Australian National Data Service (ANDS)

National Collaborative Research Infrastructure Strategy 2013 (NCRIS 2013) (Extension)

BUSINESS PLAN 2015-16

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1   Executive Summary

This Annual Business Plan describes the planned activities and outcomes of the Australian National Data Service (ANDS) for 2015-16. It describes the activities based on two possible funding situations: firstly, what ANDS intends to do with the remaining $2.7M of existing NCRIS 2013 funding, and secondly what it will do with additional NCRIS 2015 funding, which has not yet been confirmed but is anticipated to be a modest increase on existing funding. Necessarily it is not possible to provide exact financial plans, so this report describes activities and provides percentages that will provide information that shows the relative levels of effort on different activities. There are no major new directions that are described in this business plan, but it does strengthen one particular direction, which is an increased focus on research data over national and institutional infrastructure. The reason for this is quite clear – Australia should exploit its research data advantage now. The increased focus internationally on research data means that Australia's leading position should enable increased focus on data intensive and data complex challenges now.

ANDS was established in January 2009 following the ANDS Establishment Project. ANDS was originally created as part of the National Collaborative Research Infrastructure Strategy (NCRIS) initiative to ensure that research data is used as effectively as possible by Australian researchers. The Super Science initiative announced in May 2009 provided additional funding from the Education Investment Fund (EIF) to establish the Australian Research Data Commons (ARDC). This provided the opportunity to leverage both NCRIS and EIF funds to build a co-ordinated set of programs through to June 2013. As a result of additional Collaborative Research Investment Scheme (CRIS) funding, and then NCRIS 2013 funding, ANDS has been funded to operate until June 2015. Expenditure against original NCRIS and EIF funding concluded in June 2014. As a result of uncertainty with regard to funding in 2015-16, ANDS management, in consultation with the steering committee, the lead agent, and partners and government, determined that it was appropriate to delay some of the NCRIS 2013 funding. This plan describes activity funded by NCRIS 2013 funding and outlines proposed addition activities when anticipated additional NCRIS 2015 funding becomes available.

ANDS exists to transform Australia's research data environment by making Australian research data collections more valuable by managing, connecting, enabling discovery and supporting the multiple use of this data. The purpose of this activity is to enable richer research, more accountable research, more efficient use of research data, and improved provision of data to support policy development. The outcome of this activity will be that Australia's research data as a whole becomes a nationally strategic resource.

This document describes ANDS' plans for the 2015-16 financial year. This plan is in accordance with our extended strategic direction and describes an increased focus on data rather than principally focused on data infrastructure. Rather than institutions just focussing on meeting ANDS' goals, the team will encourage organisations, research groups and researchers to realise their own research data ambitions.

The work of ANDS will continue to be carried out under four programs:

- **National Engagements** with government, institutional, discipline and national facility data providers
- **National Services** including registration, publication, discovery, and advisory services
- **Institutional Engagement** with all of Australia's major research institutions

- **International Collaboration** with data infrastructure providers to ensure that Australian research data infrastructure is compatible with international approaches.

(Note that the National Collections Program has been renamed the National Engagements Program to reflect a wider role in collections development and collections service development.)

Significant progress has been made to date and by June 2015 ANDS will have:

- Populated the ARDC with over 100,000 collections descriptions discoverable through Research Data Australia, Google and other mechanisms

- Maintained national data services

- Helped establish coherent institutional research data infrastructure

- Improved the ability of the Australian research system to coherently manage Australia's research data assets

- Increased the international collaboration over research data

- Increased the connectivity of data assets to researchers, projects, outputs and services, including data storage services and new data tools and services, and through these activities

- Increased the value of Australia's research data assets

During 2015-16 ANDS will work to ensure the following outcomes are achieved:

- A richer more valuable set of research data collections with appropriate tools and services will be available to Australian research

- Collections that are formed, whether they are by NCRIS capability, public sector or research institutional partners are published appropriately though integrated services

- Data storage services will be more tightly integrated with other data services both institutionally and nationally

- Institutional data services evolve to be institutional enterprise services, still integrated coherently with national systems

- ANDS will continue to deliver valued and reliable national data technical and advisory services

- An ARDC with more data collections that have been managed and connected, ensuring over 100,000 collections descriptions discoverable through Research Data Australia, Google and other mechanisms

- Continued support and expansion of Australia's research capability and capacity to work with research data

- ANDS continues to be as a trusted partner of research institutions

- Australia continues a leading role in research data infrastructure internationally, particularly through the Research Data Alliance

By the end of 2015-16 researchers across every discipline and at nearly every research institution will be represented in the Australian Research Data Commons, and nearly all research institutions will have improved their research data management, leading to routine publication of their data with ANDS persistent identifiers into a data store that feeds information to the ANDS collections registry. In addition, researchers will be able to find and use a wide variety of data sets using the ANDS data pages

through a variety of discovery paths, and more institutions will be successfully engaged in meeting their responsibilities described in the *Australian Code for the Responsible Conduct of Research*. They will support researchers with good data management reflecting the ARC mandated data management plans. ANDS will have helped Australia maintain a leading international role in research data infrastructure. Importantly ANDS will be a trusted partner of the research community in transforming research data practice.

2   ANDS Context and Approach

Research is becoming more data intensive, and the data it generates is becoming more complex. Moreover the problems being tackled are increasingly large scale and span multiple disciplines. Consequently, and as a result of high level Government reviews, the Government has invested in improving the Australia's research sector's capability to use and re-use research data. This was guided first by the NCRIS roadmaps and then by the document entitled *Towards the Australian Data Commons[1] (*TADC*).*

In support of this goal, *Towards the Australian Data Commons* identified a range of objectives for ANDS. These objectives were based on the belief that "ANDS can contribute most effectively by developing services and activities that enable stewardship within multiple federations of data management and data user communities" (p. 6). TADC identified a number of longer-term objectives for data management:

a)   A national data management environment exists in which Australia's research data reside in a cohesive network of research repositories within an Australian 'data commons'.

b)   Australian researchers and research data managers are 'best of breed' in creating, managing, and sharing research data under well-formed and maintained data management policies.

c)   Significantly more Australian research data is routinely deposited into stable, accessible and sustainable data management and preservation environments.

d)   Significantly more people have relevant expertise in data management across research communities and research managing institutions.

e)   Researchers can find and access any relevant data in the Australian 'data commons'.

f)   Australian researchers are able to discover, exchange, reuse and combine data from other researchers and other domains within their own research in new ways.

g)   Australia is able to share data easily and seamlessly to support international and nationally distributed multidisciplinary research teams. (p. 6)

As a result of these goals, initial activity, and consultations, ANDS role is to enable Australia's research data to be transformed:

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[1] Available online at http://ands.org.au/towardstheaustraliandatacommons.pdf

From Data that are:	To Structured Collections that are:
• Unmanaged	• Managed
• Disconnected	• Connected
• Invisible	• Findable
• Single use	• Reusable

This is delivering and will continue to deliver a nationally significant resource so that Australian researchers can easily publish, discover, access and use Australian research data.

ANDS is doing this by first creating the Australian Research Data Commons (ARDC), the focus of the Super Science project. The ARDC is a combination of the set of shareable Australian research collections, the descriptions of those collections including the information required to support their re-use, the relationships between the various elements involved (the data, the researchers who produced it, the instruments that collected it and the institutions where they work), and the infrastructure needed to enable, populate and support the commons. ANDS does not hold the actual data, but points to the location where the data can be accessed. The ARDC can be envisaged below, where ANDS is contributing to the green pipes and boxes:
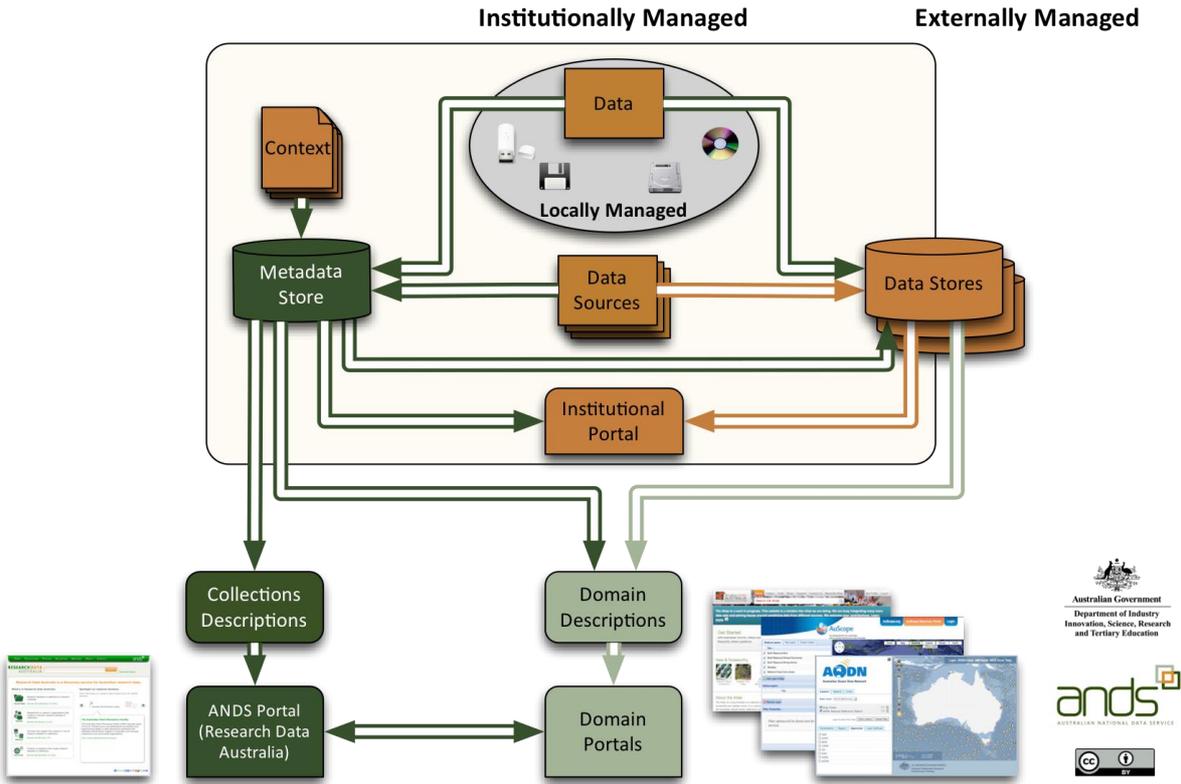

Figure 1: Australian Research Data Commons

ANDS is thus creating a combination of national services and coherent institutional research data infrastructure, combined with the ability to exploit that infrastructure with tools, policy and capability. To deliver against these objectives, ANDS has four inter-related programs of activity (Institutional Engagement, National Services, National Engagements, and International Collaboration).

The ANDS activities, whether CRIS funded or NCRIS 2013 funded, have been conducted under the same management structure, thereby maximising opportunities for cost savings. However, as required by contract, separate reports will be provided to the Department for the CRIS project and NCRIS 2013 project activities that took place in FY 2013-14. ANDS has also entered into two other Funding Agreements with the Department. The first agreement was to progress outcomes arising from the First Joint Australia-EU Research Infrastructure (RI) Workshop in June 2011. Subsequently, in 2012, two more agreements were entered into, for the Second Joint RI Workshop, and the Data Web Forum, all of these concluded by June 2014. This business plan provides a combined view of how ANDS intends to execute NCRIS 2013 activities in 2015-16.

The programs, or components, are:

- **National Engagements**, ensuring that the formation and curation of research data collections, together with associated services, is maintained (this has been renamed the National Engagements Program to reflect a wider role in collections development and collections service development);
- **National Services**, ensuring that the research data services, both technical and advisory, that have been established under the ANDS programs to date are maintained;
- **Institutional Engagement**, ensuring that institutional research data infrastructure is maintained, and continues to develop in a cost effective and nationally coherent manner; and
- **International Collaboration**, ensuring that the research data collaboration internationally is maintained, principally through the established international partnerships, notably the Research Data Alliance.

These four programs, taken together, will enable ANDS to continue its data partnerships with:

- Research institutional partners – focused on the Universities and the PFROs.
- Research data providing partners – this includes NCRIS capabilities, national data generating facilities, public and private sector data providers, international data providers, and the public.
- Research data infrastructure partners – this includes RDS, NeCTAR, NCI and Pawsey, regional data service providers, and institutional eResearch partners
- International partners, notably through the Research Data Alliance, but including the US, the EC, New Zealand, U.K, the Dutch, amongst others.

The particular focus of this phase of ANDS activity is research data. ANDS will ensure that the infrastructure that has been set up through the Australian Research Data Commons is maintained and operated, however there will be increased emphasis on making data visible, available and reusable. This will be carried out using both the internal resources of ANDS as well as partnerships funded by three new engagements:

- Major Open Data Collections engagements – partnering with research institutions to promote collections of enduring significance to institutions that support their research strategy and their research partnerships strategy. The result of these engagements will include twenty four internationally significant open data collections that are supported by institutions and that exploit Australia's research data infrastructure.
- The Access to Data for Research Infrastructure Capability Areas engagement will enable ANDS to partner and fund the six capability areas that are data intensive, and already have a strong ANDS

partnership, to provide continued support for data collection publication, to enable services that are being generated through the Nectar Virtual Laboratories to be connected, provide long term access to data, reliable access to collections via rich descriptions, and connections to international collections through Research Data Australia.

- The Maintaining Connections engagements would ensure that connections between institutional metadata stores and RDSI node data registries enable institutions to have a comprehensive view of their research data assets, as well as ensuring connections between the collections held on RDS nodes, their descriptions in Research Data Australia, and the developing data services, such as ones being developed through the Nectar Virtual Laboratories are connected.

As a consequence of these activities there is an over-arching outcome; Australian researchers now have access to infrastructure that enable them to:

- Systematically, reliably and authoritatively connect their research data to project, institutional and disciplinary descriptions

- Simultaneously publish citable research data collections through institutional, disciplinary and national services.

This will ensure that Australia has a mature, globally leading capability in research data, making it a key locus for data intensive research. This capability will be demonstrated by leading researchers in a variety of disciplines to show the power of this infrastructure to enhance their research.

3 Status of Project

The status of the Australian National Data Service can best be understood in terms of its four sequential stages: establishment, initial NCRIS funding, Super Science funding, additional funding, and time extension.

3.1 Establishment

The Australian National Data Service can trace its beginnings back to the Platforms for Collaboration (PfC) capability as part of the development of the National Collaborative Research Infrastructure Strategy. Following the approval of the overall PfC investment plan by NCRIS, an implementation workshop with wide representation was held to confirm the proposal to establish the Australian National Data Service (ANDS). This workshop took place on May 29, 2007. It endorsed the ANDS concept and proposed that a technical working group (the ANDS TWG) should be formed and in October 2007 produced *Towards the Australian Data Commons: A proposal for an Australian National Data Service[2]*.

In late 2007, the then Department of Education, Science and Training (DEST) asked Monash as the lead agency to work with ANU and CSIRO on a project to take the next step and establish the Australian National Data Service (ANDS). The ANDS establishment project concluded in December 2008.

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[2] http://ands.org.au/towardstheaustraliandatacommons.pdf

3.2   NCRIS funding

The ANDS Draft Interim Business Plan was submitted in September 2008, and the Interim Business Plan was submitted in December 2008. ANDS commenced officially in January 1 2009. By March 1, 2009, ANDS had 16 staff. NeAT Round 1 projects were underway and a second round of NeAT projects was identified.

3.3   Super Science Funding

In the May 2009 budget, the Commonwealth government announced a series of initiatives collectively labelled as Super Science. The ANDS 2009-10 business plan was submitted in March 2009 (prior to this announcement) and accepted in July 2009 (post this announcement). The substance and execution of this plan was substantially affected by the ARDC project (announced under the Super Science program and funded from EIF). Consequently considerable effort was expended on creating a project plan for the ARDC that was complementary to the NCRIS-funded activities.

The ANDS Steering Committee decided in mid 2009 to recommend to the then Department of Innovation, Industry, Science and Research (DIISR) that ANDS manage the NCRIS-funded and EIF-funded activities as an integrated project. The Steering Committee also decided to reshape the portfolio of ANDS programs to better reflect the implications of, and constraints on, the added funding. As a consequence, the existing separate Frameworks and Capabilities programs were merged, and the Utilities program was moved from NCRIS-funded to EIF-funded and renamed ARDC Core. Four new EIF-funded programs were instated: Data Capture, Metadata Stores, Public Sector Data, and Applications. In the period July 2009-March 2010, ANDS consulted widely on these changed plans, and after some fine-tuning to respond to consultation feedback commenced executing against them.

3.4   Additional Funding

As previously described, ANDS has also entered into three other Funding Agreements worth a total of $462K with the Department. The first agreement was to progress outcomes arising from the First Joint Australia-EU Research Infrastructure (RI) Workshop in June 2011. Subsequently, in 2012, two more agreements were entered into, for the Second Joint RI Workshop, and the DataWeb Forum. The DataWeb Forum has provided partial funding for Australia's participation in the establishment and development of the Research Data Forum (previously called the DataWeb Forum).

In April 2010, an opportunity arose to ask the Department whether a short extension might be possible for ANDS, and they advised that there was an opportunity to extend for a further period of two years to harmonize with other NCRIS and EIF investments. ANDS staff and the Steering Committee managed to identify shifts of funding and timing across reasonably permeable boundaries that still delivered a viable ANDS, one able to continue to deliver on behalf of the Australian research community through to June 2013. This extension of time required a re-allocation of funds between programs, as well as a change to the funding profile within programs. It also required the funding of the project office over a much longer period. Consequently an additional $0.5M was provided by the Department under NCRIS funding to support the operation of ANDS over a longer period. A three-year high-level project plan was developed, so that ANDS:

- honoured all existing commitments

- continued with existing partnerships - this means continuing to actively engage with the research institutions

- retained the capacity to work with data champions

- maintained an ongoing capability of engaging with the sector.

A further extension was sought in order to most effectively use the CRIS funds, as they were sufficient for only 7 of the 18 month period from July 2013 to December 2014. The project plan shows an uneven level of expenditure (as ANDS had already made substantial commitments) but does balance the need to engage with the sector over a longer period of time, and to demonstrate value early. The chart in the finance section shows the intended expenditure pattern for the various programs. This chart shows the expenditure against the newly constituted programs, mapping the previous structure to the new structure.

Another important variation to the ARDC project contract, agreed in March 2011, replaced quarterly milestone reports being delivered individually with annual reporting that incorporates reports on ARDC progress as well as NCRIS progress.

During this time ANDS reorganised its programs into four merged programs: National Collections (now National Engagements), National Services, Institutional Engagement, and International Collaboration.

3.5   NCRIS 2013 Funding

ANDS was offered $13.05M additional funding to maintain Australia's research data and research data infrastructure. This funding is not to develop new capability but to protect Australia's research data infrastructure advantage, to ensure that Australia remains a research data partner of choice and that infrastructure developed to date is maintained. The decision was taken to emphasise maintenance of national services, and access to research data collections, notably open data collections, over research data infrastructure that has been established at institutions.

As a result of uncertainty with regard to funding in 2015-16, ANDS management, in consultation with the steering committee, the lead agent and partners and government, determined that it was appropriate to delay some of the NCRIS 2013 funding. This business plan provides a description of the expenditure of remaining funds in 2015-16.

As well, it provides an outline of proposed additional funding activities, assuming that NCRIS funding for 2015-16 is made available as anticipated.

3.6   The Function of ANDS

ANDS exists to transform Australia's research data environment by making Australian research data collections more valuable though improved management, more richly connecting data, enabling discovery and supporting the multiple use of this data. The purpose of this activity is to enable richer research, more accountable research, more efficient use of research data, and improved provision of data to support policy development

The ANDS project now spans the period from January 2009 to June 2015. The function of ANDS to help transform Australia's research data environment will not be completed by June 2015. As a consequence ANDS will develop a map of the function of ANDS over 10 years informed by *Towards the*

Australian Data Commons. This will determine future directions necessary to ensure the effective delivery of the broader 2011 Strategic Roadmap for Australian Research Infrastructure.

3.7 ANDS Programs and their Transformation

Originally there were nine programs established to conduct the work of ANDS and these have been modified, concluded and reshaped over time into the current four programs:

- **National Engagements** with government, institutional, discipline and national facility data
- **National Services**, including registration, publication, discovery, and advisory services
- **Institutional Engagement** with all of Australia's major research institutions to ensure effective research data technologies and infrastructure
- **International Collaboration** with data infrastructure providers to ensure that Australian research data infrastructure is compatible with international approaches.

The following table shows the intended size and focus of the programs over the NCRIS 2013 funding period. It takes into account interest earned as well as project funding (excluding CRIS funding).

Programs	NCRIS 2013 ($M)	%	Focus
National Engagements	1,718.11	13.01%	Institutions
National Services	2,238.79	23.15%	ANDS
Institutional Engagement	7,541.32	50.97%	Institutions
International Collaboration	838.17	5.4%	ANDS
Governance and Management	744.03	7.47%	ANDS
Total Allocated Funds	**13,080.41**		

Table 1: Total allocated funds (NCRIS 2013) by Program until December 31, 2015

Notes:

- National Engagements distributions are through a combination of CSIRO and Monash with Monash disbursing contract payments directly.
- National Services distributions are through a combination of ANU and Monash with Monash disbursing some contract payments directly.

The next table shows the intended size and focus of the programs over the NCRIS 2013 funding period, up until June 2016, assuming new funding representing a modest increase over current funding.

Programs	%
National Engagements	21%
National Services	40%
Institutional Engagement	35%
International Collaboration	4%
Total Allocated Funds	**100.0%**

Table 2: Intended allocation of funds (NCRIS 2013) by Program until June 30, 2016

3.8   ANDS' Principles

In responding to the new objectives and program requirements, ANDS continues to follow its foundational principles:

Commons Framework: ANDS has started in a way that anticipates the need to scale up and adapt over time via an extensible framework of data stores, federations and services that enable better data creation, capture, management and sharing.

Focus: ANDS will continue to identify and work with those who are ready, willing and able to contribute significantly to the ARDC vision, and who provide the most strategic return to the ARDC for the effort expended. However, ANDS will endeavour to support all of the larger research institutions directly, in order to rapidly achieve critical mass.

Content: ANDS is initially focussing on content recruitment into stores and federation across stores so as to achieve a wide coverage of data quickly at an agreed level of quality; in later years the emphasis will shift towards quality improvement.

Service Provision: ANDS is focussed on service provision and infrastructure development, not research and exploration; its programs will develop, integrate, and continually improve production-level systems in support of well-understood services.

Strategic Partners: ANDS recognises the need to be open to, and engage appropriately with, innovations and external institutions relevant to the ARDC, including the Australian Access Federation (AAF), the National Computational Facility (NCI), the National eResearch Collaboration Tools and Resources (NeCTAR) and the Research Data Stores Initiative (RDSI).

Stores: ANDS assumes an environment where storage and long-term curation occur in nationally or institutionally-supported stores, either existing or brought into being over the life of ANDS. These stores will preferably hold objects described by various discipline-specific and documented metadata schemas. ANDS will work with whatever repositories exist, national, institutional or disciplinary.

Sustainability: Research data management requires a long-term commitment. ANDS has developed its plans on the assumption that the current funding does not represent a one-off investment in data.

The enduring changes forecast in this document within each program are also intended to be sustainable beyond the end of the ANDS planning period.

3.9   Scope

Constituency: ANDS works with a variety of publicly funded institutions that produce, manage or consume research inputs and outputs to achieve its aims. The scope includes:

- all Higher Education Providers in Australia

- all research organisations that are publicly funded, including CSIRO, GeoScience Australia (GA), Bureau of Meteorology, Australian Bureau of Statistics (ABS), Australian Institute of Marine Science (AIMS), the Australian Antarctic Division, Departments of Primary Industry

- members of the cultural collections sector (galleries, libraries, archives and museums).

Note that with an increased focus on the research sector's engagement with industry over data, industry is not a direct target of engagement, but it will be a focus of how **ANDS engages** with the research sector.

ANDS has been funded to work with all research disciplines in Australia, not just the NCRIS capabilities. This means that the specific concerns of the Humanities and Social Sciences are also taken into account.

ANDS Community: The ANDS Community consists of providers of research data and ANDS services, consumers of research data and those services, and managers of research inputs/outputs. This includes key stakeholder aggregations such as CAUDIT (The Council of Australian University Directors of Information Technology) and CAUL (The Committee of Australian University Librarians). The ANDS Community includes the general public only to the extent that they will be able to use some ANDS services to discover and access publicly available data.

Data: ANDS is concerned with the digital data that is produced by researchers as well as data that is used by and made accessible to them. Data is the information that researchers study, that is transformed by researchers and produced by researchers. Research publications are not included within the scope of ANDS but files, images, tables, databases, models, computer outputs, and similar digital representations are included. ANDS will support the ability to create links between data, publications, software code and visualisations, where these may appear as either research inputs or research outputs.

3.10   ANDS' Impact

3.10.1   Research Data Collecting Institutions Overview

Collections Approach

As the concept of data publication and sharing gains traction, and the volume of data available in the Australian Research Data Commons increases, the value of taking a collections approach is becoming apparent. This approach has long been used in libraries to introduce focus and applicability into the presentation of material. Collectors can track content across time series, locations or related subject. The heart of this approach is to partner with institutions to manage their data assets.

In ANDS this approach will allow the highlighting of data collections with an increasing focus on those that are of national significance. It will work with collecting institutions to bring this material together, describe it in a way that enables flexibility in presentation, helping to ensure the data is as open as is possible, and highlight it for discovery. Enabling this approach to the management of data provides the following benefits:

- enables increased discoverability and browsability of data collections
- provides a more complete picture of data on any given topic
- shines a spotlight on important and significant data
- enable new and more complex research questions to be addressed.

By working with collecting institutions, ANDS can leverage their understanding of the data and research environment in which it is created and used to develop the data descriptions that enable it to be presented in meaningful contexts.

Collection Types

There are a number of ways in which this collecting may occur.

1. Single Significant National Collections

   These collections are collected and maintained by a single institution or unit. They can be definitive, comprise specimens or observations and may be seminal in nature. Their function may be likened to reference material in libraries and be of broad uptake outside a specific discipline. However there may also be collections in this category that are largely confined to a specific discipline, but may have unexpected uses. Curation of these collections lies with a single institution. They can be seen as a significant institutional asset.

2. Collections brought together for a specific collaboration

   These are often gathered from a range of sources and they could also cross a range of disciplines. They are brought together to address a specific research activity and may be transitory in nature depending on the size and longevity of the research activity. The question of the continuing maintenance of the collection once the collaboration is complete will arise. Datasets may be repurposed. Curation of these data collections will be as varied as the number of collaborators unless data curation is identified as a specific activity within the collaboration. This may then become an issue when the collaboration is complete and funding for curation ceases.

3. Major Open Data Collections

   Data collections can enhance the strategic aims of a research institution, and strengthen partnerships. An institutionally focused major open data collection leverages significant institutional and national research data infrastructure to create one or more signature collections, that are supported by the institution, using their data management capacity.

4. Distributed Collections

   One of the values of a national metadata store is that it provides the ability to pull together 'like' data. There are two ways this can come about. One is a coordinated approach to collecting from institutions (collecting with intent) in which relevant institutions describe and publish collections with a view to their use. Examples would include the collections that are in discipline portals. Another is to do this on the fly within Research Data Australia using the metadata. This method

allows a 'slice' to be taken that crosses disciplines and formats and profiles a collection based around a topic or location. Thus a collection could be formed of the data within RDA on water that includes observations, models, photographs, historical anecdotes, commentary on water use, socio-economic impact statements etc. It has the potential to provide wider and deeper insight into a given issue. It also delivers value in the serendipitous exploration of data for innovative research and strongly supports the addressing of the 'big' questions: complex research issues. Additionally it presents data in a way that supports e-research methodologies. A characteristic of this type of collection is its fluidity. A dataset can belong to more than one collection and be presented in many contexts.

5. Institutional profiles

   While not necessarily a national collection, a collections approach has the value of being able to showcase the data produced by an institution, either as research output or as support for Australia's research effort. The value of Australia being able to showcase the data outputs of its institutions could contribute to attracting research and funding internationally.

Collections Engagement

Through the previous ANDS Institutional Engagement and National Collections programs ANDS has engaged with institutions to support their data collections and to support the role of data collecting. ANDS' focus in the National Engagements program will be on those collections of national significance, particularly those collections that may be made available through an RDSI node. In all cases the engagement has been structured to enhance the value of those collections through improved management, connectedness, discoverability, and reuse.

3.10.2 Research Institutional Engagement Overview

As many institutions are now reaching significant milestones in their data management maturity two particular aspects of ANDS' support for institutional research data management are emerging:

- the continuing relevance of ANDS' engagement with the institution as a whole

- the importance of institutions undertaking an enterprise approach in a range of areas in order to deliver the ANDS "four transformations" effectively.

At the same time, ANDS is ramping up the provision of services to allow for consistent ways of publishing, discovering, accessing and using data.

In order to bring together these services and the institutional approach ANDS is encouraging a coherent approach to research data infrastructure; without this, Australian research will be unable to reach its full potential.

ANDS plans to engage with its research institutional partners through a coordinated approach that will assist partners to achieve this coherence and realise the following benefits:

- develop knowledge of the full extent of the institution's data holdings and the subsequent ability to present it as their body of work

- secure valuable data assets for validation and reuse

- improve the institution's ability to collaborate through a consistent and supported data management infrastructure

- position the institution to be fully acknowledged in the re-use of its data by others and the consequent reputational benefits
- improve the institution's ability to demonstrate research excellence.

The development of coherent institutional research data management across the sector ultimately supports the building of a sound ARDC infrastructure.

This approach is a way of delivering a combination of services, software, policy and resourcing that will enable a research producing institution to develop and provide the necessary infrastructure so that its researchers can effectively manage their data to be published, discovered, accessed and used.

The aim of the approach should be to present a unified, consistent picture of the infrastructure, policy and procedures that ANDS thinks an institution needs to have in place for effective research data management, publishing and research support. The approach should actively support the four transformations as seamlessly and effectively as possible.

An institution with a coherent approach is one whose data infrastructure can be accessed and used across the organisation, as well as being consistent with infrastructure approaches across the sector. ANDS will continue to work to put in place services that enable and support this form of coherence across the sector. Solutions should not limit the ability of an institution to interact with the broader environment in the sector. The aim of the approach should be to enable every data collection that can be made available to be made available in a timely fashion.

The way the approach is implemented, and the focus areas that the institution chooses to address, should be in line with the larger data aspirations of that institution. That is, they should enable the institution to participate in collections of particular interest or value to them.

ANDS' role will be in encouraging, supporting and/or funding institutions to have the following coherent capabilities in place:

1. An institution wide data management policy that includes relevant planning options for researchers where appropriate.

2. IT infrastructure for the institution that enables this policy to be implemented. At the most basic level, if there is nowhere to store data, and/or no easy way to collect it into that storage, then there is no point in having a management policy for it. Equally this infrastructure should be capable of connection to IT tools that will allow for sharing, re-use and reconfiguring. These tools may have been developed locally, through ANDS funded programs such as Data Capture or Applications, through other Government funded projects such as NeCTAR, or outside Australia.

3. Co-ordination of the policy and IT infrastructure to encourage and facilitate the creation and storage of data in a fashion that will enable sharing and re-use at an appropriate future time.

4. Storage and collection mechanisms that support the capture and creation of metadata about the data, so that the data can be shared and re-used. Where possible this should be drawn from existing sources (to avoid re-keying) and be as widely shared as possible. From an ANDS perspective, these metadata should be made available in the Australian Research Data Commons.

5. Dedicated services in place to support all of the above that draw from the relevant areas of expertise across the institution.

6. Industry engagement over data through establishing valuable data collections that enable broad engagement with industry partners of choice for research institutions.

Institutions will implement research data support in a wide variety of ways that will best suit their needs. By seeking common outcomes from similar initiatives at institutions across the sector in Australia, ANDS is seeking to enable the Australian Research Data Commons to be a nationally strategic resource. ANDS will work with institutions in this way through all of its programs but with the engagement being focused through its Institutional Engagement program.

3.10.3   National Research Data Infrastructure Partner Overview

ANDS is part of the Government's investment in research data infrastructure in Australia. This investment can be seen very broadly as comprising all of the investments in research data generating activity – indeed many research grants have a substantial data acquisition component. However ANDS has a particular responsibility and opportunity to engage in partnership with other major national data infrastructure investments. ANDS has to date particularly engaged with:

- some of the major data generating instrument investments including the Australian Synchrotron, the Australian Nuclear Science and Technology Organisation's neutron beam instruments, the Australian Telescope National Facility, as well as investments in a larger number of smaller data generating instruments through investments like BioPlatforms Australia, the Australian Microscopy and Microanalysis Research Facility, and the National Imaging Facility

- the major problem or discipline focused data investments, including the Terrestrial Eco-Research Network (TERN), the Integrated Marine Observation System (IMOS), the Atlas of Living Australia, AuScope, the Australian Urban Research Information Network (AURIN), the Australian Data Archive, the Australian Biosecurity Information Network, and the Population Health Research Network (PHRN)

- the major eResearch enabling data investments including NeCTAR, with investments in data tools and data collaboration, RDSI for data storage, and the high end computation facilities to enable data analysis and generation.

ANDS' engagements to date and planned engagements have occurred across all of the ANDS programs. ANDS continues to engage with a number of capabilities on data licencing issues through ANDS' work with AusGOAL and an ANDS sponsored working group.

ANDS is focusing on nationally significant research collections though partnering with a range of collection institutions with a view to enabling Australian researchers to get better access to this data, often stored and made available through RDSI funding.

ANDS thus has engaged with a very wide range of activities in collaboration with other research data capabilities, but also participates in efforts to ensure that ANDS strong institutional focus complements other more specific investments.

The net effect of all of this activity is that the many data investments that Australia makes are enhanced by having data collectors, research institutions, and research infrastructure providers combine to give Australian researchers a significant research data advantage.

3.10.4   Funded Engagement Overview (assuming additional funding)

In the event that ANDs receives additional funds a number of funded engagements are proposed. They are described in broad outline here; further detail in the context of the 4 infrastructure programs will be provided once the funding envelope is clarified.

High Value Collections

Following the Open data programs, and the Houghton/Gruen report on the value of data, it is important to continue to work with the sector on taking existing important collections to higher value, particularly through open-ness, but also through other transformations, particularly enhancing usage of valuable data. A particular focus of value would be the enhancement of research and industry collaboration over data. This would enable the continuation of the open data programs, and especially in the health area, but also enable other forms of value adding. This would be the major focus of expenditure.

Research Data Services

Through the engagement with Nectar and NCRIS partners, data services connected to ANDS services are being developed. eResearch providers and RDS Nodes are also likely to develop data services. It is important to maintain activity that promotes data services (while not investing in the creation of new services) that is better done close to research teams and communities.

Institutional Research Data Infrastructure Connectivity

Research institutions now see data assets as needing management, and though some are choosing to continue with their particular metadata store solution to manage these assets, a new breed of asset management systems, such as Symplectic and Pure are being installed. There is a risk that these systems will remain disconnected from national systems, including Research Data Australia, so some funding is needed to maintain institutional research data infrastructure connectivity. It is imagined that this would be done through a consortial approach with institutions who are adopting similar solutions.

Institutional Research Data Capability

Many research institutions have developed significant research data capability but there are a number who have not – notably the medical research institutes, but others, including CRCs and other smaller bodies, who had may not have seen the value of engaging with research data early. For a national and coherent approach to research data to continue to deliver value and enable significant policy development, these areas also need engagement. Again this is envisaged as via consortia rather than with individual institutions.

International Research Data Engagement

To ensure that Australian researchers and institutions are in the forefront of international developments, Australia needs to continue to strongly participate in the Research Data Alliance, and there needs to be funding to enable Australians to participate in these activities. **A particular focus would be international research and industry collaboration over data.**

The following guide shows how ANDS programs will be involved in these engagements. It is increasingly the case that no single program of ANDS is solely involved in engagements – the many different skills and capabilities across ANDS are deployed across engagements as needed.

Program/Engagement	National Engagements	National Services	Institutional Engagement	International Collaboration
High Value Collections	✓	✓	✓	
Research Data Services	✓	✓	✓	

Institutional Research Data Infrastructure Connectivity		✓	✓	
Institutional Research Data Capability		✓	✓	
International Research Data Engagement		✓		✓

4 Research Infrastructure

For researchers to work in the world of data-intensive research, they will need:

- policies that support a new way of working

- a technical data fabric that enables storing and moving data

- a metadata infrastructure to manage rich information about their data

- referencing mechanisms that enable input data, modelling outputs (such as visualisations), software code and documents to be cross referenced

- the ability to search across all the collections that have been registered

- Training and training materials that enable the infrastructure to be used well.

To deliver that infrastructure there is a need for substantial data collections, and a combination of national and regional services and coherent institutional services. ANDS has created many of those services, and is helping to seed institutional services that are optimised to be part of the Australian Research Data Commons where re-use, sharing and commonality of approach is possible because of the coherence achievable with national investments. These services can also be integrated with other national services – whether they be data storage services, high intensity data analysis, or discipline or problem specific data services.

ANDS has instituted four programs to establish and maintain this infrastructure:

National Engagements

The National Engagements program represents ANDS' focus on data collections that are contributed by national data providers such as the NCRIS data intensive facilities, the NCRIS eResearch facilities, and Commonwealth science agencies and data collecting and aggregating departments. This national focus complements the institutional focus of the institutional engagements program which caters for Australian research organisations, typically universities.

National Services

Through this program, ANDS provides data publication infrastructure as well as support for those using ANDS infrastructure. The support extends more broadly to research organisations and public sector data providers building their own institutional capacity and capability as part of the Australian Research Data Commons.

Institutional Engagement

The aim of the program is to ensure that institutional research data infrastructure is developed, maintained and operated at all of Australia's major research organisations. This will ensure a continuing coherent Australian Research Data Commons, and that the research data assets of the institutions

provide as much value as possible. The program will maintain activity funded in previous years under the Seeding the Commons, Data Capture, Metadata Stores and Applications programs. These programs built a fabric for data management with a view to increasing the scope of the data commons; improving data capture and management across the research sector; funding the establishment of infrastructure in institutions for depositing data and metadata into well-managed stores; and funding the creation of a number of demonstrations of the value of bringing data together to answer new questions.

International Collaboration

The International Collaboration program works with data infrastructure providers to ensure that Australian research data infrastructure is compatible with international approaches. The program focuses on the Research Data Alliance, although a number of existing activities will continue in parallel. The purpose of the Research Data Alliance is to accelerate international data-driven innovation and discovery by facilitating research data sharing and exchange, use and reuse, standards harmonisation, and discoverability.

These programs will be delivered in a co-ordinated manner that will ensure that ANDS' partners engage with ANDS as a whole, not with the individual programs. This has the consequence that ANDS needs to have a greater emphasis on customer relationship management so that partners do not have to navigate their way through different parts of ANDS.

4.1   National Engagements

The National Engagements program represents ANDS' focus on connected data collections that are contributed by national data providers such as the NCRIS data intensive facilities, the NCRIS eResearch facilities, and Commonwealth science agencies and data aggregating departments. This national focus complements the institutional focus of the institutional engagements program which caters for Australian research organisations, typically universities.

In undertaking this activity, the National Engagements program is trying to move beyond a focus on data collections that are managed, connected and findable, to include also the critical fourth transformation: collections that are reusable. In this context, National Engagements is also responsible for high value collections functionality: custom presentation of particular collections, themes to aid with discovery and re-use, data re-use tools, and connections to available services over data. These features will be progressively embedded within Research Data Australia as part of our commitment to maintaining the re-usefulness of data and improving its value.

In order to achieve these objectives, the program operates across two areas of activity: collections development and national scale projects to develop the reusability of collections, focused on NCRIS capabilities. Together these reflect the spectrum of interaction ANDS has with these national providers.

Through collections development and national projects, ANDS both maintains long term relationships with nationally focused data providers and delivers value to NCRIS eResearch services and NCRIS data intensive facilities. The resources of the entire program are pooled to provide a coherent experience for key stakeholders, sufficient resource scaling to provide value, effective sharing of corporate memory and specific skills.

4.1.1   Expected Highlights

Working with the relevant cross program streams the National Engagements program aims to achieve the following:

- High Value Collections - Improved presentation, discovery and access to key data collections of value to national and international research. This will particularly be achieved through partnerships with NCRIS data intensive facilities.

- Research Data Services – the value of data collections is increased when they are connected to associated services. National Engagements aims to enhance re-use through leveraging national initiatives and broad engagement with data providers.

- Institutional Research Data Infrastructure Connectivity – National Engagements will work cooperatively to support cross institutional engagement to bring data assets and services together with a particular focus on key public sector data providers.

- Institutional Research Data Capability – achievements here will involve working with data providers and institutions to enhance access, discover and the ability to re-use data assets, building on collaborative arrangements with NCRIS eResearch facilities and also working with public sector data providers.

National Engagements will engage through a consultative approach with NCRIS data intensive facilities, the NCRIS eResearch facilities, Commonwealth science agencies, and data aggregating organisations

on a series of highly targeted projects, the details of which will be refined pending information about the available funding envelope.

4.1.2 Expected Difficulties

Coordinating business planning and resource allocation with other NCRIS facilities will be a challenge for this highly collaborative area of activity. Uncertainty of resources at many Commonwealth agencies and departments will result in unpredictable project and engagement timelines in these areas. A reduction in funding in these areas has the potential for a reduction in capability to manage, publish and connect data. In addition, the recent NCRIS funding crisis has led to some of the staff at the facilities taking positions elsewhere – this will slow their ability to respond.

The dispersed nature of data storage and approaches to its management across the nodes, institutions and data providers does mean variance in standards and practice. Drawing connections across this, and providing a coherent national approach, will be a challenge for the National Engagements team.

The timelines for planning and delivery of a set of engagements where e-Research infrastructure activity is aligned with the needs of data-intensive NCRIS capabilities are very tight, leaving little slack time in the schedule. This may also impact negatively on the ability to take advantage of funding opportunities and the longer term sustainability of data initiatives.

4.1.3 Expected Breakthroughs

Maintaining access to research data through coordination of storage (either institutional or on RDSI nodes) with services (delivered either by NeCTAR or other data service providers, as well as by ANDS) via ANDS descriptions in support of NCRIS facilities will be a breakthrough that underlines the pivotal and cross domain nature of ANDS services within the NCRIS model. Considerable progress has been made over recent years in the development of storage and service solutions and the implementation of data management infrastructure and practice. The breakthrough ANDS is aiming for is to connect these activities and present them in meaningful and navigable ways. The identification of key collections and associated services will demonstrate Australian research strengths and capability.

4.1.4 2015-16 Expected Activities

The National Engagements program will be engaged in two streams of activity for 2015-6:

1. National Projects
2. Collection Development

National Projects

Expected activities will maintain data access though ANDS engagement with data-intensive NCRIS capability areas. In particular, ANDS will maintain existing data publication support arrangements for:

- Data Intensive NCRIS facilities such as: IMOS, TERN, BPA , ALA, APPN, APN, AuScope, AURIN, PHRN, NIF, MMRF and NCI

- Priority Commonwealth data aggregators such as GA, BOM, ABS, Environment, AIHW and some state government agencies

This will enable ANDS to continue its engagement that has already informed the thinking of the Research Data Infrastructure Committee, and will leverage existing engagements with the data intensive NCRIS facilities.

With anticipated additional funding, further projects will provide continued support for data collection publication to enable services that are being generated through the NeCTAR Virtual Laboratories to be connected, provide reliable access to collections via rich descriptions, and enhance connections to international collections through Research Data Australia. The connection of services over data to collections will make the collections themselves more valuable and more likely to be reused. These projects will be informed by any changes to the eResearch infrastructure environment and its governance arrangements over the period covered by this plan.

Collections Development

Expected activities will include:

- The identification of key data collections and services over data associated with specific collections held at research institutions through engagement with data providers, institutions, nodes and NCRIS facilities. Continued work on the water data collection is an example of this effort.

- Creation of a wider set of thematic views of RDA content based initially on the themes that emerged from the *2011 Strategic Roadmap for Australian Research Infrastructure*, but also analysing RDA data holdings for thematic gaps as well as other national themes such as those identified by the Chief Scientist.

- Provision of continued input into content strategy and business solutions for RDA including information architecture review for a renewed user focus.

With anticipated additional funding, we will:

- Work with other ANDS programs and institutions and data providers to identify and aid the presentation of high value data collections

- Develop a focus on how collections can be easily and variously presented in RDA taking advantage of the service implementation of vocabularies.

4.2 National Services

Through the National Services program, ANDS provides data publication infrastructure as well as support for those using ANDS infrastructure. The support and services extend to NCRIS facilities, research organisations and public sector data providers building their own capacity and capability as part of the Australian Research Data Commons. A stable and reliable national data publication platform is the aim of ANDS services and infrastructure. ANDS also works with research organisations to build data capability and improve the policy frameworks for research data.

4.2.1 Expected Highlights

High value collections with connectivity between data, publications, and researchers are expected highlights. With the steady increase in awareness of research data in the sector, a continued and increased demand for ANDS education and outreach services in 2015-6 is expected including more workshops, greater support for communities of practice, and more specialised support materials.

If ANDS receives NCRIS 2013 funding, it will continue to operate national services and focus on four cross-program streams:

High Value Collections: ANDS will provide both systems support and partner capability building for a set of high value collections building on open data collections, NCRIS collections and public sector providers to provide rich national assets.

Research Data Services: ANDS will maintain and enable connectivity of research data infrastructure operated by ANDS and data services operated by Nectar, NCRIS partners, eResearch service providers and RDS nodes.

Institutional Research Data Infrastructure Connectivity: ensure connectivity between data infrastructure operated by ANDS and data infrastructure operated by research organisations (such as data asset stores, enterprise information systems, etc.) This includes facilitating technical integration of ANDS services with software solutions (both commercial and open source) that are in common use with our institutional partners.

Institutional Research Data Capability: ANDS will facilitate and coordinate a national and coherent approach to building capacity in research data across all organisations but with particular focus on two new areas: Medical Research Institutes and Cooperative Research Centres. This will build infrastructure capacity and capability more broadly in the sector and support potential national policy directions.

International Research Data Engagement: ANDS will support activities of the Research Data Alliance in particular working groups such as the Data Description Registry Interoperability Working Group and the Data Publication Services Working by collaboratively developing global linkage and discovery services with international partners from research and industry.

4.2.2 Expected Difficulties

The challenge for ANDS National Services is maintaining input and buy-in from research organisations so that ANDS services remain valuable and relevant in a fast-moving area.

4.2.3   Expected Breakthroughs

It is expected that a number of research organisations will make progress towards better researcher identification and more open and high value data.

4.2.4   2015-16 Expected Activities

The National Services Program will be engaged in two streams of activity in 2015-16:

1. Infrastructure Maintenance and Online Service Provision
2. Capability Building (Skills, Resources, Policy)

Infrastructure Maintenance and Online Service Provision

Expected activities will include the integration and optimisation of the DOI Service, integration of Grant info with ORCID and optimising the dataset information, adding complex collections views (support for high value collections) to Research Data Australia, re-launching the Vocabulary Service, adding extensibility for research object types (software, models, vocabularies, publications) to RIF-CS, providing higher availability services for the underlying infrastructure and improving its service support.

With *anticipated additional funding* we will support project and engagement activity with ANDS key stakeholders in the following areas:

- High Value Collections**:** ANDS systems and support services will support the visibility, management, connectedness and re-usability of high value data collections from our partner research infrastructure facilities, research organisations, and public sector data providers.

- Research Data Services: ANDS online services will support connectivity of research data with data services operated by Nectar, NCRIS partners, eResearch service providers and RDS nodes through:

  o data registry solutions

  o connections between high value datasets and data services

  o piloting highlighting of data services with application to industry and education

- Institutional Research Data Infrastructure Connectivity: ANDS national services facilitate technical integration of ANDS services with software solutions that are in common use with our institutional partners. ANDS will be responsive to our partners needs but target systems may include:

  o research data management systems (e.g. Symplectic and Pure)

  o repository systems (e.g., CKAN and MediaFlux)

- This may include integration with services such as:

  o Identifiers (DOI, Handle, ORCID)

  o Data Publication and Syndication (e.g. Research Data Australia)

- o Data Citation Indexes
- Licensing and re-use information

International Research Data Engagement: Development and integration support for the :

- Data Description Registry Interoperability Working Group
- Data Publication Services Working Group

Capability Building (Skills, Resources, Policy)

Expected activities include building capability in strategic areas with target stakeholders through activities such as virtual events, workshops, product development, awareness raising, publications and communications. These are design to ensure a sustainable future for data management and access. The key activities for 2015-16 therefore include:

- Webinar Series
- Workshops
- Events
- Publications

With *anticipated additional funding*, we will support Institutional Research Data Capability through targeted capability building support for:

- Medical Research Institutes
- Cooperative Research Centres

4.3 Institutional Engagement

The aim of the program is to ensure that institutional research data and data infrastructure is developed, maintained and operated at all of Australia's major publicly funded research organisations. This will ensure a continuing coherent Australian Research Data Commons, and that the research data assets of the institutions provide as much value as possible, not only to the institution and the researcher, but also to others that would like to use the data (like industry and business, government and policy and education, thereby increasing the value of the data for the nation).. This program supports research data infrastructure and continues the development of open data collections through institutions.

4.3.1 Expected Highlights

If ANDS receives no additional funds, the institutional engagement team will continue to support the institutions until December 2015 but will not provide financial support.

If ANDS receives additional funding, the institutional engagements team will continue institutional engagements and focus on four cross-program streams:

High Value Collections: A set of high value collections building on open data collections, NCRIS collections and public sector providers to provide rich national assets.

Research Data Services: Maintaining and enhancing connectivity of research data infrastructure operated by research institutions and data services, in particular, data storage services.

Institutional Research Data Infrastructure Connectivity: ensure connectivity between data assets, research institutional enterprise metadata store solutions, and national systems, including Research Data Australia.

Institutional Research Data Capability: a national and coherent approach to building capacity in research data across all organisations involved (particular in the health and medical field). This will ensure all the institutions and organisations can continue to deliver value and enable significant policy development, which should enable effective use of data assets.

ANDS will engage with institutions through projects, with separate institutions and through community engagement activities. The collections formed will exploit Australia's research data infrastructure and Australian research institutional data capabilities to enable the best possible international profile and partnerships.

4.3.2 Expected Difficulties

The major difficulty would be if no further funding were available and support for research data at institutions ceased. Given delays in the NCRIS 2015 funding announcements, there might be corresponding delays in undertaking proposed partnerships with institutions on high value data and associated infrastructure. By learning from its past experience, ANDS has attempted to minimise the time required for contract reviewing by the University Solicitor's Office by using existing contract arrangement formed under past ANDS projects. However, as it cannot predict whether further contract reviews will be undertaken by individual institutions, delays in commencing projects at the institution may occur.

It is important that ANDS remains connected with the interests of the institutions in order to offer meaningful and valuable activities and resources to the institutions. If this is not the case institutions

might well not be interested in engaging in partnerships and discussions with ANDS and community activities.

4.3.3 Expected Breakthroughs

Assuming funds will be made available the Institutional Engagement team will partner with the institutions to deliver High Value collections providing visibility of the rich research data assets of the institutions. This will support the institutions by enhancing the collaboration of research and industry over data.

By promoting research data services ANDS aims to provide a connected landscape of services for the benefit of researchers and other data users, which will allow them to optimally discover data, understand and provide context to the data holdings, and build on the data being made available. This will bring together the various national NCRIS investments and provide additional value to the research data being produced.

The institutions will have a good view of their research assets in systems that are integral part of their business processes. These systems will be connected into the Australian Research Data Commons, providing a rich view through Research Data Australia of the institutions' assets. Universities will have established networks of expertise across institutions which will help provide longer term support for these systems.

By building research data capability in a broader group of institutions a national and coherent approach to research data will be supported. Hereby this broader group of institutions will have a better view of their rich data assets and be able to maintain these.

4.3.4 2015-16 Expected Activities

Expected activities include continued support for the institutions until December 2015 but no financial support.

With *anticipated additional funding*, we will continue a series of institutional engagements, through projects and activities, which will enable new data focused partnerships in order to assist organisations involved achieve their research data ambitions. Engagements will be supported by a service offering that includes advice, tools and training, to be offered such as data and metadata management, internal capability building, publication citation, and re-use.

High Value Collections: Following the Open data programs Institutional Engagement will continue to work with the sector on taking existing important collections to a higher value, particularly through open-ness. This would allow institutions to build on the experience gained in the open data programs, and extend this into the medical and health area.

Research Data Services: The Institutional Engagement team will provide effort into developing and brokering partnerships between institutions and Nodes to connect data services.

Institutional Research Data Infrastructure Connectivity: The Institutional Engagement program will engage with institutions to ensure connectivity between data assets and their particular metadata store solution to manage their data assets and ensure connectivity to national systems, including Research Data Australia.

Institutional Research Data Capability: Many research institutions have developed significant research data capability but there are a number who have not – notably the medical research institutes, and others, including CRCs and other smaller bodies, who had may not have seen the value

of engaging with research data early. For a national and coherent approach to research data to continue to deliver value and enable significant policy development, engagement is also needed in these areas. It is envisaged this will be undertaken via a consortial approach rather than with individual institutions.

As ANDS has a broad view of activities in all Australian institutions it is in a good position to facilitate national exchanges on developments in the field of research data. By engaging with the research data community ANDS will maintain and further develop a community of experts on research data across institutional boundaries that can share challenges, learn from each other, and identify shared needs. This will provide a benefit of scale, as there are often only a few experts focused on managing research data within a single institution, yet a wealth of experience across Australia. Universities exploring research data can learn from how others have addressed a challenge. ANDS will facilitate these communities through regional face to face meetings, virtual exchange and capability building activities (see capabilities). The topics addressed will be based on the institutions' needs. Leading experts from these communities can also be brought into international exchanges to ensure that Australia develops experts that can contribute to the international debate and ensure that that the Australian voice is also heard (see International).

4.4 International Collaboration

The main vehicle for International Collaboration will continue to be the processes and opportunities provided by the Research Data Alliance, although a number of existing activities will continue in parallel. The purpose of the Research Data Alliance is to accelerate international data-driven innovation and discovery by facilitating research data sharing and exchange, use and re-use, standards harmonization, and discoverability. This will be achieved through the development and adoption of infrastructure, policy, practice, standards, and other deliverables. The Research Data Alliance has been funded by The Australian Commonwealth Government through the Australian National Data Service, the European Commission through the RDA/Europe project funded under the 7th Framework Program, and the United States of America through the RDA/US activity funded by the National Science Foundation.

The work of the Research Data Alliance is primarily being undertaken through its working groups and interest groups. The development of solutions will occur through working groups. These are intended to come into existence, work on a problem and deliver a solution that is both adopted and that improves data exchange at the end of a 12-18 month period. Interest groups are for people with an interest in a particular data technology or research discipline. Interest groups may identify data interchange problems that need to be solved. Participation in working groups and interest groups, starting new working groups, and attendance at the twice-yearly plenary meetings is open to all. The first tranche of Working Groups presented their outputs at the Plenary meeting in September 2014, and a number of organisations who are adopting these outputs talked about the experience and its benefits at the Plenary meeting in March 2015.

Australian representation on RDA governance is currently through:

- Dr Ross Wilkinson (ANDS) as one of the members of Council
- Dr Andrew Treloar (ANDS) as one of the co-chairs of the Technical Advisory Board
- Dr Stefanie Kethers (ANDS) as a member of the Secretariat
- Dr Simon Cox (CSIRO) as one of the members of the Technical Advisory Board

A number of other Australians are involved in Working Groups and in the Organisational Advisory Board.

4.4.1 Expected Highlights

Expected highlights over the planning period will be:

- Continued momentum of the RDA
- Successful holding of Plenary 6 (Paris, September 2015) and Plenary 7 (Tokyo, March 2016)
- Continued development and adoption of the Research Data Switchboard (an output of the RDA Data Description Registry Interoperability Working Group)
- Greater involvement of Australian participants in RDA Interest Groups and Working Groups
- Successful initiation of the THOR project (building on the success of the ODIN project) funded by the EU and in which ANDS is an active participant
- Refining and improving data flows from Research Data Australia into the Thompson-Reuters Data Citation Index

- Ongoing expansion of the DataCite organization, of which ANDS is a founding member

4.4.2 Expected Difficulties

The major difficulty anticipated is the challenge of recruiting greater Australian involvement in the RDA when the bulk of the members come from Western Europe and the USA. This manifests itself at this stage of the RDA in distances to be travelled to physical meetings, and the time zones chosen for virtual meetings. This should improve over time as the membership of RDA becomes more geographically diverse – the Plenary in Japan in 2016 is a positive pointer in this direction.

4.4.3 Expected Breakthroughs

The two major breakthroughs anticipated during the planning period are:

- Deployment of the Research Data Switchboard in production, and the creation of appropriate governance arrangements
- Completion of the Belmont Forum (https://igfagcr.org) Collaborative e-Infrastructures and Data Research Action (http://bfe-inf.org/), where ANDS serves on the Steering Committee

4.4.4 2014-15 Expected Activities

Expected activities will include:

- Ongoing contribution to RDA Governance bodies as outlined above
- Contributing to the ongoing success of Datacite, including attending DataCite Board Meetings and Annual General Meetings
- Ongoing engagement with ORCID (author identifiers) and Thompson Reuters (Data Citation Index)

With *anticipated additional funding* we will:

- Actively seek and work with Australian representatives of discipline communities for whom an RD-A working group is an appropriate vehicle to develop and implement international data exchange technologies
- Undertake ongoing development of the Research Data Switchboard and establishment of appropriate governance
- Take part in the THOR follow-on project to ODIN to enable connection using researcher IDs, data IDs and publication IDS.

4.5 Overall 2015-16 Expected Outcomes

This section describes outcomes based on anticipated additional funding, as the alternative is the closure of ANDS at the end of 2015. The outcomes for this year build on previous years activity and continue to grow the research data environment in Australia, with no major new outcomes, reflective of the continuance of the ANDS programs with changes of emphasis, but not of broad intent. The overall outcomes for 20156-16 are expected to be:

- A richer more valuable set of research data collections with appropriate tools and services will be available to Australian research

- Collections that are formed, whether they are by NCRIS capability, public sector or research institutional partners are published appropriately though integrated services

- Data storage services will be more tightly integrated with other data services both institutionally and nationally

- Institutional data services evolve to be institutional enterprise services, still integrated coherently with national systems

- ANDS will continue to deliver valued and reliable national data technical and advisory services

- An ARDC with more data collections that have been managed and connected, ensuring over 100,000 collections descriptions discoverable through Research Data Australia, Google and other mechanisms

- Continued support and expansion of Australia's research capability and capacity to work with research data

- ANDS continues to be as a trusted partner of research institutions

- Australia continues a leading role in research data infrastructure internationally, particularly through the Research Data Alliance

5 Confidential Information

There is no confidential information.

6 Access and Pricing

The mechanisms for deciding access and pricing will be consistent across the ANDS services. Generally speaking, ANDS will provide services for research purposes and aims to ensure the legitimate research use of those services will be free and access to the services open.

Software developed under the programs will be released as Open Source code, with the choice of licence and licensing conditions varying on a case-by-case basis. Documents produced or funded by ANDS will be made available as public documents, on a no warranty, royalty free basis using the CC-BY license. ANDS will maintain a register of software that is produced through its funded projects.

However content access and charging regimes belong in the hands of content providers, so that the access and pricing issue in ANDS relates to the rules under which content may be provided into the ARDC and therefore supported by ANDS utilities and other support activities.

ANDS services will be restricted to users who are non-commercial, and engaged in research, with the exception of Research Data Australia, which will be searchable by any interested party. Research Data Australia will not be used for the advertisement of paid services. Equally, the Identify my Data service will only be accessible for non-commercial use.

7 Governance

The Governance and Management arrangements for ANDS are described in the contracts for the NCRIS project and the EIF project, as well as in a separate Collaboration Agreement. These arrangements have been deliberately designed to ensure that the governance is as open as possible, consistent with the acceptance and management of risk by the lead agency. The Governance arrangements were established for the NCRIS contract, but the Department, Monash University, the lead agent, and the Steering Committee have agreed to use the same approach to governance and management for the EIF ARDC contract and other contracts as well.

Monash University entered into an agreement with the Department to implement the Projects, receive NCRIS and EIF Funds and be accountable to the Department for execution and performance of both Projects. Monash University has established a Collaboration agreement with the Australian National University and CSIRO as partners in the projects.

Monash hosts and operates one of the ANDS Offices, which will be used to manage the Project. ANU hosts the other office that houses both ANU and CSIRO staff.

Monash appointed the independent Chair of the Steering Committee after consultation with the Department and the ANDS partners and formally includes the independent Chair in the performance management arrangements of the Executive Director of ANDS. The Executive Director of ANDS is Dr Ross Wilkinson.

7.1 Steering Committee

The current ANDS Steering Committee comprises a minimum of four (4) and a maximum of eight (8) voting members, including;

(a)   an independent chair appointed by Monash;

(b)   one representative appointed by each of the ANDS Members; and

(c)   such additional persons as the ANDS Steering Committee may agree, such as data provider, data policy and other specialist representatives.

The Department has nominated a non-voting observer, Cheryl Kut or her nominee.

The processes of the ANDS Steering Committee will be as transparent as possible.

As at March 2014 the current ANDS Steering Committee Members are:

- Independent Chair: Dr Ron Sandland;
- Ms Cathrine Harboe-Ree (Monash University);
- Mr Euan Sangster (CSIRO);
- Ms Roxanne Missingham (The Australian National University);
- Prof Mark Ragan (University of Queensland);
- Mr Paul Sherlock (University of South Australia);
- Dr Siu Ming Tam (Australian Bureau of Statistics);
- Prof Craig Johnson (University of Tasmania);

- Prof Brian Yates (Australian Research Council); and
- Executive Director (ex-officio): Dr Ross Wilkinson (Australian National Data Service).

It is anticipated that the ANDS Steering Committee membership can be expanded over time to incorporate any additional requirements of the Project.

7.2 Management structure

ANDS is currently managed by a full time executive staff comprising an Executive Director (located at Monash), and two Directors (a Monash Director, and an ANU Director) as currently agreed under the ANDS Collaboration Agreement, as well as Program Managers.

Directors and Managers report to the Executive Director with regard to ANDS activities and to a nominated person in the host institution for administrative purposes (the Supervisor). The Supervisor is normally the host institution's representative on the Steering Committee.

Directors normally have a high degree of autonomy within their areas of responsibility but work under the leadership of the Executive Director.

If there is disagreement or conflict between the Executive Director and a Director the matter is discussed with the Supervisor in the first instance, after which it can be escalated to the Chair of the Steering Committee and, if necessary, the Steering Committee.

Any alterations to this arrangement will be as a result of, and documented in, a revised Collaboration Agreement that takes account of this Project.

ANDS staff work collaboratively with each other and support activities across ANDS. Some will be located at ANDS Member institutions and others out 'in the field'. These field locations may include state based eResearch organisations, a Division of CSIRO or major data federating institutions.

ANDS staff within or appointed by an ANDS Member institution report to the relevant Director, or as otherwise negotiated for staff located in other institutions. These staff are appointed in consultation with the Executive Director.

If necessary, the Executive Director can direct, through the Directors and Managers, or other supervisory arrangements applicable at other institutions, the work of ANDS staff located in any institution.

The ANDS central office at Monash provides administrative support to ANDS and its staff, including communications, branding, and website maintenance.

8 Risk Management

ANDS maintains a Risk Register. The risk assessment methodology, adapted from the Australian Risk Management Standard AS/NZS 4360:2004, involves identifying and analysing each risk in terms of how likely it is to happen (Likelihood) and the possible impacts (Consequence).

The key risks for ANDS in executing the Projects and the risk management strategies to be employed can be grouped into four major categories.

8.1.1 Risk 1 – Inconsistent messaging and perceptions communicated to our partners and stakeholders

Risk Factors:

- Ineffective communication internally and externally of what ANDS is about and our key messages.
- Lack of confidence in governance, management, or Project delivery.
- Perceptions of slow engagement with areas of the sector.
- Change of emphasis with regard to the policies around publicly funded research data.
- Lack of certainty of the funding of the function of ANDS.

Risk Mitigations:

- Develop a clear and concise Communications Strategy that support the overarching messages and directions of ANDS. Ensure that a Communications Plan is developed, implemented and communicated to the ANDS team to provide clarity and awareness of the ANDS messages. Diagnostic strategies have been implemented to mitigate against failure.
- Use a central point where progress of the ARDC is being tracked by metrics such as number of collections available, and numbers of datasets accessed, and the status of every project is tracked.
- Engage actively with communities to avoid perception (or reality) of not meeting its needs.
- Ensure that the Project reflects the Government's expectations through constant dialogue.
- Maintain close contact with key Departmental officers to ensure they provide input to decision making, including having an observer on the Steering Committee.
- ANDS communicates the message about the longer term vision of the function of ANDS in the sector.

8.1.2 Risk 2 – Poor Performance of the ANDS Project

Risk Factors:

- Lack of effective processes, mechanisms for planning and appropriate levels of staff leadership and management.
- The structure of ANDS has a negative impact on coordinated delivery of required activities.
- Collaboration between the Project and across locations is not effective.
- Funding guidelines do not allow for sufficient Project staff to administer funded programs of work.
- State based staff have competing priorities and insufficient oversight.
- Projects have insufficient time to complete.
- Managers departing.

Risk Mitigations:

- Ensure that there are effective processes in place to support the function of ANDS. Ensure that appropriate and timely planning occurs on a regular basis. Ensure that there is appropriate levels of leadership and management being undertaken by the ANDS Management Team.

- Management and planning processes have been put in place that include formal reporting and regular reviews to ensure the efficient conduct of the Project.

- Regular meetings of Project staff are held to build a team approach. Communication structures in place to facilitate working together.

- Staffing levels are monitored and adjusted as required.

- Contracts and partnerships with state based organisations that host Project staff have been put in place that ensure that staff are clear about their role. Ensure that ANDS-funded staff based in organisations who are ANDS sub-contractors are not placed in a position of conflict of interest.

- Ensure all late starting projects are closely managed.

- Recruit replacement managers as soon as possible

8.1.3 Risk 3 – That the continued emphasis on external contracted engagements represents too big a burden on the lead agent

Risk Factors:

- University processes, focused on student and supplier engagement, are not a good fit for sector wide activities. ANDS' role as a sector wide agent in many of its programs has imposed additional requirements on the lead agent causing pressure on its staff to assist ANDS.

- ANDS EOI approach generates clusters of work with tight timelines that impact on specific university functions such as the Solicitors' Office and Finance.

Risk Mitigations:

- Approval has been obtained for streamlined approaches at Monash University to enable ANDS to work more effectively.

- Fund additional staff or specific work at Monash University to enable ANDS to work more effectively.

- ANDS reduces the number of projects that are externally funded

8.1.4 Risk 4 – That the Project's external stakeholders are not effectively engaged

Risk Factors:

- Stakeholders are not prepared to undertake the changes within their own organisations that are necessary for the realisation of the ARDC.

- Stakeholders do not see their interests in data management and those of the Project as being aligned.

Risk Mitigations:

- Maximise the effectiveness of connections between the Project and related eResearch and other initiatives, including involvement of groups outside ANDS in the ANDS Policy Forum, the ANDS Technical Forum, and the ANDS Content Forum.

- Ensure that ANDS' engagement with stakeholders meet their research data ambitions as well as ANDS' requirements.

- Ensure ongoing, strong engagement with the Research Sector, including research infrastructure capabilities.

- All activity plans were developed after consultation with relevant stakeholders.

- Membership of the Steering Committee includes key stakeholders.

- Performance measurement for the Project should include effective stakeholder engagement.

- Effective communication of benefits to stakeholders.

- Provide a clear rationale behind the decision process for project funding.

- Communications activities have been increased to create awareness of the value of ANDS' activities.

- ANDS effort has been increased in creating partnerships as compared to contracting.

8.1.5 Risk 5 – That the Project's partners do not appropriately contribute to the Project

Risk Factors:

- Partner produces outcomes of low quality or does not meet the requirements of the contract.

- Partner expends funds in a way that is not consistent with the EIF guidelines.

- Lack of effective arrangements in place to ensure the contracted services are provided to an agreed service level.

- Service providers see themselves as disconnected from the Project's decision-making or strategic planning.

Risk Mitigations:

- Collaboration Agreement is in place to manage output and management of joint venture partners.

- Formal procurement processes have been implemented to ensure that the requirements are understood and that potential suppliers meet the set criteria.

- Provide ongoing contract management to ensure the delivery of required outcomes to the contracted service levels.

- Effective vendor and partner engagement approaches have been put in place.

8.1.6 Risk 6 – That ANDS is not perceived as a long-term partner and hence the services are not taken up

Risk Factors:

- The impending end of ANDS NCRIS and EIF funding together with the different purposes of CRIS and NCRIS 2013 funding, causes a perception that ANDS initiated services will not continue.

Risk Mitigations:

- ANDS gained approval to expend existing funding over longer timelines (consistent with other Super Science funded activities).
- ANDS creates reliable sustainable services that are offered over the longer term by other long term service providers.
- Securing CRIS funding and mapping ANDS services through this new funding regime will preserve long-term services.
- Strong contribution to Research Infrastructure Roadmap, RDIC and NRIP processes will be a mitigating factor.

8.1.7 Risk 7 – That there is confusion about role of ANDS versus other related service providers in the eResearch sector which impedes effective service delivery

Risk Factors:

- ANDS and eResearch infrastructure partners' offerings are confused by possible users.
- Relationship between ANDS and state-based eResearch providers (such as Intersect) is not clear to users.
- Greater expectation of collaboration between eResearch infrastructure partners based on Research Data Infrastructure Committee (RDIC) report.

Risk Mitigations:

- Ensure that ANDS' communications to a range of stakeholders provide greater clarity about ANDS services.
- Ensure that ANDS' offerings are clearly targeted and that this is clearly stated.
- Seek greater clarity from other eResearch service providers about their offerings, avoiding either actual or perceived overlap with ANDS' offerings.
- Increased coordination of offerings by eResearch service providers through eResearch Infrastructure.
- Discussion with NCI, NeCTAR and RDSI taking place to ensure clarity of eResearch service offerings.
- Ensure RDIC provides guidance for improved communication.

8.1.8 Risk 8 – That data providers/federators do not make their data available

Risk Factors:

- The storage needs of researchers are not met, so will not consider sharing their data.

- Researchers do not wish to share their research data.

- Confidentiality agreements prevent researchers from making their data available.

- Existing data federations see insufficient value in making their data available.

Risk Mitigations:

- Strategically promote incentives and rewards in the research system for data publishers

- ANDS will co-ordinate with RDSI and Institutional stores to mitigate this risk.

- Enable data citation so that researchers get recognised for the publication of their research data.

- Encourage the use of access controlled data stores.

- Ensure that ethics agreements balance confidentiality with openness.

- Recommend that funding be linked to the provision of data via the ARDC as it becomes available.

- Provide targeted assistance to data federations to assist with integration into the ARDC.

8.1.9 Risk 9 – That re-users of research data do not use ANDS Services to discover, access and exploit data

Risk Factors:

- The various strategies for exposing data in the ARDC do not result in the data being easily discoverable.

- Access control mechanisms are too restrictive or complex.

- Other sources of data for re-use are more attractive or easier to use.

Risk Mitigations:

- Ensure a nuanced and multi-faceted approach to exposing the Project's accessible data.

- Work with AusGOAL and the Australian Access Federation to identify a simple set of licensing and standard access control policies.

- Ensure that it is easy to re-purpose ARDC accessible data.

8.1.10 Risk 10 – That the standards and technologies that ANDS adopts are not adopted more widely

Risk Factors:

- ANDS is the only user and maintainer of actual or *de facto* standards, leading to inability to share maintenance and development costs.

- ANDS is the only source of development activity on particular technologies (RIF-CS, ORCA, ANDS Handle code).

Risk Mitigations:

- Promote community ownership of standards such as RIF-CS, for example through community-led advisory boards

- Seek international engagements and partnerships to take up standards and technologies favoured by ANDS and share development load.

- Ensure enough people are trained on the standards and technologies that ANDS is adopting to support wide adoption.

- Make implementation decisions such that ANDS is not dependent on particular standards and technologies, but on general approaches that can be transferred across technologies.

- Encourage the use of ANDS-developed technologies by other data aggregators such as Terrestrial Ecosystem Research Network (TERN).

8.1.11   Risk 11 – That high quality staff are hard to recruit and retain

Risk Factors:

- Limited availability of skilled staff (both within ANDS and in ANDS-funded projects) impacts ability to perform tasks funded by ANDS

- Funding uncertainty leads to potential for staff departures.

Risk Mitigations:

- Build a vision for the function of the ANDS for the longer term and communicate this to staff.

- Provide as much certainty to staff as is possible, and involve them in navigating the future.

8.1.12   Risk 12 – That ANDS is most effectively reporting under all various programs

Risk Factors:

- Staff needing to report on similar activities multiple times throughout the year as per funding agreements that have been signed with the Commonwealth Government.

Risk Mitigations:

- Develop a reporting calender and circulate amongst relevant staff and provide reminders

8.1.13   Risk 13 – Not Taking ANDS in the right direction and developing inappropriate strategies

Risk Factors:

- The Research Infrastructure system in Australia is complex, political and uncertain. Therefore long term planning is difficult as is developing strategies to support the long term goals of ANDS.

Risk Mitigations:

- Ensure there is a high level of engagement within the Research Infrastructure System and provide clear direction for the ANDS Project. Ensure that there is appropriate levels of communication that support the development of appropriate strategies

8.1.14 Risk 14 - Our partnerships with Institutions, Government, Data Providers, International Partners are not as effective as they should be

Risk Factors:

- Due to the complexity of our engagements ANDS is not providing sufficient time, energy and resources to all of partnerships, although they are equally important.

Risk Mitigations:

- Ensure that engagements are tracked and monitored with our relevant partners. Ensure that relationships with Government and International Partners are fostered and maintained.

8.1.15 Risk 15 - Uncertainty around the future funding of the ANDS Project

Risk Factors:

- Due to the complexity of our engagements ANDS is not providing sufficient time, energy and resources to all of its partnerships, although they are equally important.

Risk Mitigations:

- Ensure that engagements are tracked and monitored with our relevant partners. Ensure that relationships with Government and International Partners are fostered and maintained.

9 Key Performance Indicators

Since an initial condition of the NCRIS Funding Agreement for ANDS is that "Key Performance Indicators (KPIs) acceptable to DIISRTE must be developed" (Attachment A, Section 5.1), ANDS has been using a consistent set of KPIs.

9.1 Key Performance Indicator Series

1. The number and coverage of data repositories providing metadata feeds to the national registry compared to the number of data repositories.
2. The number and coverage of institutions and number of research groups with which ANDS has engaged
3. The number of institutions with research data management policies and practices consistent with ANDS recommendations
4. The number of times a search is initiated with an ANDS discovery service
5. The number of times an ANDS data page (defined below) is accessed
6. The satisfaction of researchers and partners (see below) with ANDS services as measured by an annual survey
7. The number of data access and sharing agreements with stakeholders – principally research institutions, government data agencies, government research agencies

There are two measures that ANDS will not have full control over, but that are important and will measure success in influencing others' behaviour:

8. The number of research data sets in harvestable repositories
9. The number of research data sets with persistent identifiers

There is a final measure that ANDS aspires to – it will be measured but is unlikely to be a useful short-term KPI

10. The number of times a data set is reused and referenced – the ultimate long term measure

These KPIs address ANDS objectives (refer 2.1) as follows:

- **The commons:** KPIs 1, 2, 4, 5, 7, 8, 9 and the long-term measure 10 address objective A.

- **Data management:** KPIs 3, 6 and ANDS' long-term measure address objectives B and D.

- **Repositories:** KPIs 3, 8 and 9 address objective C.

- **Access:** KPIs 4, 5, 6, and 7 address objective E.

- **Use:** KPIs 4, 5, 6, 7 and the long term aspirational measure 10 address objectives F and G. (Note – when KPIs 4 and 5 are being measured, not only use will be noted, but where it is initiated so that analysis can be done both within and across disciplinary use. The satisfaction survey will be qualitative, enabling an understanding of how well disciplinary, cross-disciplinary and multinational interaction is being facilitated.)

The form in which ANDS services are offered will be shaped by adherence to the guidance provided above. This guidance will be reflected in the business plans, and adherence to this guidance will be determined in discussion with stakeholders.

Notes:

An ANDS data page is a page generated from the ANDS collections registry that describes a data set, a collection, a research group, a research project, or an institution.

ANDS will focus on monitoring Institutions that are research data producing organisations, such as the Bureau of Meteorology, Landsat, the Australian Synchrotron, the Cultural Collections sector, etc., and the research data using organisations, such as the Universities, the PFROs, and affiliates. Many organisations have both roles.

Researchers have many partners in carrying out research and ANDS needs to satisfy their needs as well – this includes funders, assessors, institutional representatives, such as DVC-Rs, eResearch Directors, Information providers such as libraries, IT providers such as University ITS Departments, partner service providers, such as ARCS and NCI, as well as umbrella organisations such as disciplinary bodies such as the Academies, international research bodies, etc.

The qualitative measures are intended to capture not only usage figures, but also attitudinal attributes – ANDS only succeeds with cultural change, so this will be measured as well. The first survey will again set benchmarks, but also help inform future surveys.

9.2   Estimates against Key Performance Indicators for 2015-16

Performance Indicator	Measure
1. The number and coverage of data repositories providing metadata feeds to the national registry compared to the number of data repositories.	1. ANDS intends to maintain at least 100 metadata feeds. This will cover at least 60 research data-holding institutions.
2. The number and coverage of institutions and number of research groups with which ANDS has engaged.	2. ANDS will continue to engage with all Australian universities, PFROs, and 20 major Government data providers this year.
3. The number of institutions with research data management policies and practices consistent with ANDS recommendations.	3. The target is 35
4. The number of times a search is initiated with an ANDS discovery service.	4. The target is 25,000 using a new form of calculation
5. The number of times an ANDS data page is accessed.	5. The target is 20,000 (now counting filtered page views using Google Analytics standard excluding robots spiders etc).
6. The satisfaction of researchers and partners (see below) with ANDS services as measured by an annual survey.	6. No number can be given here, but a report will be provided.
7. The number of data access and sharing agreements with stakeholders – principally research institutions, government data agencies, government research agencies.	7. ANDS will aim to maintain at least 50 agreements to make information available.
8. The number of research data sets in the ARDC.	8. Access to more than 100,000 collections will be maintained.
9. The number of research data sets with persistent identifiers.	9. The target is 20,000
10. The number of times a data set is reused and referenced.	10. This will be tracked but cannot yet be reported.