



National eResearch Collaboration Tools and Resources

# NeCTAR NCRIS 2016-17 Annual Business Plan

v0.8

1 July 2016 to 30 June 2017



**NCRIS**  
National Research  
Infrastructure for Australia  
An Australian Government Initiative

NeCTAR is supported by the Australian Government through the National Collaborative Research Infrastructure Strategy, NCRIS, to establish eResearch infrastructure in partnership with Australian research institutions, organisations and research communities. The University of Melbourne has been appointed as the Lead Agent.

The NeCTAR Annual Business Plan details proposed NeCTAR projects to continue to enhance the capability and competitiveness of Australian research by facilitating knowledge-centred innovation; accelerating access to research data, tools and models; and removing barriers to collaboration.

NeCTAR funding through NCRIS 2016 represents a 2% increase on NCRIS 2015 funding. The majority of this funding continues the development of NCRIS 2015 infrastructure projects, whilst also enabling the inclusion of a new Strategic Initiatives component to enable NeCTAR to better support and plan for the emerging needs and future concerns from NCRIS domain capabilities, in response to the recommendations of the eResearch Framework.

NeCTAR's Annual Business Plan aligns with the NeCTAR strategic vision, which is based on the following principles:

1. Partnering with NCRIS research domain-focussed capabilities to improve support for the national strategic investments in research infrastructure priorities.
2. Re-investing in the NeCTAR investments in infrastructure to meet the advancing needs of Australian researchers.
3. Partnering with key stakeholders incl. ANDS, RDS, commercial cloud resource providers, and industry, to maximise research impacts.
4. International leadership in the development of eResearch collaborative tools and resources.

## 1. Governance

The NeCTAR NCRIS Project will continue to operate under the Governance and Management arrangements established for the NeCTAR NCRIS 2013 investment. Those arrangements are described in detail in the NeCTAR NCRIS 2013 Final Project Plan and summarised below.

The University of Melbourne continues as Lead Agent for the delivery of the NeCTAR NCRIS Project and has overall responsibility for the management and implementation of the Project in accordance with the reporting and accountability requirements outlined in the NeCTAR NCRIS Funding Agreement.

The existing NeCTAR Project Board is the independent body formed under the NeCTAR Super Science Project to provide strategic guidance to The University of Melbourne and the NeCTAR Director. The NeCTAR Project Board continues to perform this role under the NeCTAR NCRIS Project.

The NeCTAR Platforms Steering Committee (PSC) provides oversight and strategic guidance to the Control Groups and work package participants who monitor and operate the NeCTAR Research Cloud. The PSC is responsible for the endorsement of work package operations and implementation plans for each of the Research Cloud components. The PSC also provides advice and guidance to the NeCTAR Directorate and NeCTAR Project Board in the execution of the Research Cloud Operations component of the NeCTAR Program and towards achieving the NeCTAR Project objectives.

The NeCTAR Virtual Laboratory Advisory Group (VLAG) is comprised of senior researchers involved in the NeCTAR Virtual Laboratories, and provides advice on the Virtual Laboratory program. The VLAG is an advisory group who provide input to the NeCTAR Directorate and the NeCTAR Project Board on the Virtual Laboratory program.

The NeCTAR Directorate carries out the program management activities of the NeCTAR NCRIS Projects, including oversight of the NeCTAR Research Cloud and Virtual Laboratory support subprojects.

## 2. Annual Business Plan Components

The scope of this NeCTAR NCRIS 2016-17 Annual Business Plan includes activities under four specific components (described in Section 3 below):

- **Virtual Laboratory Support;**
- **Research Cloud Operations;**
- **Strategic Initiatives;** and
- **Directorate.**

The proposed allocation of funding to these components is provided in the following table.

<b>Allocation of NeCTAR NCRIS 2016 Funds by Component</b>		
<b>NeCTAR NCRIS 2016 Component</b>	<b>Funding</b>	<b>% of total</b>
Virtual Laboratory Support	\$2,020,000	40%
Research Cloud Operations	\$2,020,000	40%
Strategic Initiatives	\$500,000	10%
Directorate	\$501,000	10%
<b>Total:</b>	<b>\$5,041,000</b>	<b>100%</b>

NeCTAR NCRIS funding through the 2016-17 funding period represents a 2% increase on 2015-16 funding period. This funding will be allocated to continue support for national infrastructure established under the Research Cloud and Virtual Laboratory programs and to support a Strategic Initiatives component.

It is proposed that the Strategic Initiatives funding will provide support for NeCTAR to engage stakeholders to transition the NeCTAR programs through a period of change in the NCRIS program. The intention is to improve alignment with NCRIS priority investments and to respond to changing sector needs arising from the eResearch Framework process.

Allocation of funding to activities under the Strategic Initiatives will be subject to endorsement by the NeCTAR Project Board. Activities under this component are expected to build on previous NCRIS funding rounds which have worked with Virtual Laboratories and NCRIS domain capabilities, aligned programs of work with NeCTAR, ANDS and the AAF, and this will continue to build on constructive relationships with ANDS, RDS and the Cloud/RDS Node operators.

NeCTAR has received an invitation to continue to stage 2 of the application process for Agility Funding, and is requesting \$508,000 to establish an Australian BioSciences Cloud, Australian Ecosystems Science Cloud, and an Australian Marine Sciences Cloud, in partnership with BPA, TERN, and MARVL. These science clouds will leverage the existing NeCTAR Research Cloud, Virtual Laboratories, RDSI collections, NCI capabilities and RDS Data Services infrastructure. The project seeks to align infrastructure planning (cloud compute and storage) and software infrastructure planning (Virtual Laboratory like platforms) in partnership with research domains. Applications closed 2 May 2016 and it is not yet clear whether an outcome will be communicated prior to the submission of the Annual Business Plan.

### 2.1. Alignment with RDS, ANDS and AAF

NeCTAR aligns with RDS, ANDS and AAF at a range of levels.

To facilitate increased alignment at the strategic level, ANDS, RDS and NeCTAR have agreed to a shared strategic goal in each capability's business plan:

*Co-ordinate provision of e-research services in support of an identified set of NCRIS facilities.*

RDS, ANDS and NeCTAR recognise the significant additional value available to the research community in creating a more coherent and connected experience when accessing national underpinning capabilities. Together the projects will demonstrate this value through a series of coordinated activities undertaken between ANDS, RDS, NeCTAR and AAF to support a whole of data lifecycle approach in support of a number of NCRIS data-intensive capabilities.

This activity will involve connecting together ANDS, NeCTAR and RDS systems using existing identifiers to provide a more joined-up experience, with the identifiers envisaged at this stage being ORCID for people and grant identifiers (ARC, NHMRC) for projects. This will ensure that data is coming from authoritative sources of truth for pre-population of data, streamlining the provisioning experience for users while enabling the harvesting of provenance metadata throughout the data's developing life.

Within the business plan of each of the three capabilities, further detail is given at tactical and operational levels of how that capability will work towards this shared strategic goals. Details of NeCTAR's operational implementation of this goal is contained in the Strategic Initiatives component through support for the Data Lifecycle initiative proposed by RDS. RDS have also expressed support for the NeCTAR Science Cloud proposals described in the NeCTAR Agility Fund proposal.

It is proposed, in order to drive collaboration as well as assist in the transition to a remodelled eResearch framework that a Directors Forum of relevant NCRIS capabilities will be established. The exact reach and operational environment together with a terms of reference would be developed for consideration by the participating Project Boards. It is anticipated that this group would be operational within the first quarter of 2016/17 and meet monthly to examine areas of joint interest and collaboration.

NeCTAR, ANDS, RDS and AAF also work collaboratively through other parts of the NeCTAR program programs, as detailed in the next sections.

### **2.1.1. Virtual Laboratory Reuse and Uptake Enhancement**

NeCTAR will continue to work with ANDS and RDS to identify and encourage the development of Virtual Laboratory projects which:

- Leverage and improve alignment with the RDS research domain-focussed "A1" Research Data Services activities
- Improve the management, accessibility and reuse of research data;
- Leverage the RDSI storage investments
- Promote usage of AAF services and facilitate development of further AAF services of high value to the Virtual Laboratory program.

### **2.1.2. NeCTAR Research Cloud and RDS Central Services**

NeCTAR, RDS and the RDS node operators are committing to align our investments in common service activities, including User Support, Infrastructure monitoring and reporting and Resource Allocation. NeCTAR is also committed to supporting RDS and ANDS where resources permit, in the provisioning of infrastructure using the cloud as an access standard, and through aiding and supporting in developments activities including the Data Lifecycle initiative (RDS led, ANDS, AAF, AARNet collaborative project).

### **2.1.3. Strategic Initiatives**

NeCTAR proposes that activities to be supported under the Strategic Initiatives component may include:

- Support for an identified joint project with RDS and ANDS. The proposed project to be supported under this program is the RDS-proposed Data Life-Cycle Project. (Indicative contribution: \$150k).
  - Nectar expertise and leverage of NeCTAR resources is also identified as a key in-kind

contribution to the project.

- Response to recommendations emerging from sector consultations in NCRIS planning and transition processes.
- Progressing implementation of a Multi-cloud strategy with a view to facilitating future access to sector-based and commercial cloud providers.
- Planning and implementation of improved alignment of the NeCTAR programs with national research priority investments (including NCRIS investments).

Planning the future processes for the provisioning of research infrastructure will need to address aspects of storage and compute infrastructure (enabling active data platforms) and will most likely include aspects of national or community data, and the management services needed to coordinate on a national scale (active data management and discovery). RDS and ANDS have been engaged in our business planning, around the research domain clouds concept (NeCTAR led), around the Data Lifecycle concept (RDS led), and through sharing Agility Fund proposals.

Allocation of resources to initiatives under this component will be subject to endorsement by the NeCTAR Project Board.

### 3. Project Components

#### 3.1. Virtual Laboratory Support Component

The Virtual Laboratory Program consists of three components of activity to build on and extend the existing programs supported under the NeCTAR NCRIS 2015 Final Project Plan:

- **Common Services and Operations**
  - Support common operational requirements of the Virtual Laboratory operations which will produce improved outcomes for quality and sustainability of operations across the portfolio of projects, including User Support and Resource Monitoring.
- **Virtual Laboratory Re-use and Uptake Enhancement Program**
  - Support improved delivery of value from the Virtual Laboratory program through funding proposals for re-use and extension of existing Virtual Laboratory infrastructure to support broader cohorts of research user, with a particular emphasis on support for NCRIS domain capabilities.
- **Virtual Laboratories Program Leadership and Community Development**
  - The NeCTAR Directorate will continue to lead and facilitate coordination of the Virtual Laboratory program through the Deputy Director of Research Software Infrastructure. This component includes the salary for the Deputy Director of Research Software Infrastructure, and directorate-led programs to support the Virtual Laboratory program.

Funding support for these activities under NCRIS 2016 would ensure the capacity to:

- Begin transitioning to the vision contained in the eResearch Framework of improved support for NCRIS domain capabilities.
- Improve efficiency through consolidated services supporting common operational needs in the Virtual Laboratory projects;
- Derive greater benefits for more research communities from the Virtual Laboratory infrastructure investments.

The proposed high level allocation of NCRIS 2016 funds in the Virtual Laboratory Support Program is provided in the following table. The funding allocated under NCRIS 2015 funding is also shown for reference.

<b>Virtual Laboratory Support - sub-components</b>	<b>NCRIS 2015</b>	<b>Proposed NCRIS 2016</b>
1. Common Services and Operations	\$150,000	\$170,000
2. Virtual Laboratory Reuse and Uptake Enhancement	\$2,070,000	\$1,600,000
3. Virtual Laboratory Program Leadership and Community Development	\$80,000	\$250,000
<b>Total:</b>	<b>\$2,300,000</b>	<b>\$2,020,000</b>

The Virtual Laboratory Program includes an international orientation, supporting international collaboration by Virtual Laboratories through the Reuse and Uptake Enhancement Program, where international collaboration is part of project selection criteria. The Program Leadership and Community Development also facilitates relationship building with international initiatives that may lead to collaborative projects at Directorate level, such as the Science Gateways Community Institute (NSF funded in USA for \$15m for 5 years), Horizon 2020 (Europe), Software Sustainability Institute (UK) and Centre for Open Science.

### **3.1.1. Common Services and Operations Program**

The Common Services and Operations program is a continuation of the NeCTAR NCRIS 2015 program.

Funding is requested to propose support for two projects to operate services which support common needs across the portfolio of Virtual Laboratory sub-projects. In 2013 and 2015 these projects provided high-value outcomes to a range of Virtual Laboratories. Funding is requested to continue this work on two projects, with possible projects to include:

- Defining models and technologies to support the authentication and authorisation needs emerging from NeCTAR Projects - Australian Access Federation
- Virtual laboratory user support enhancement - QCIF, with involvement of 5 VLS
- Improving federation of data storage infrastructure with cloud resources to support advanced data processing workflows - BCCVL, with involvement from other VLS.

Proposals will be endorsed for funding by the NeCTAR Project Board.

### **3.1.2. Virtual Laboratory Reuse and Uptake Program**

The NeCTAR Virtual Laboratory program has delivered highly valued online research software infrastructure environments to support the following research domains:

- Marine Science, GeoScience, Climate and Weather Science, Endocrine Clinical Research, Genomics, Characterisation, Human Communications Science, Astronomy, Cultural Data, Biodiversity and Climate Change, and Industrial Ecology.

These Virtual Laboratories continue to operate and deliver benefits to these research communities based on operational co-investment from the Virtual Laboratory partners. The Virtual Laboratory infrastructure is highly valued by the associated research communities who derive benefits through improved collaborative access to the data, tools, computational models and resources specific to their research domain.

The eResearch Framework reiterates the value of the Virtual Laboratory program, recommending the development of Research Community Platforms to tailor otherwise separately provided and independent resources into integrated digital platforms that meet specific research requirements. Virtual Laboratories provide a strong basis for Research Community Platforms, integrating of methods, instruments, computation and data for research.

Under the Virtual Laboratory Reuse and Uptake Enhancement a call will be issued to identify high value proposals to broaden the delivery of value from the Virtual Laboratory infrastructure in alignment with eResearch Framework recommendations, \$1.6M will be available to fund proposals. Proposals will be endorsed for funding by the NeCTAR Project Board. The Strategic Initiatives component may also provide additional funding to Virtual Laboratory projects.

The program offers a timely and critical opportunity for investment in continuing to maintain the sector's capacity for development and operation of significant research software infrastructure. This investment would significantly mitigate the substantial risk that critical software infrastructure and engineering skills will continue to be lost to the research sector. Without such an investment it is highly likely that the sector will continue to experience loss of access to these key skills.

### 3.2. Virtual Laboratory Program Leadership and Community Development

This component facilitates coordination of the Virtual Laboratories program through the Deputy Director of Research Software Infrastructure and directorate-led initiatives to build capability in the sector. NeCTAR has developed significant expertise in the development and management of collaborative resources and forums that support research communities, in areas including governance, sustainability, user support and capability building. This component supports initiatives that facilitate the Virtual Laboratory community to identify and incorporate best practice in these areas, particularly capability building. In recognition of the growing community of expertise within research and technology community networks, NeCTAR, RDS, ANDS, AAF and AARNET are collaborating on the coordination of capability building programs to ensure the establishment and acceleration of research community knowledge sharing with a technical focus. The importance of people and skills development has been identified in a number of reviews in the sector, including as a headline item in the eResearch Framework. In 2015 NeCTAR invested \$80,00 directly in capability building initiatives, and will utilise part of the Virtual Laboratory Program Leadership and Community Development budget to continue this focus. This funding is currently supporting facilitation and support of knowledge sharing within the technical community about technical and data requirements needed to support future research and innovation. Part of this project is a discipline-centric pilot focused on the ecoscience community which may provide a framework that can be utilised in other research areas in partnership with their NCRIS capabilities. These projects are in early phases, and will continue until October 2016. Outcomes will be reviewed before allocation of further funding.

### 3.3. Research Cloud Operations Component

The Research Cloud operations program includes support for the operations of the NeCTAR Research Cloud through two components:

- The “**Research Cloud Federated Operations**” sub-component is an extension of the equivalent component in the NeCTAR NCRIS 2013 and NCRIS 2015 Project which supports:
  - The federated operations of the NeCTAR Research Cloud Fabric and other federated services and activities.
- The “**Research Cloud Node Operations**” sub-component is an extension of the equivalent component in the NeCTAR NCRIS 2015 Project, proposed to provide funding to the node operators to partially support node-local operating costs.
  - Co-funding obtained by node operators against this federal investment to support the full node operating costs will be required.

The proposed initial allocation of funding to these sub-components is provided in the following table.



Allocation of NeCTAR NCRIS 2015 Funds by Research Cloud sub-component	
NeCTAR NCRIS 2015 Component	Funding
Research Cloud Federated Operations	\$950,000
Research Cloud Node Operations	\$1,070,000
<b>Total:</b>	<b>\$2,020,000</b>

As detailed plans for implementation of these components are developed in Q3 2016, funding allocations may be adjusted subject to endorsement by the NeCTAR Platforms Steering Committee and the NeCTAR Project Board.

### 3.3.1. Research Cloud Federated Operations Component

The following table includes the proposed allocation of NeCTAR NCRIS 2016 funds to continue support for the activities identified in the Research Cloud support component of the NeCTAR NCRIS 2013 Final Project Plan. The funding allocated under the NeCTAR NCRIS 2013 funding and NCRIS 2015 funding are also shown for reference.

#### **Summary of NCRIS Budget Allocations by Component Activity and Proposed NCRIS 2016 Budget Allocations:**

Work Package	Allocated NCRIS 2013	NCRIS 2015	Proposed NCRIS 2016
WP 1. Cloud Core Services	\$1,191,000	\$721,000	\$440,000
WP 2. Monitoring and reporting services	\$228,000	\$0	\$0
WP 3. Security monitoring and incident response	\$228,000	\$0	\$0
WP 4. Virtual Machine Image QA	\$98,000	\$0	\$0
WP 5. Continuous improvement	\$114,000	\$0	\$0
WP 6. User community support, documentation and helpdesk	\$1,322,000	\$189,000	\$198,000
WP 7. Cloud Ecosystem services	\$912,000	\$0	\$0
WP 8. Cloud Resource Allocation Process and Management	\$228,000	\$38,000	\$62,000
WP 11. NSP Operations	\$898,000	\$223,000	\$0
Leadership, Coordination and Community Engagement	\$781,000	\$0	\$250,000
<b>Total:</b>	<b>\$6,000,000</b>	<b>\$1,171,120</b>	<b>\$950,000</b>

#### Operations and Continued Improvement

The NCRIS 2016 components will seek to support the established research infrastructure, with a focus on the operations and improved delivery of the existing NeCTAR Research Cloud platform. The level of NCRIS 2016 funding required to support the Research Cloud (WP1) is substantially less than that requested under the NCRIS 2015 Project Plan. Under the NCRIS 2015 plan and with reduced funding, consolidation of the Work Package responsibilities has occurred for many of the work packages formerly described in the NeCTAR NCRIS 2013 Project Plan. During 2016 the NSP service and users will transition to devolved node local services under the Research Cloud program. A level of remaining NCRIS 2013 funds (WP7 ecosystem service, WP11 NSP) has been used to support Core Services operations and the NSP in transition during 2016. Remaining funds in NCRIS 2015 under WP1 Core Services will continue to support Core Services during the 2016/2017 period, reducing the level of NCRIS 2016 funds required.

User Support (WP6) is currently supporting a large user-base across 8 nodes, and the existing levels of



funding does not fully cover business hours support. NeCTAR is seeking to work with RDS and other national providers of eResearch infrastructure to investigate consolidation of user support efforts, increased levels of user support nationally, a reduction of overall costs, and co-funding towards cover business hours.

Changes in the national allocations of resources are expected during the 2016/2017 period, so additional Resource Allocations (WP8) transition work is expected. The will address changes in co-funding arrangements, managing the limited resource with increasing demand, and the potential needs of national domain capabilities under the Strategic Initiatives component.

The NCRIS 2016 budget does not specifically cover the refresh of hardware, but it is proposed that the Research Cloud Node Operations component can be used for hardware refresh at nodes. A present risk is that parts of the infrastructure (sections of several research cloud nodes that were established early in the NeCTAR Super Science program) are beyond operational life expectancy of 3 years and much of the infrastructure is nearing the end of 3 years maintenance.

#### Strategic Initiatives Impact

As a part of the strategic initiative component, NeCTAR will seek to better support and plan for the emerging needs and future concerns from research domain capabilities. Over the NCRIS 2016 period NeCTAR will further engage with strategic domains capabilities, on both Research Cloud and Virtual Laboratories, to seek a stronger alignment in infrastructure improvements, development and planning. Engagement has begun and alignment is expected to strengthen.

Operational improvement impacts on the Research Cloud may include domain involvement in the allocation of resources, evolving cloud features, promoting domain tools and evolving access partnerships to meet specific domain requirements. There are a growing number of opportunities to engage with international research cloud initiatives coming from significant Australian participation in international research communities, and also the emergence of over 20 OpenStack scientific clouds globally.

#### Leadership, Coordination, Community Engagement

The NeCTAR Directorate will continue to lead and facilitate coordination of the Research Cloud and Federated Operations through the Deputy Director of Research Platforms. This component includes the salary for the Deputy Director of Research Platforms. Engaging the growing expert community that supports research through technology, informatics and software infrastructure is a national activity. The national expert community - found in Virtual Laboratories, NCRIS domain capabilities and at Nodes and research institutions - enable the wider research community through supporting tools and software platforms. Engaging with research enablers allows a better understanding of the evolving research needs and research methods.

### **3.3.2. Research Cloud Node Operations Component**

The “**Research Cloud Node Operations**” component is proposed to make funding available to the research cloud node operators to partially support node-local operating costs through the 1 July 2016 to 30 June 2017 funding period. Node-local operating costs include: node system administration support; upgrade management; power and cooling; data centre and cloud app support costs.

<b>Research Cloud Node Operations</b>	<b>\$1,070,000</b>
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During the 2016/2017 funding period, this level of investment is expected to be a fraction (around 30%) of the total business as usual operating costs of the nodes, which includes node system administration support, upgrade management and power, cooling and data centre costs.

Existing co-investment commitments have now been fully met by nodes, and funding will be made available to partially support node-local operations. Provision of access to this funding will:

- ensure continued access to national merit allocation across the nodes of the Research Cloud;
- support node operators to attract sectoral co-investment in the node operating costs; and
- help to support the transition to a mixed funding model for sustaining the Research Cloud as a national research infrastructure platform.

A mechanism for allocation and distribution of funding to nodes will be confirmed through consultation with the cloud node operators and endorsement by the NeCTAR Project Board. Nodes will be required to adhere to the following operating conditions:

- Commitment to operate the resources for the period, as agreed part of the national NeCTAR Research Cloud.
- Agreement to operate under common operating principles that are being set out in the Operating Level Agreement (defining shared technical operating structures, documentation, functions, processes, support and service targets) and with common end-user terms of use.
- An agreed portion of the cloud node (of the federally funded hardware infrastructure) will be made freely available to the national access allocation process.
- The remaining portion of the cloud node, federally funded hardware infrastructure, will be recognised as part of the federation infrastructure supporting research nationally, as supported by the federal investment in federated operations and in federal capital investment. Allocations of this and co-funded costs will be the responsibility of the node, within the principles of the original infrastructure investment use.
- Nodes will be required to report on use, co-funding and co-investment to the NeCTAR Directorate on behalf of the Commonwealth programme against the federal infrastructure. Reporting on co-funding for extended cloud infrastructure leveraging the federated operations will be required.

### **3.4. Strategic Initiatives**

NeCTAR will seek to better support and plan for the emerging needs and future concerns from national research domain capabilities. Over the NCRIS 2016 period NeCTAR will further engage with strategic domain capabilities, on both Research Cloud and Virtual Laboratories, to seek a stronger alignment in infrastructure improvements, development and planning. Engagement has begun and alignment is expected to strengthen. Activities under this component will build on previous NCRIS funding rounds which have worked with Virtual Laboratories and NCRIS domain capabilities, aligned programs of work with NeCTAR, ANDS and the AAF, and this will continue to build on constructive relationships with ANDS, RDS and the Cloud/RDS Node operators.

The strategic activities component seeks to progress key aspects coming from the eResearch Framework by consultation through engaging, planning and partnering. This component supports:

- Research and NCRIS domain capabilities engagement and planning
- eResearch NCRIS capability alignment and planning

One of the key issues for NeCTAR's Annual Business Plan is potential changes to NCRIS eResearch capabilities structures, and possible timelines for transition. Rhys Francis' proposed eResearch Framework emphasises the role of NCRIS eResearch capabilities in supporting the NCRIS domain capabilities, and there is considerable incentive for NeCTAR to increase alignment in NCRIS 2016. The Framework was completed in early May, however, it is unclear when transition could begin to the proposed new structure, as the Framework will now feed into the NCRIS Roadmapping exercise (to be completed by end of 2016). The

Strategic Initiatives component provides some flexibility in responding to this transition as requirements become clearer.

Initiatives will be identified by negotiation in alignment with national research priorities, future eResearch transition, and improving the value of the NeCTAR programs and investments to the Australian research community.

<b>Strategic Initiatives</b>	<b>\$500,000</b>
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### 3.5. Directorate

The Directorate will continue to operate through the period with funding support from the identified Governance components of the NeCTAR NCRIS 2015 Final Project Plan and this proposed allocation from the NCRIS 2016 funding. This includes salary for Directorate staff, with the exception of those salaries for the Deputy Directors, which are located within the Virtual Laboratory Support and Research Cloud Operations programs.

<b>NeCTAR Directorate</b>	<b>\$501,000</b>
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## 4. Key Performance Indicators

Key Performance Indicator	Estimate
<b>Virtual Laboratory Support: Common Services and Operations</b>	
Percentage of funded Virtual Laboratory projects aligning with NCRIS domain capabilities.	50%
Fraction of Virtual Laboratory projects utilising services provided through the common services and operations sub-component.	50%
Increase in number of research users of the Virtual Laboratory programs.	50%
Fraction of Virtual Laboratories providing support for Australian industry.	30%
<b>Research Cloud Operations</b>	
Number of Virtual Laboratory projects operating production infrastructure on the Research Cloud and NSP	8
Number of NCRIS and Super Science capabilities operating key infrastructure on the Research Cloud and NSP	>6
Overall resource availability across the NeCTAR Research Cloud nodes	>98%
Breadth of uptake of Research Cloud and NSP services: Fraction of Resource Allocations across 2-digit Field of Research (FOR) codes.	90%
Number of registered users of the Research Cloud and NSP service	8000
Number of research cloud allocations supporting national services/activities/organisations	200
Number of research cloud allocations supporting multi-institution collaborations	200

## 5. Financial Summary

A summary of expected (GST exclusive) expenses for the NeCTAR NCRIS 2016 investment broken down by major component is provided in the following table.

Expected Expenses	Research Cloud Federated Operations	Research Cloud Node Operations	Virtual Laboratory Support	Strategic Initiatives	Directorate
Operation, management and governance costs	\$162,000		\$420,000	\$50,000	\$355,000

Salaries and on-costs for technical staff	\$716,000	\$608,000	\$1,600,000	\$400,000	
Infrastructure maintenance					
Utilities		\$462,000			
Rent					
Consumables					\$12,000
International				\$50,000	\$62,000
Industry engagement and outreach	\$72,000				\$72,000
Other					
<b>Total:</b>	<b>\$950,000</b>	<b>\$1,070,000</b>	<b>\$2,020,000</b>	<b>\$500,000</b>	<b>\$501,000</b>

## 6. Risk Management

The NeCTAR NCRIS 2016 Project will continue to follow the risk management strategy articulated in the NeCTAR NCRIS 2013 Final Project Plan and through the NCRIS 2015 Annual Plan.

Analysis of the program wide key risks and proposed management strategies are included below.

Furthermore, each of the infrastructure and services operators are required to actively manage internal risks through their obligations under the agreements with NeCTAR.

### 6.1. Report against the NeCTAR NCRIS 2013 Project Plan Risk Strategy

#### **Risk: Delays in appointing staff to roles funded through NeCTAR NCRIS projects**

Likelihood: Medium, Impact High

*Impact:* Delays in appointing key operational staff will impact on the timely delivery for improvements to service operations and the availability of higher-level services.

*Mitigation:* Many staff are already in place, but the continuation one year contracts can impact on staff turnover. Existing operators of the NeCTAR infrastructure are well placed to access appropriate expert staff through their relationships with key eResearch and IT stakeholders through recruitment and secondment. Secondment of staff from partner organisations has provided an appropriate mechanisms for rapidly filling key early roles.

*Status:* It is not yet clear in the ongoing state of flux in the eResearch sector will cause some staffing issues.

#### **Risk: Delays in establishing Research Reference Group**

Likelihood: Medium, Impact Moderate

*Impact:* Delays in identifying and recruiting appropriate representatives for participation on the Research Reference Group are delaying the voice of the research users to inform the operations and direction of the Research Cloud and NSP platforms.

*Mitigation:* Prioritise agreement on a strategy for nomination and selection of representatives on the Research Reference Group. Members of the PSC, VLAG and the NeCTAR Project Board to assist the Directorate in supporting nominations from the identified stakeholders groups. The VLAG can also provide an alternative method for access to the voice of the research users.

*Status:* No progress has yet been made in appointment of the Research Reference Group. NeCTAR commits to work with the nodes to renew efforts to progress establishment of this important body

in 3 2016.

### **Risk: Failure to achieve stable operations for infrastructure and services**

Likelihood: Moderate, Impact: High

*Impact:* Failure to meet agreed expectations for robust and responsive operations to agreed service levels will negatively impact on the delivered value for Australian research, reduce uptake and utilisation of services and impact negatively on attempts to establish sustainable models for ongoing operations of the services.

*Mitigation:* Continue to maintain a robust framework for transparent reporting of service levels and service availability. Maintain a comprehensive monitoring framework for early identification of service problems and the operational teams to respond rapidly.

*Status:* Delivery of high levels of availability and stability in the cloud fabric operations has largely been achieved. The overall availability and reliability of these services is reported transparently through the <http://status.rc.nectar.org.au> website and additional internal reporting is now available as an outcome of Work Package 2. Core Services operations (Work Package 1) have developed and are operating under an "Operating Level Agreement" which outlines service and response targets for both core services and node operations. User Support (Work Package 2) are now working to a set of operational targets that are monitored by the User Support Control Group and the PSC.

### **Lack of uptake and utilisation of offered services and infrastructure**

Likelihood: Low, Impact: High

*Impact:* Reduction in delivered value to Australian research. Current experience suggests the likelihood is low. The existing NeCTAR infrastructure is seeing high demand, with over 7,500 users of the Research Cloud, and 10,000 users of the Virtual Laboratories..

*Mitigation:* Clear plan for communications of the value of the NeCTAR services coordinated across the operators and stakeholders of the current infrastructure providers and service operators. Prioritise operation of services with end-user self-service capability and low barriers to initial access and use. Training and outreach activities engaged with research disciplines.

*Status:* The NeCTAR Research Cloud continues to show strong progress in uptake and utilisation by the nodes of the Research Cloud, as reported at <http://status.rc.nectar.org.au>. Issues in the efficiency of utilisation of the infrastructure by the cloud have been and are continuing to be addressed in 2016 through refinement of the resource allocation process, improved overcommitment of resources, and improved processes around trial access.

### **Failures in Governance to achieve the project objectives**

Likelihood: Low, Impact: High

*Impact:* Failures in the governance arrangements may lead to reduced delivery of infrastructure and services, fragmentation in service offerings, failures to deliver key infrastructure and impact negatively on establishing a basis for sustaining operations beyond 2017.

*Mitigation:* Each of the governance bodies will operate in a manner which provides high levels of transparency to other governance bodies in order to identify at an early stage emerging issues and breakdowns in the existing governance arrangements.

*Status:* Information flow between NeCTAR the Project Board and the members of the PSC has been achieved with the appointment of an independent chair of the PSC, who is a full board member.

## 6.2. Additional Risks associated with this Annual Business Plan

### **Failure to maintain the Research Cloud Federation**

Likelihood: Moderate, Impact: High

*Impact:* During the term of this Plan, all nodes are beyond their contracted obligations to continue to operate the project infrastructure within the NeCTAR Research Cloud federation based on identified co-investment. Nodes choosing to close down operations would impact on the ongoing delivered value of the program and the

*Mitigation:* Seek to continue to demonstrate and deliver to the node operators the efficiency benefits of participating in the federation as well as the additional value to researcher users of a single national cloud fabric. Support the node operators to establish sustainable business models for continued operation of the infrastructure. Continue to advocate for continued Commonwealth funding support for Research Cloud node operations. Furthermore, the NeCTAR Funding agreement includes a requirement that subcontractors continue to use the asset in accordance with the agreement and for the purposes of the Project.

### **Failure to deliver the expected enhanced uptake and delivery of value in the Virtual Laboratory Reuse and Uptake Enhancement project**

Likelihood: Moderate, Impact: Moderate

*Impact:* That the proposed Virtual Laboratory Reuse and Uptake enhancement projects fail to deliver the expected additional enhanced uptake by the target research communities.

*Mitigation:* Each project will be encouraged to establish projects where they have existing strong links and alignment with the target research communities. NeCTAR will require that sub-project governance includes strong representation by leaders within the target research communities.

### **Delays in appointing staff to Virtual Laboratory Reuse and Uptake Enhancement projects**

Likelihood: Moderate, Impact: High

*Impact:* Delays in initiation execution of the programs of work and delivery of infrastructure within the sub-projects, which could be exacerbated by internal restructures in organisations such as CSIRO. Given the limited timeframes available for execution under this Plan this may severely impact on ability to expend the funding and require significant descoping of projects and consequent loss of value to the sector.

*Mitigation:* The confirmation of ongoing NCRIS funding for ten years has assisted in ensuring that staff retain some confidence of ongoing employment and choose to remain in the sector. Each Virtual Laboratory undertakes its own risk management to ensure availability of expert staff to commence work on the proposed sub-projects.

### **Delays in approval and contracting of Virtual Laboratory projects**

Likelihood: Moderate, Impact: High

*Impact:* Lengthy delays in development of proposals, review and approval, and in contracting will have high impacts on ability to deliver high value sub-projects in the constrained timeframe of the NCRIS 2016 funding period and may lead to descoping and additional loss of value.

*Mitigation:* Discussions have begun with the community on potential funding criteria and template elements (Virtual Laboratory Workshop April 2016, and Virtual Laboratory Advisory Group meetings), which will be similar to previous rounds. The Directorate will continue to build on its experience under NCRIS 2013 and NCRIS 2015 to establish efficient review and approval of proposals. Projects will receive extensions of existing contracts rather than new contracts, reducing contracting timelines, and high readiness within the Directorate will be established to issue the call for proposals following the approval of NCRIS 2016 funding.

#### **Failure to deliver adequate benefit and impact from use of the infrastructure by Australian researchers**

Likelihood: Low, Impact: High

*Impact:* Reduced delivery of value arising from the Research Cloud infrastructure leading to sub-optimal delivery of impact on Australian research. A failure to capture information on benefits and impacts can lead to poorly targeted delivery of services and infrastructure to the Australian research community. Failure to adequately measure and report the delivered benefits and impacts can lead to the infrastructure being under-valued by supporting organisations and agencies.

*Mitigation:* Continue to improve the capture and reporting of benefits and impacts on Australian research, which has included the obligation to report impacts by resource allocation recipients. Reporting enforcement measures have been implemented, such as a requirement to provide impact reports before renewal of resource allocations. Review the reported impacts and benefits to ensure the infrastructure remains targeted to maximise the impact on Australian research.

#### **Failure to respond quickly to 2016 National Research Infrastructure Roadmap and eResearch Framework recommendations**

Likelihood: Medium, Impact: High

*Impact:* The ongoing relevance of the NeCTAR project will be affected by NeCTAR's ability to respond to the requirements of these reviews.

*Mitigation:* The ability of NeCTAR programs to respond in a timely manner to recommendations from the 2016 National Research Infrastructure Roadmap and eResearch Framework will be affected by the timing of the release of these outcomes (end of 2016 at earliest). To mitigate this, NeCTAR will begin some transitioning to align with recommendations of eResearch Framework in July 2016, and initiate Strategic Initiatives funding allocation to enable focus on emerging priorities.

## **7. NeCTAR Capital Renewal Path - 5 year plan**

NeCTAR is proposing a capital refresh and renewal plan that includes:

- An urgent need for replacement of end-of-life cloud computing infrastructure procured under Super Science EIF funds (\$8M).
- Transition to a continuous, rolling capex/opex investment strategy (\$4M per annum)
  - which is well suited to cloud computing technologies and provides capacity to respond to emerging need, technology evolution and commercial cloud providers.

### **7.1. Urgent Capital refresh**

During the 2016-2017 NCRIS funding period, two thirds of the original NeCTAR research cloud infrastructure, established under the Super Science EIF funding, will exceed the 3 year replacement cycle (with much of the equipment older than 5 years). A renewal of this capacity is urgently required to support the priority needs of the instrument and data-intensive NCRIS capabilities and existing research users of the



Research Cloud aligned to national research priorities. A refresh of the remaining capital investment will be required in the following financial year. A level of capital funding comparable to the original EIF-funded infrastructure investment (\$12M) will maintain a comparable base level of capability and fitness for purpose.

Proposed Research Cloud Capital Renewal and Operating Expenditure					
	2017-18	2018-19	2019-20	2020-21	2021-22
Capital	\$8000k	\$4000k	\$4000k	\$4000k	\$4000k
Operations	\$3300k	\$3300k	\$3300k	\$3300k	\$3300k

(Figures are not indexed.)

Based on NeCTAR experience, we expect to attract up to 40% direct sector co-investment in the combined capital and operating budgets. NeCTAR and RDS propose a more streamlined, interoperable future investment in cloud computing and storage infrastructure.

### 7.2. Continuous Capex/Opex Re-investment Strategy

After addressing the initial need for capital replacement, ongoing research cloud capital renewal would be best delivered through an annual investment in capex based on an estimated base funding rate of \$12M over a 3 year cycle. Annual operating funds for the base level of infrastructure capacity are estimated at \$3.3M per year (20% of the capital expenditure plus cloud fabric operating costs and national user support). It is expected that access to commercial resource providers as well as sector-based will be supported over this time period.

### 7.3. Additional Capacity Growth through Sector-based Investment

The Research Cloud has a proven ability to attract further sector investment in additional capacity. This NCRIS investment will drive greater coherence in the way institutions, research organisations, research centres and communities invest in computational and data infrastructure; leading to a more inter-operable, coherent and cost-effective national collaboration and resource sharing platform.

Current growth in demand (45% per annum) and further uplift in demand, due to improved cloud storage provisioning through the RDS capital re-investment, lead to projections of a potential **further investment from the sector of up to \$27M** over the 5 year period. Close alignment of future RDS storage investments with the NeCTAR cloud will provide significant benefits. We would suggest a capital plan which addresses just cloud compute in isolation from storage is unlikely to deliver the optimal outcome.

### 7.4. Renewing investment in Virtual Laboratory infrastructure

While the Virtual Laboratory program does not require an investment to refresh physical capital, NeCTAR advocates for a renewed investment to meet the demand for creation and development of new Virtual Laboratories and re-investing in the existing Virtual Laboratories to address evolving research needs.

## 8. Update to NeCTAR NCRIS Industry Engagement Plan

An updated version of the NeCTAR NCRIS Industry Engagement Plan is submitted separately (attached).

DECLARATION

I confirm that the information in this report is true and correct to the best of my knowledge following due investigation.

\_\_\_\_\_ Date: \_\_\_\_\_  
Signed

\_\_\_\_\_  
Name

\_\_\_\_\_  
Position