaboration.</i></p>
<p>WA: Capacity – Perth Metropolitan (Pawsey HPC Centre Link)</p> <p><i>Connection of the Pawsey HPC centre to the Perth Metropolitan Ring and the Perth-Geraldton and Perth - Adelaide links.</i></p>
<p>WA: Connectivity – Perth Metropolitan (Ring Network)</p> <p><i>A metropolitan ring network would provide improved and resilient connectivity to support CSIRO Floreat (Centre for Environment and Life Sciences) and University of Western Australia campus sites.</i></p>
<p>WA: Connectivity – Perth to Geraldton (Astronomy)</p> <p><i>Radio astronomy research requires flexible high bandwidth connectivity from Murchison to the Pawsey HPC centre. A link between Murchison and Geraldton is being constructed by CSIRO and the NBN RBBP program includes a Perth to Geraldton link.</i></p>

4 PRIORITISED PROJECTS

The full list of projects identified by the sector has been prioritised by considering the degree to which they:

- contribute effectively to Australia’s research infrastructure priorities, including Super Science initiatives and NCRIS capabilities, and
- are required to support the continued delivery of current levels of service to the AREN; or
- are essential for the extension of the AREN to support research needs.

As a result of this prioritisation process, eight “Component Projects” have been identified for funding under the NRN project. The infrastructure created and developed as part of each Component Project is expected to be part-funded by the Commonwealth and part-funded by other participants.

In order to ensure funding is available to each Component Project, a notional contribution to each Component has been identified by DIISR. The notional contribution allocated to each Component is generally less than the cost estimates provided during the consultation process.

Component Projects
<p>National: Backbone Capacity – Adelaide to Perth</p> <p><i>A transmission link to complete the national AREN backbone network between mainland capital cities and enable high-end research connectivity between the East and West coasts.</i></p>
<p>National: Connectivity – Data Centre Interconnection</p> <p><i>Details of the location of the Data Centres to be funded under the Super Science Research Data Storage Infrastructure project are yet to be finalised. However, each Data Centre will require a high bandwidth connection to the AREN and may also require dedicated networks between Storage facilities.</i></p>
<p>NSW: Connectivity – Sydney Metropolitan</p> <p><i>Basin lease replacement as well as options to extend the network.</i></p>
<p>QLD: Connectivity – Sunshine Backbone</p> <p><i>New connections from the regional backbone network between Brisbane and Cairns to provide additional capability to university campuses and related centres of education and research.</i></p>
<p>QLD: Capacity – Outer Metropolitan Network</p> <p><i>Creating linkages between outer metropolitan and inner urban sites and research precincts.</i></p>
<p>TAS: Connectivity –Regional Network</p> <p><i>Connectivity between Burnie, Launceston, Hobart and Melbourne.</i></p>
<p>VIC: Innovation – HPC and Medical Research WAN</p> <p><i>Connectivity between education and research institutions and precincts.</i></p>
<p>WA: Capacity and Connectivity Projects</p> <p><i>Connection of research intensive facilities in Western Australia to the AREN.</i></p>

5 NRN PROJECT ARRANGEMENTS

The total Commonwealth funding for the Project is \$37 million over two years: \$20 million in 2010-11 and \$17 million in 2011-12.

Funding will be provided to support Component Projects via a Funding Agreement between the Department and the University of South Australia (UniSA) as Lead Agent.

UniSA has been a key partner in the successful establishment of the South Australian Broadband and Research Education Network (SABRENet), demonstrating that it can work collaboratively with partner organisations for the benefit of the broader AREN.

The Department approached UniSA to lead the NRN project because the SABRENet fibre network reaches all major South Australian research sites and there were therefore no connectivity or capacity component projects identified for delivery in South Australia during the NRN project period.

It is anticipated that the NRN project will enhance the AREN including the infrastructure and service delivery capabilities of AARNet as well as existing regional network operators, for example VERNet.

5.1 Roles and responsibilities

UniSA has overall responsibility for the management and implementation of the Project and will:

- Coordinate the development and management of detailed Component Project Plans, in conjunction with key stakeholder representatives. Component Project Plans will address co-investment and ongoing operational costs.
- Manage the Project and the distribution of EIF funds through sub-contracting arrangements with organisations to establish individual project Components. Those sub-contracts will include the payment of funds based on milestones agreed in the Component Project Plans; and
- Establish a Steering Committee, and appoint a Project Director. The Steering Committee will advise UniSA, through the Project Director, on the detailed implementation of the Component Projects including the extent to which Component Project Plans represent value for money. Each individual Component Project will require a detailed recommendation by the Project Director, formal endorsement by the Steering Committee and approval by DIISR before work may commence.

5.2 Component Project funding

As noted, the infrastructure created and developed as part of each Component Project is expected to be part-funded by the Commonwealth and part-funded by other participants.

The Commonwealth intends that its funding shall be provided to sub-contractors to support agreed elements of each Component Project. UniSA will work with component sub-contractors to maximise the value obtained by the education and research sectors for the Commonwealth's investment.

As outlined, in order to ensure funding is available to each Component Project, a notional contribution to each Component has been identified by DIISR in the Funding Agreement with UniSA. However, the actual contribution made by the Commonwealth will depend on detailed planning and the nature of costs included in Component Project Plans as EIF funding can only be used for the creation and development of infrastructure.

It is acknowledged that Component projects are likely to cost more than the NRN contribution available. In light of this, stakeholders in each Component Project will be able to contribute additional resources to each Component reflecting their priorities.

Should a Component not proceed for whatever reason, UniSA and DIISR will agree in writing for the reallocation of the funds set aside for that Component Project to another network project identified in the consultation process for the NRN project.

5.3 Ownership and access

Ownership of assets created by Component Projects will be vested in the contracting parties as set out in Component sub-contracts.

Component Project Plans will also describe how the Component sub-contractors will operate the infrastructure and provide service delivery well beyond the Component Project Period.

The Commonwealth acknowledges that it would be financially, administratively and technically inefficient to restrict use of the resulting Components to research purposes only, although the basis for the provision of the funding is the provision of infrastructure to support and enable research.

In particular, to the extent that the NRN Component Projects also deliver enhanced telecommunications services to educational institutions, the NRN project will also support the education objectives of the AREN.

The Commonwealth expects that, as a condition of providing funding, the operators of Components will make the infrastructure available on equitable terms across the research sector, which is defined as:

- all Higher Education Institutions listed in Table A, Section 16-15 of the *Higher Education Support Act 2003* including all campuses;
- Commonwealth, State and Territory research agencies including CSIRO, ANSTO, AIMS, AIATSIS as well as the Bureau of Meteorology and Geoscience Australia;
- health and medical research institutions; and
- any other body the Commonwealth determines plays a role in the sector.

In addition, the Commonwealth considers the broader research and education sector to include schools and school systems and vocational education and training institutions and providers

5.4 Next steps

UniSA will invite key stakeholder representatives to develop detailed Component Project Plans in collaboration with other users of the infrastructure to ensure that the Component Project meets their needs.

Component Project Plans will address co-investment and ongoing operational costs and will identify the sub-contractor(s) for the Component.

Currently, AARNet, VERNet, the University of Tasmania, iVEC and QRNO have been identified as key stakeholder representatives for the Component Projects.

Additional key stakeholder representatives will be identified by the Commonwealth as the NRN project develops.

Paul Sherlock, Director Information Strategy and Technology Services can be contacted for further information on the NRN project by email paul.sherlock@unisa.edu.au or phone (08) 8302 3575.
