

ANDS submission to the Inquiry into technological and service innovation in Western Australia.

The Australian National Data Service (ANDS) understands that the Inquiry will focus on the following sectors of the Western Australian economy: *agriculture and food; mining and energy; and advanced manufacturing*, which have been identified as areas of focus both in the state government's Science Strategy and the federal government's Industry Growth Centres Strategy. Given that the focus of the Australian National Data Service (ANDS) is on (international and national) research data and how its sharing and reuse can benefit society, we are not able to provide specific answers to all of the issues, which, naturally, have a Western Australian/specific industry focus.

The main thrust of the ANDS submission is that research data and associated methods and software, if made more openly available, offer industry and business immediate and practical opportunities to innovate and other opportunities to lift competitiveness and productivity. Importantly, ANDS is able to highlight vibrant examples in Western Australia where research and industry are already collaborating in two of the Inquiry's priority areas (agriculture and mining) and where open research data is at the centre of this collaboration.

ANDS submits that the kind of open data collaboration could be a key issue and a key opportunity for the Inquiry to further consider.

The specific issues for the Inquiry are:

- what drives innovation;
- collaboration between government, universities and business;
- how research can lead to the development of new products, services and jobs;
- the challenges associated with financing and commercialising new technologies, products and services; and
- models of development by which technological and service innovation could be encouraged in Western Australia.

1. Australian research infrastructure: a leveraging opportunity for Western Australian industry

Since the early 2000s, the Australian Government has invested continuously in research infrastructure through the National Collaborative Research Infrastructure Strategy (NCRIS¹). NCRIS delivers world class research facilities so that Australian researchers can solve complex problems both here in Australia and around the globe. NCRIS drives innovation and collaboration to bring economic, environmental, health and social benefits to Australia. NCRIS facilities cover many discipline areas, some of which can be mapped thematically to industry; we believe there is a very significant opportunity for Western Australian industry to benefit from this existing (and developing) research infrastructure, and especially from research data and related products like techniques and algorithms².

¹ <https://education.gov.au/national-collaborative-research-infrastructure-strategy-ncris>

² <http://www.ands.org.au/discovery/reuse.html>

Leveraging off existing and developing Australian research infrastructure is one of the main issues described in this submission, the others being around an enhanced (sharing and reuse) policy environment with respect to the outputs of research.

The Australian National Data Service (ANDS) is one of the NCRIS facilities; ANDS is building the Australian Research Data Commons, which is a cohesive collection of research resources from all research institutions, to make better use of Australia's research data outputs. The Commons can be viewed through Research Data Australia (RDA)³. RDA is a metadata repository which provides a "one-stop shop" for the discovery of data outputs of the NCRIS program and the broader research sector. Industry can search for and browse over 115,000 records⁴ of research data collections, which might be useful starting point for research-industry engagements. The Australian Government's Research and Science priorities⁵ can similarly be 'mapped' quite readily to collections referenced in RDA, again underlining the strategic opportunities of research data.

2. Data has value for industry and innovation

Complementing the 'traditional' outputs of research (e.g. journal articles, books, conference proceedings), are the 'non-traditional forms'—which include research data, techniques, algorithms, software etc. The non-traditional forms may offer more immediate and practical opportunities for industry, which is one of the key issues in this submission.

Research data is critical infrastructure to researchers—most research cannot be undertaken without it. This data can be the key to effective collaboration between research and industry—it fosters deep engagement, builds trust, and avoids the problem of traditional outputs (e.g journal articles) being the only information 'product' industry normally sees. Data generated by some of the NCRIS facilities has already proven crucial in this regard; for example, the [Australian Urban Research Infrastructure Network](#) (AURIN) provides urban data that strengthens engagement with many areas of research, government and industries.

The timelines to lift the competitiveness and productivity of industry in many cases may be too short to use the traditional approach to research, which may include extensive data collection, either in the field or in the laboratory, analysis and publication of the results; this can involve years in some cases. Research data, techniques and algorithms which have already been collected or cleaned, modelled or integrated into more sophisticated forms or products, offer industry immediate and practical avenues for innovation and other opportunities to lift competitiveness and productivity.

The following link provides many examples of where the outputs of research (and especially the non-traditional forms) have benefited industry; it is important to note that the case

³ <https://researchdata.ands.org.au>

⁴ RDA is a metadata repository; it does not hold the actual data but points to where the data is stored, custodianship, license conditions etc

⁵ <http://science.gov.au/scienceGov/ScienceAndResearchPriorities/Pages/ThePriorities.aspx>

studies (as below) span multiple industries and research areas and share one thing in common: *readily available and sharable research data*.

<http://www.ands.org.au/partner/open2015posters/index.html>

Western Australia

The following describes two vibrant case studies based in Western Australia (and in two of the priority areas for the Inquiry). These are concrete examples of research-industry engagements which could be significantly built upon in the future, through enabling infrastructure, supporting policy and incentives, as dealt later in this submission:

- West Australian mining sector: Curtin University *Digital Mineral Library*
 - Youtube: <https://www.youtube.com/watch?v=NS1JMYco8XA>
 - Poster: <http://www.ands.org.au/partner/open2015posters/curtin.png>
 - Project description: <https://projects.ands.org.au/id/MODC25>
 - Significance: national and international buy-in to open digital library of over 20 years of data collection (by Geological Survey WA) 'standard' rock types in WA with long term research and economic investment potential. Provides enhanced opportunities for researchers and industry to collaborate as well as for national and international investment in the mineral industry.

- West Australian agriculture: University of Western Australia *cropPAL*
 - Youtube: <https://www.youtube.com/watch?v=ngrYFqJlYqs&feature=youtu.be>
 - Poster: <http://www.ands.org.au/partner/open2015posters/uwa.png>
 - Project description: <https://projects.ands.org.au/id/MODC24>
 - Significance: national and international buy-in to open digital library of key proteins in rice, corn, wheat and barley, with major implications for food production in a changing climate, crop responses to temperature and salinity and to support biotech innovations. Provides long term enhanced opportunities for researchers and industry to collaborate.

3. Policy issues

In order for Western Australia (or elsewhere equally) to further encourage collaboration between government, universities, business and innovation more broadly, there needs to be a favourable policy environment which encourages the sharing and reuse of the outputs of research, particularly the non-traditional forms. This would need to include the (West Australian) government⁶—as government data are also inputs to research—any state agencies funding research within the state, the universities—via university IP policies, which for the most part do not recognise the non-traditional outputs of research, as well as the businesses and industries themselves.

Universities have made great progress in recent times in data management and have an increased willingness to engage with the idea that open data can be an important output of research organisations⁷. Although all universities have some form of IP policy, only a small number of these mention data. It is also the case that, generally speaking, the university

⁶ The WA government has a comprehensive policy on open government data: <https://www.dpc.wa.gov.au/Consultation/Pages/WAWholeofGovernmentOpenDataPolicy-Draft.aspx>

⁷ See examples noted above: <http://www.ands.org.au/partner/open2015posters/index.html>

sector does not recognise data, techniques and algorithms as first class research outputs, either within IP policies or more widely. The IP policies are generally focused on the traditional outputs of research (journal articles, book chapters etc), commercialisation and patents.

Including non-traditional outputs explicitly in university IP policies and also adopting a harmonised approach to its licensing (such as AusGOAL⁸) could improve engagement, simplicity, and certainty for industry, business and industries seeking to re-use non-traditional outputs of research organisations.

At the present time, the non-traditional outputs cannot usually be used in applications for national research funding; although this issue is broader than an individual state or territory⁹, the Inquiry might like to consider ways to encourage researchers to share and reuse these outputs, especially with business and industry and ways of acknowledging this to the benefits the researchers. Similarly, university employment practices include drivers of promotion that can work against the interests of industry engagement and innovation. The principle applies also to the non-traditional outputs of research which are unlikely to figure in criteria for promotion regardless of what industry engagement they had generated.

4. Conclusion

The research infrastructure of the NCRIS facilities provides a practical starting point for research-industry engagement and innovation. Research data and other related digital products (such as models and tools) should be considered as important outputs of research and of potentially wide value to industry, business, education, and public policy. An accessibility policy framework for these outputs could involve both government and universities (via revised IP policies to include non-traditional outputs of research), noting that the West Australian government is well advanced in this area. Opportunities to reference non-traditional outputs in research reporting, within-state grant applications and promotion procedures could provide important incentives for research-industry engagement.

In terms of the Western Australian situation, there are already vibrant examples of research-industry engagement and innovation, based around available and sharable research data, with the potential to provide the state (and the nation) with effective models for the future. Any changes in the accessibility policy framework for research data, as suggested in this submission, can only enhance the opportunities for Western Australia.

Please contact Greg Laughlin (greg.laughlin@ands.org.au) for any further information.

⁸ As recommended by the West Australian government open data policy

⁹ At the present time the NHMRC and ARC generally only allow publications, books etc to be counted in applications, although this may change in the next few years.