REGIONAL UNIVERSITIES NETWORK (RUN) RESPONSE TO ACOLA DISCUSSION PAPER: ENHANCING RESEARCH OUTCOMES FROM AUSTRALIA'S REGIONAL, RURAL AND REMOTE UNIVERSITIES

Introduction

Regionally-based universities, such as the seven members of the Regional Universities Network (RUN) (Charles Sturt University, CQUniversity, Federation University Australia, Southern Cross University, University of New England, University of Southern Queensland, and University of the Sunshine Coast), are fundamental to growing regional economies, providing regional sustainability, facilitating digital transformation, and upskilling regional workforces to align with national priorities and goals. They enable the best use of human capital and resources, and contribute to the educational opportunities, economic development, innovation and community capabilities for the more than thirty per cent of Australians who live outside the capital cities.

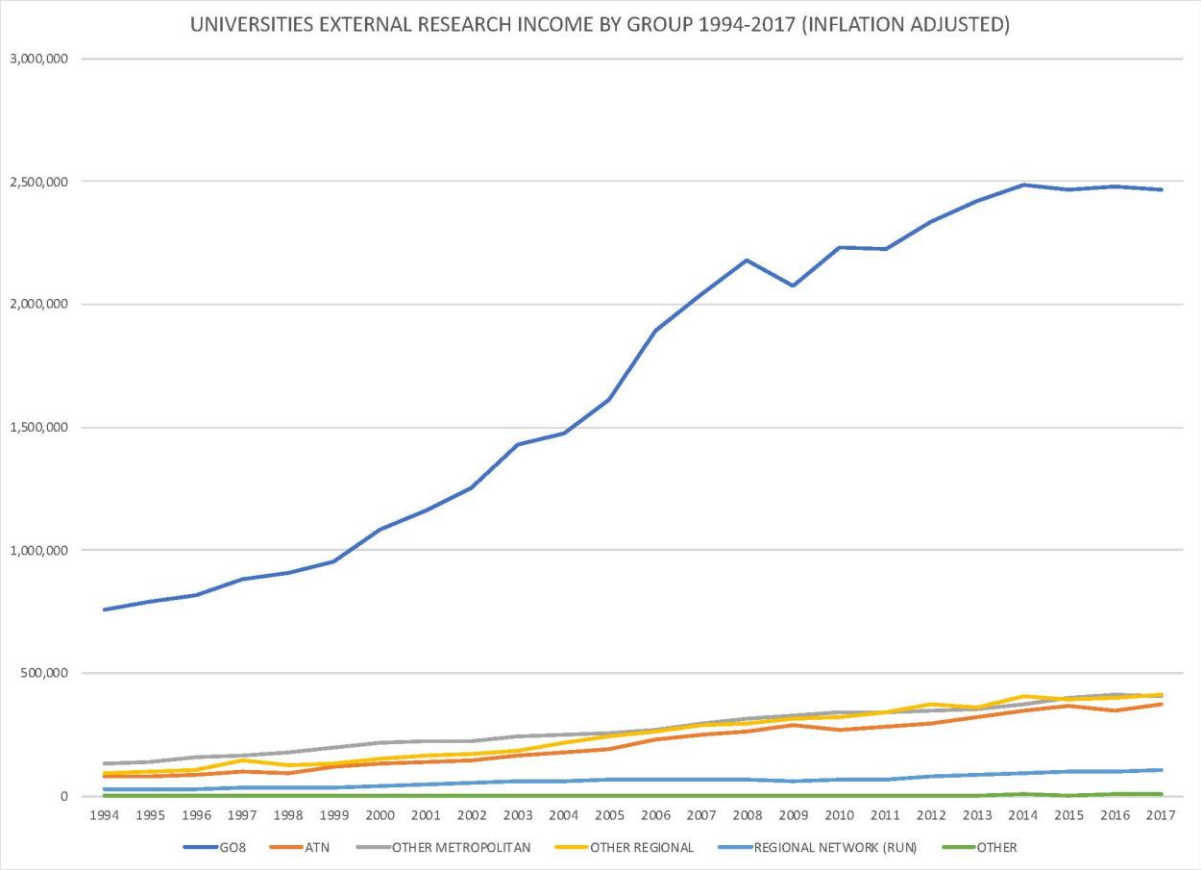
The six original RUN members spend over $1.6 billion and students spend $480 million in their campus regions[1]. Furthermore, they deliver over an additional $1.7 billion to real GDP in their regional economies through: growing the skilled workforce and increasing wages; driving demand through increases in private and government consumption and international and interstate exports; and contributing to industry through research and knowledge capital. A separate study on the economic impact of Charles Sturt University showed that it had a contribution of $1.4 billion to Gross Regional Product in its regions of operation[2].

The significant contribution of RUN group universities to regional and national economic performance results from relatively modest Commonwealth investment in research and infrastructure. For example, RUN group campuses are much less well-resourced than the regional, rural and remote campuses of large, metropolitan universities. Similarly, figure 1 below shows an estimate of the research funding that goes to different university groupings. On average, the RUN

[1] 2018, Report for RUN by Nous Pty Ltd *The Economic Impact of the Regional Universities Network* http://www.run.edu.au/resources/RUN%20Economic%20impact%20report%20final.pdf
[2] 2018, Western Research Institute, Economic Impact Report, Charles Sturt University

group receives much less funding than other university groupings including the Group of Eight and the Australian Technology Network. This could imply that focussed investment in regionally-headquartered universities may result in even better economic outcomes for regional Australia.

Figure 1 Universities External Research Income by Group 1994-2017 (data compiled by Charles Sturt University)



Research excellence in Australia's regional, rural and remote universities

Question 1: What does research success look like for universities in RRR areas?

Research success for regionally-based universities is characterised by:

- Growing world-class research, not only in areas of importance to regional Australia (e.g. agriculture, environment, mining, tourism, regional health, water resource management etc.), but also in new fields, including in HASS disciplines.
- The ability to grow and sustain world-class research in areas of importance to RRR communities.
- Growing innovation in areas of importance to RRR Australia.
- Increasing research funding from government and industry sources in line with national population spread (around a third of Australians live outside capital cities).

- Increasing collaboration with other universities, industry and government partners, both in Australia and overseas.
- Rapidly increasing ERA rankings, citations, and other indicators of research excellence, along with the impact of that research.
- Increasing numbers of higher degree by research (HDR) students contributing to a highly skilled regional workforce.
- Ability to attract and retain world-class researchers, and develop early career researchers in regional Australia.
- Ability to provide access to world-class research infrastructure, either on campus or in partnership with other universities or institutions.
- Wide recognition, both in Australia and internationally, of the excellence of the research at regionally-headquartered universities, increasing their prestige and place on world university rankings.
- Engaging closely with RRR communities and impacting in ways that are not always captured by conventional metrics e.g. via extension activities where there is knowledge transfer without a cash-based interaction.

Question 2: What role does research excellence play in the overall success of universities in RRR areas?

Research excellence is a fundamental and central part of being a university. It is a driver for the prestige, social sustainability and regional development of the RRR community where the university is located. The role played by research excellence includes:

- The reputation of the university, both nationally and internationally, and its ability to attract staff and students, who in turn further boost regional economies by providing broader benefits to the region where the institution is located, including attracting professionals, both within and outside the university.
- The impact of regionally-relevant research on regional communities and industry, which addresses key issues of importance to regional Australia and the nation e.g. agriculture, regional health, environmental management, tourism, Indigenous knowledge etc.
- Providing exposure for RRR Australians and students to research, including as a career.
- Attracting and keeping both domestic and international students to RRR Australia, undergraduate as well as HDR.
- Attracting funding for research infrastructure, which can have broader benefits for regional communities.
- Attracting relevant industry and government organisations, which can host placements for and later employ students/graduates, this growing regional economies.

Question 3: What strategies have been implemented to boost research excellence in RRR universities? What has and what has not worked?

The Australian Government's Collaborative Research Networks (CRN) program, in which less research-intensive/newer Australian universities partnered with more established, research-intensive ones, helped establish a more robust and sustainable research base for regionally-headquartered universities. The program, reviewed by the Department of Education in 2014,

focussed resources strategically, created opportunities to test and develop partnerships and helped to generate capacity through a range of institutional reforms and generated secondary benefits such as new linkages, different business models, products and services.

Importantly, it introduced new funding into the system which regionally-based universities had priority accesses to, and facilitated collaborative and productive relationships with other institutions.

CRN was largely transformational for regionally-headquartered universities. It generated several secondary benefits such as greater internal and external networking and cross-institutional learnings. The CRN programme also built secondary skills and linkages by encouraging corporate areas to be part of the delivery equation, which has contributed to greater administrative efficiencies in terms of better reporting, coordination and business planning.

Less successful projects were ones where there was little focus, those that were not driven by researcher to researcher links and those where the funding did not go directly to the regionally-headquartered university.

A future round of a program similar to CRN should reflect the evolution of the research effort at regionally-based universities since 2010 – some ideas are presented in response to Q.11.

The Regional round of the Educational Investment Fund provided funding for research infrastructure on the campuses of regionally-headquartered universities, and the Australian Research Council's (ARC's) Linkage Infrastructure, Equipment and Facilities grants play an important role to assist our researchers in utilising important equipment.

Funding organisations such as the ARC should focus on providing more funding to regionally-based universities as has been successfully modelled in other countries. For example, the US National Science Foundation (NSF) has an initiative called EPSCoR (https://www.nsf.gov/od/oia/programs/epscor/), which is directed at funding research at regionally-based universities in the USA.

- The program was established in the 1950s to prevent an undue concentration of research effort and to encourage competitive research in regions of the US that were less able to compete successfully. About 15 per cent of NSF funds are set aside for the EPSCoR program.
- The program's objectives focus on developing research capabilities, supporting minority graduate and U/G students, establishing STEM education and professional development pathways, supporting engagement and outreach, and encouraging *impact research and economic development.*
- The research element includes support for infrastructure improvement (support for infrastructure, collaborations, minorities and fellowships), co-funding of research and support for workshops and outreach.

Question 4: How can universities in RRR areas best address the "breadth vs depth" challenge described above, with particular consideration to attracting and retaining high-calibre staff?

Despite the significant growth of the research effort at regionally-headquartered universities, it is difficult to achieve breadth with limited resources. We need to focus on depth to achieve research

excellence in relevant areas and attract high calibre researchers. Starting new areas of research requires considerable commitment of resources with no guarantee that the endeavour will succeed.

Additional new resourcing for research would assist in terms of the breadth of research undertaken at regionally-headquartered universities and in attracting excellent researchers. Developing breadth of research would also assist regional communities e.g. in the arts and social sciences.

Additional measures which would assist in recruitment of high-calibre researchers to regional locations include:

- more flexibility in visa processing
- more conjoined appointments with international partners
- mobility support funding or a travel assistance scheme, and
- better broadband access.

Harnessing Australia's Indigenous research capability

Question 5: What steps can be taken to increase Aboriginal and Torres Strait Islander research workforce and encourage research on Aboriginal and Torres Strait Islander communities and issues?

More work needs to be done to build the pipeline of Aboriginal and Torres Strait Islander students who aspire to higher degrees, academic and research careers.

Building education and training pathways that recognise and appreciate Aboriginal and Torres Strait Islander culture and educational challenges are vital. Graduating more Aboriginal and Torres Strait Islander students will increase the availability of graduates for HDR programs. There must be good HDR scholarships for Indigenous students (e.g. starting at $40,000), but a challenge for many universities is that there aren't enough students to take them up.

PVC's Indigenous may assist in developing strategies to grow the pool of Indigenous students – such pathways must recognise cultural differences in learning, and research questions should be identified in partnership with regional communities.

One possible solution may be the development of a State or National *'Indigenous Academy'* to facilitate culturally appropriate and focused access by Aboriginal and Torres Strait Islander students to university. Such an *Academy* could be run under the auspices of, and supported by, multiple universities; providing a unique and coordinated approach to building Indigenous education equity, ensuring relevant, impactful research activity and outcomes and future proofing regional workforces while improving indigenous employment rates. To ensure maximum impact such an *Academy*, must work across the sector to encourage/build aspiration and provide (local) supportive pathways from High School to VET and Higher Education, encourage students in their undergraduate and honours years to undertake HDR degrees and facilitate subsequent academic appointments within relevant universities (including the Academy itself), industry and government.

Recruiting more Indigenous academics would be helpful, but there is a lot of competition for a relatively small pool of researchers.

Improved regional proportion of the ARC Discovery Indigenous project would be of assistance.

Question 6: How can universities in RRR areas better engage with local Indigenous communities through research?

Indigenous knowledge is relevant to many fields of research, including land management, climate change adaptation, agriculture, aquaculture, creative studies etc. A first step towards working with this knowledge and tradition in research is to clarify understanding of how local Indigenous communities wish to engage with universities and a shared understanding of key issues for specific regions (in addition to State and National priorities).

Several Universities have found having 'elders in residence' from local Indigenous groups and/or Indigenous Advisory Groups to advise on strategy is a helpful approach.

Resourcing continues to be an issue – the funding regionally-based universities receive for Indigenous (or indeed regionally-focused) research is not proportional to the proportion of Indigenous people who live in our RRR communities versus Metropolitan.

Barriers faced by universities in regional, rural and remote areas

Question 7: What barriers exist to universities in RRR areas improving their research outcomes?

Despite the significant growth of the research effort at regionally-headquartered universities, the following barriers exist to improving research outcomes:

- Lack of funding to grow research - government research funding overwhelmingly goes to the Group of Eight, or other large, metropolitan universities (see Figure 1).
- Increasing competition for research funding as all universities seek a greater proportion of the existing pool.
- The incorrect perception with Australian funding agencies and reviewers that regionally-based universities are almost exclusively focussed on teaching.
- Paucity of funding schemes particularly directed at regionally-based issues best addressed by local (regionally-based) universities.
- Industry structure in regional areas, which is dominated by SMEs, rather than large companies, that have more resources to potentially invest in research.
- Decline in research in HASS fields in RRR universities limits the possibility of transdisciplinary research, and the capacity to meet global challenges.
- Difficulty for some RRR campuses to attract and retain researchers for a variety of reasons, including funding.
- Poaching the best researchers (and teams) at RRR universities by larger metropolitan universities that can offer greater funding and infrastructure support remains a significant problem.
- Difficulty in attracting HDR students, both domestic and international, to RRR campuses. There needs to be more flexibility in visa processing to attract high quality, international researchers, and the lack of investment in regional cities, including in health, education and other support services, is a general disincentive in attracting researchers to regional locations. Recent government approaches to increase Post Study Work Rights for students completing degrees in RRR are warmly welcomed.
- The relative youth of RRR universities and relatively few alumni, including those willing to be benefactors and provide funding for research / HDR students.

- Difficulties in accessing physical infrastructure located elsewhere. Barriers include travel costs, and fees to use the infrastructure.
- The Medical Research Future Fund is most accessible to larger groups established at older research universities.
- Difficulties around accessing data - the availability of useful bandwidths in parts of RRR Australia to access large amounts of data.
- The NBN has not yet been rolled out to many regions, and there isn't always an AARNet service in close proximity. There are still facilities and instruments, campuses and regions that are either not directly connected to AARNet, or are in locations where AARNet does not have a physical presence.
- Lack of resources to support women in STEM means that research reestablishment funding and other research equity initiatives are not as high up the agenda as at metro universities, restricting the research workforce, and with implications for innovation.
- The cost to be compliant, both real and indirect, is the same for regionally-headquartered universities as at larger universities, but the resources are much less at the former.
- Lack of resource means limited capacity to promote impact, and attract interest in research through both traditional and social media. There is less ability to track altmetrics.
- Lack of resources can lead to the inability to update and overhall systems.
- The capping and decline of international HDR student numbers.

Question 8: Are there perverse incentives that negatively impact research outcomes in RRR universities?

In ERA, STEM subjects assessed on citations are better rewarded than those assessed by peer review (e.g. creative arts, humanities in general, and social sciences). This is a disincentive for regionally-headquartered universities to pursue non-STEM disciplines, even though research in the other fields is of great value to RRR communities. It is also important in multidisciplinary research to solve "big challenges".

International rankings may act as a perverse incentive as they may be 'gamed'. Projects and proposals should be looked at on merit rather than from the perspective of how a university is ranked.

Opportunities for increased research excellence

Question 9: What opportunities exist for universities in RRR areas to pursue research excellence and impact?

The research perspective of regionally-based universities differs from that at large, metropolitan universities – it is strongly connected to place and *impact* (rather than ranking-focused outcomes).

Embedded in regional Australian communities, huge opportunities exist in regionally-headquartered universities in terms of research excellence and impact with respect to fields such as agriculture, environmental sustainability, mining, tourism, health, education, RRR supply chain, Indigenous knowledge etc – all of which impact on economic sustainability/development and workforce

development. The challenges for regional Australia are similar to many regional areas world-wide, and provide a basis for international research connections.

At RUN universities, there are examples of research excellence in areas outside the suite of fields of research normally associated with "regional" issues e.g. astronomy (Charles Sturt, USQ), and road accident research (USC).

More work can be done to build research into models for regional development e.g. Smart Specialisation in the EU is an innovation ethos that can enable regional transition and develop industries of the future, strengthen business and industry capacity and attract new business to RRR areas. Regionally-headquartered universities can be hubs for such activity and, while examples of such industry moves from metropolitan are now emerging (e.g. the AgriPark at Charles Sturt), they are still limited.

Question 10: What are some examples of strong collaborations between industry and universities in RRR areas? What has and what has not worked?

What has worked*…(*more information on relevant examples can be obtained directly from the universities)

Charles Sturt University

The Charles Sturt AgriPark (https://agripark.csu.edu.au/) in Wagga Wagga facilitates connections between international agricultural companies, knowledge-rich agribusinesses, food producers, innovative SMEs and Charles Sturt University to tackle complex global issues. It fosters innovation, entrepreneurship, synergy and collaboration through co-location.

CQUniversity

CQUniversity research in collaboration with industry includes:

- The use of near infrared spectroscopy technology has led to the development and commercialisation of technology to non-invasively assess the internal quality of fruit. This technology is now in use for assessing when to harvest fruit to achieve maximum flavour and eating quality.

- The 10,000 Steps community health program developed by researchers at CQUniversity has directly impacted public health both in Australia and around the world. 10,000 Steps uses activity trackers (pedometers, Fitbit), web and app technology to track daily physical activity and motivate people to move more regularly by encouraging them to take 10,000 steps a day.

- Fatigue in shift-workers is a well-known cause of accidents and dangerous behaviour in the workplace. In order to predict the likely timing and duration of sleep and wake in shift-workers, and thus the likely levels of fatigue, CQU researchers have developed an algorithm that organisations are using for the all-important activity of employee rostering. Using data to predict sleep patterns, this algorithm has been commercialised by Interdynamics Pty Ltd, a development company that has produced software to predict fatigue levels associated with shift-work.

Federation University Australia

Federation University Australia's Technology Park was established in 1995 in partnership with the City of Ballarat and the Victorian State Government. New funding from the state of Victoria will see a new Technology park opened in Morwell as part of the plan for regeneration in the La Trobe valley. Together the Federation University business parks are the largest in an Australian University. The business parks host a range of multi-nation companies including Concentrix, IBM, Serco, and C4Net as well as national and local businesses including St John of God HR services, the State Revenue Offices and Emergency Services Telecommunications. The parks employ more than 2,100 full-time jobs in Ballarat alone and provide a further $300M of economic benefit to the City. They provide internship opportunities for our students, who often go on to full-time employment and therefore retention of a skilled labour force in the region. More recently, the tenants are providing opportunities for research collaborations including the potential location of a Watson Institute for the Internet of Things on the Federation University Mt Helen Campus.

Recently, a business accelerator has been established in the Ballarat City Centre Business Park (RunWay Ballarat) in collaboration with the Federation Business School and the Victorian State Government. This will transform the capacity of the University to generate sustainable start-up companies within the City and eventually in our other regional campuses.

Southern Cross University

The National Marine Science Centre (NMSC) has marine science academics from Southern Cross University (SCU) collocated with fisheries researchers from the Department of Primary Industries. The NMSC has a state-of-the-art flow-through seawater supply system, that draws water from Charlesworth Bay, high quality filtered seawater is available on tap in the laboratories, hatchery, aquarium rooms and tank farm.

As one of the best systems in Australia, the supply of seawater supports a range of experimental research activities and specialist laboratories, for researchers from SCU, the DPI and other industry partners. The facility also holds a large aquaculture that house a wide range of fish and invertebrate species in a variety of round tanks and raceways that range from 1,000 to 7,000 litres. This space includes open air, undercover and climate-controlled rooms to cater for different animals and research requirements; and a hatchery with a broodstock facility (30,000 litres), hatchery and nursery tanks to grow fish to fingerling stages.

As well as collaboration with the DPI, Marine Science researchers at the NMSC have worked with the Rural Industry Research Development Corporation grants to investigate Mulloway fish farming and sea urchins; Fisheries Research Development Corporation grants to study aging lobsters; and the Recreational Fishing Trust to restock Mangrove Jack and Blue Swimmer Crabs.

University of New England's Animal Genetics and Breeding Unit (AGBU)

AGBU, the Animal Genetics and Breeding Unit, is a partnership between the University of New England (UNE) and NSW Department of Primary Industries (in the form of an unincorporated joint venture), and was founded in 1976, with a clear focus on R&D to underpin and advance the genetic improvement of livestock.

Genetic improvement, or animal breeding, is the process of identifying the animals with the best genes for traits that impact farmers' profits (and those of others in the supply chain), and then using those animals as parents of the next generation.

AGBU has been largely responsible for the development of the very successful national genetic evaluation systems BREEDPLAN (beef cattle in Australia and overseas), Sheep Genetics, and TREEPLAN. AGBU has an ongoing role in improving those systems to ensure they remain world-best.

Recent independent studies have shown that the value of genetic improvement in Australia for beef cattle, sheep and other livestock, grows industry worth by well over $60m per year (genetic improvement is cumulative – so we estimate the amount by which the value grows each year). As an example of the impact at the level of the farm family, for a typical individual beef producer, current genetic improvement adds the equivalent of $9,000 extra profit each year, by comparison with the rate of progress prior to the introduction of BREEDPLAN.

University of Southern Queensland

The Northern Australian Climate Program (NACP), focussing on the grazing industry in northern and remote Australia, is a multi-disciplinary, vertically integrated team with particularly strong collaboration between institutions conducting high level science (e.g. deep convection in the tropics, seasonal climate forecasting) and extending to graziers dealing directly with the red-meat industry in rural and remote northern Australia. The project is funded by Meat and Livestock Australia, the 'MLA Donor Company', the Government of Queensland, and also USQ.

The Drought and Climate Adaptation Program (DCAP) ($5.2m) has provided the University of Southern Queensland/Centre for Applied Climate Sciences with three projects in DCAP that work in the red-meat, grain, sugar, wine and dairy industries across the State in regional and rural areas. Within DCAP, an especially innovative project has been USQ's project that is producing enhanced crop insurance systems and associated financial decision support tools for rural industry in Queensland ($1.08m). USQ has teamed-up with Willis Towers Watson (WTW) (London), a large global insurance brokerage and reinsurance company, together with the Queensland Farmers' Federation (QFF), the cotton industry, and Queensland Canegrowers to research and develop more affordable alternative risk transfer insurance options to allow farmers in regional and rural areas to mitigate the impact of adverse and extreme weather.

University of the Sunshine Coast's Innovation Centre Sunshine Coast

University of the Sunshine Coast's Innovation Centre has become a focal point for business innovation and entrepreneurship on the Sunshine Coast. It has supported the start-up and growth of over 200 knowledge economy businesses since its establishment in 2002, creating over 860 jobs. With a $2.2 billion world-class health and medical precinct in the region, the Centre is working with

regional partners to leverage the benefits of this significant new regional asset to attract and assist innovative health, science and technology related start-ups and high growth companies. A new four month health, wellbeing and medtech accelerator program has also run in the Sunshine Coast University Hospital from 2018.

What hasn't worked…

CQUniversity

What is difficult to make work are HDR placements in the relevant industries. CQUniversity is securing more industry-sponsored and industry-relevant HDR scholarships but often by larger industries that are not necessarily located in the same city as a CQUniversity campus. Companies and businesses in regional cities are mostly SME's which usually don't have the resources to fund PhD scholarships, especially with such commitments being over a number of years. HDR placements therefore necessitate the HDR student taking up the placement at some distance from their home and family where they are studying. This adds additional cost and hardship to the students.

University of New England

Joint Research Engagement (JRE) Engineering Cadetships:

https://www.aph.gov.au/~/media/Committees/eet_ctte/estimates/supp_1617/Education/Answers/SQ16-000805-Attachment-A1.pdf

University of New England (UNE) struggled to find appropriate candidates to take JRE Engineering Cadetship up. The scheme was not designed in the most flexible manner, and had too many constraints (e.g. international PhD students were ineligible). It was difficult to engage with PhD students towards the end of their candidature, rather than engaging them with industry right from the outset.

Southern Cross University

Engaging with industry to find Internships and Work Integrated Placements for HDR students can be challenging. There are few relevant industries with the resources and capacity to support placements in regional areas. Further-more, many industries that regionally-based universities work with have been hit hard by drought, flood, fire etc. and this has impacted on projects, and the ability of industry, to continue to fund research at the same rate as previously.

Question 11: How can government policy facilitate universities in RRR areas to boost their research excellence and impact?

We note that Recommendation 6 of the National Regional, Rural and Remote Tertiary Education Strategy provided some associated actions relating to building the research effort at RRR universities, including:

- *implementing a new grants program to enhance research capacity in regional universities, including partnering with metropolitan universities, engagement with local employers and industries, and exploring opportunities to increase their role in providing national research infrastructure, and*

- *identifying opportunities to establish national research infrastructure in RRR areas, including undertaking a comprehensive scoping study to underpin future national research infrastructure investments*
- *Continue to build strategies to attract domestic and international students to RRR areas, building on recent initiatives.*
- *Establish a program to support VET and university students in both RRR and metropolitan areas to undertake WIL placements in RRR areas, including internships, mentorships, practicums, research, teaching and tutoring placements.*

RUN suggests the following initiatives, some of which pick-up on actions from the National RRR Tertiary Education Strategy above:

- Dedicate a percentage of Australian Research Council / Collaborative Research Centres or National Medical or Research Council funds or fellowships for regionally-headquartered universities for research projects, research fellows, and infrastructure. This model is similar to the US National Science Foundation's EPSCoR scheme. Under the program, designed to prevent an undue concentration of research effort and to encourage competitive research in regions of the US that are less able to compete successfully, 15 per cent of NSF funds are directed to regionally-based universities.

- Another round of the Collaborative Research Networks program, or another stand-alone program dedicated to building research at regionally-based universities via collaboration. Regionally-headquartered universities are generally now not lacking the research leadership, management and engagement skills to develop world class research portfolio's, but would benefit from providing the appropriate resources, including linkages, to pump-prime our research strategies. We therefore suggest a few modifications from the original CRN program:
    - all funding should go directly to regional-headquartered universities rather than partners;
    - collaborative partnerships should be flexible, allowing partnerships with other regionally-based or metropolitan universities in Australia, and with international universities which are strong in relevant fields of research. As well as building the research and international reputation of regionally-based universities, international partners would assist in attracting international staff and students, and building international links more generally in RRR Australia.

    Projects relevant to regional development could be prioritised to meet national goals.

- Removing the 10 per cent cap for international HDR students at regionally-headquartered universities in the Research Training Program. Such a move would be an incentive for more HDR students to study in RRR universities.

- Setting aside some funding from the Research Training Program to attract research students to regionally-headquartered universities in areas of national priority to facilitate regional development, and additional funding to support the cost of research and travel for students to use National Research Infrastructure facilities.

- Locating significant research infrastructure in regional Australia.

- Incorporating research and innovation in regional development funding and policy.

- Building regional knowledge hubs, which bring education (work integrated learning and placements), research and innovation together to build regional economies e.g. in areas such as health, agriculture, environmental science.

- More flexibility in visa processing and around conjoined appointments with international partners would help the recruitment of more international researchers.

- Mobility support funding or a travel assistance scheme would help attract a high-calibre researchers