Australian Catholic University (ACU) Submission to the Senate Inquiry into Australia's Innovation System

July 2014

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Executive Summary

Australian Catholic University (ACU) welcomes the opportunity to make a submission to the Senate Inquiry into Australia's Innovation System.

If Australia is to successfully face the challenges of increasing global competition in innovation, research and education, we must continue to support and advance diverse, vibrant and high quality research communities across the nation.

ACU advances the following reform proposals as imperative to sustaining the long-term viability and competitiveness of Australia's innovation system.

ACU believes that the Excellence in Research for Australia (ERA) scheme which assesses the quality of research conducted in Australian universities presents a powerful incentive for universities to concentrate on high quality innovation rather than merely high volume output. The following reforms to the ERA assessment scheme would strengthen ERA and ensure that the drivers that influence behaviour in the nation's universities align as strongly as possible with the objectives of a high quality research and innovation system.

Reform proposals:

- ERA should recognise and assess multi-disciplinary research.
- Reduce the reference period for ERA from six years to four years.
- There should be a cap on the volume of research outputs required for ERA assessment.

ACU believes that if Australia's innovation system is to successfully face the challenges of increasing global competition, government must:

- Support a diversified research landscape where universities are funded to undertake quality research and play to their particular demonstrated research strengths.
- Encourage universities to align teaching with their particular research strengths.
- Secure a policy environment which recognises that universities that are growing research capacity need to be supported and allowed sufficient time to develop their research strengths.
- Endorse strategies that support research intensification across all universities, promoting:
    - Greater concentrations of research excellence.
    - Competitive and strategic allocation of resources based on 1) well-articulated research plans and 2) rigorous assessment of performance.
- Focus on research quality over research quantity in research assessment and administration. This would better serve research and innovation in Australia and more effectively advance the objective of high quality research, by freeing up additional resources for better investment in actual research and quality researchers.
- Recognise the vital connection between university research and teaching, which underpin scholarship and innovation.
- Facilitate active engagement in strategies to build international research engagement and collaborations. There is significant advantage to be gained from tapping into research talent and advances overseas by collaborating with the world's leading researchers and research institutes.

Better Identifying and Promoting Quality Research in Australia - Excellence in Research for Australia (ERA) Assessment Reform

ACU proposes the following reforms to the Excellence in Research for Australia (ERA) scheme to enhance its functions and further Australia's objectives to support a high quality research and innovation system:

- Recognise and assess multi-disciplinary research - Universities that have formally established multi-disciplinary research centres or institutes should be permitted to make a limited number of ERA submissions based on the work of these centres or institutes and to use a specific field of research (FoR) code to identify this research.
- Reduce the reference period for ERA assessment from six years to four years – this would provide a closer relationship with the quality of research being undertaken in each university at the time that the results are released.
- Cap the volume of research outputs required for ERA assessment - There should be a maximum number of research outputs permitted in each four-digit (i.e. specific discipline field) FoR code. This would compel universities to direct research investment to the top researchers who will contribute quality outputs for inclusion and assessment in the ERA. It would also cut unnecessary red-tape and create greater efficiency in the ERA assessment process by alleviating much of the administrative burden and cost incurred in meeting the current assessment requirements.

What is ERA and why is it important?

The Excellence in Research for Australia (ERA) scheme was introduced in 2010 to identify and promote excellence across the 'full spectrum' of research activity in Australia's universities.

The ERA scheme seeks to "evaluate the quality of the research undertaken in Australian universities against national and international benchmarks," with ratings determined by committees of highly reputed domestic and international researchers.[1] It identifies the research strengths of individual universities and highlights disciplines in which there are opportunities to develop research capacity. A five-point rating scale is used to identify individual university's research performance in each of their assessed research areas,[2] with the ratings as follows: 5 (well above world standard); 4 (above world standard); 3 (at world standard); 2 (below world standard); or 1 (well below world standard).

ERA is fast becoming the core benchmark against which universities assess their research performance, determine where to direct or target strategic research investment, and upon which they rely to validate their research strengths[3].

ERA is highly influential in government decision-making regarding the share of public funding for research activities to be allocated to individual universities. For instance, ERA results are a key data

[1] Australian Research Council – Australian Government, 'Excellence in Research for Australia (ERA)', at http://www.arc.gov.au/era/default.htm

[2] Under the ERA, disciplines are defined as two-digit and four-digit Fields of Research (FoRs) codes. The two-digit FoR code relates to a broad discipline field (e.g. Physical Sciences (02) or History and Archaeology (21)). A two-digit FoR code consists of a collection of related four-digit FoR codes which relate to a specific discipline field of a two-digit FoR code (e.g. Astronomical and Space Sciences (0201) or Archaeology (2101)). As per http://www.arc.gov.au/pdf/era12/report_2012/ARC_ERA12_Introduction.pdf

[3] For example see La Trobe University at http://www.latrobe.edu.au/handbook/2014/general/research.htm; Macquarie University at http://mq.edu.au/research/era/research-areas/index.html; The University of Melbourne at http://themelbourneengineer.eng.unimelb.edu.au/2011/02/%E2%80%98well-above-world-standard%E2%80%99-melbourne-engineering-and-technology-era-results/

input that feed into the Government's calculations when determining research block grant amounts to be awarded to universities. The Government's 'Excellence Index' moderator is designed to "recognise and reward research performance at or above world standard according to the outcomes of the ERA initiative."[4]

The Rationale for Reform

The assessment of research quality conducted through the ERA process makes a valuable contribution to the development of research and innovation in Australia. It has become a powerful incentive for universities to concentrate on high quality innovation rather than on the routine production of a high volume of output of modest quality. Despite this the ERA contains flaws in its design which, were they corrected, would enhance research and innovation by ensuring that the drivers that influence behaviour in the nation's universities align as strongly as possible with the objective of a high quality research and innovation system.

ERA Reform Proposal: Recognise and assess multi-disciplinary research

The current ERA assessment scheme does not accommodate multi-disciplinary research, as research quality is only evaluated under individual discipline categories. It would be difficult to find many credible research-leaders in Australia who would advocate that a focus on research in a single discipline is the way to achieve high quality research and innovation. Most significant research projects, especially those designed to deal with complex problems, require a team of researchers who bring together expertise from different disciplines. And yet, astonishingly, there is no recognition at all in the ERA for centres or institutes established as multi-disciplinary research concentrations. In addition to the assessment of performance in a discipline there needs to be an option to submit multi-disciplinary research groups for assessment.

Since Australian Research Council (ARC) and National Health and Medical Research Council (NHMRC) panels, for example, regularly assess projects that are multidisciplinary it should not be too difficult for ERA panels similarly to consider the quality of multi-disciplinary centres or institutes.

Reform Proposal: Universities that have formally established multi-disciplinary research centres or institutes should be permitted to make a limited number of ERA submissions based on the work of these centres or institutes, and to use a specific FoR code to identify this research. Implementation of this proposal would provide universities with incentives for investment in multi-disciplinary research concentrations.

ERA Reform Proposal: Reduce the reference period for ERA assessment from six years to four years

The ERA reference period for publication is currently set at 6 years. This means that results released in 2015 will cover research for the years 2008-2013.

The research landscape, however, changes more rapidly than is implied by such a time scale. Many of Australia's universities are also relatively young and their profiles in some cases are changing rapidly. To illustrate, in the citation disciplines, 16 of the top 20 researchers at ACU have joined the University in the last 12 months, and whereas the 10th ranked researcher had a career total of 700 citations last year, the 10th ranked researcher now has a career total of 6000 citations.

The nation needs to know who is performing at a high level now rather than back in 2008. The reference period needs to be shortened.

[4] For example see Department of Education – Australian Government, 'Research Block Grants – Calculation Methodology, at https://education.gov.au/research-block-grants-calculation-methodology

Reform Proposal: The reference period for ERA assessment should be reduced to four years. This will allow ERA results to have a closer relationship with the quality of research being undertaken in each university at the time that the results are released.

ERA Reform Proposal: Cap the volume of research outputs required for ERA assessment

Under the current ERA scheme, universities are required to submit all research publications which meet the eligibility criteria for assessment. Where an institution has fewer than 50 research publications or 'outputs' in a given assessment category, these are considered low volume and fall below the volume threshold standard; consequently they are not evaluated under ERA.[5]

There are three major problems with the volume of material required for assessment.

The first problem is that the low volume threshold of 50 outputs in a four-digit FoR code is absurdly low when it is considered that this represents the total requirement by all academic staff in the institution over six years. This volume of output could be more readily included in the aggregated assessment at two-digit level of a range of four-digit FoR codes. In many disciplines one strong researcher is sufficient to achieve the threshold of 50 outputs, but one strong researcher is not a reasonable basis on which to make a claim about an institutional performance.

The second problem is that an institution is required to submit every publication by every single academic staff member who meets the eligibility criteria. This makes 'Excellence in Research for Australia' arguably a misnomer because it is clear that a large amount of the research submitted is not by any means excellent. The ERA process must cope with a great deal of material that is not excellent. It is hard to see what benefit can possibly flow from the assessment of a large quantity of poor quality research. It would make more sense for such material to be filtered out by universities and not submitted.

Finally, the ERA system as it stands is not efficient or sustainable given the large volume of research that needs to be processed under its requirements. The number of research publications universities are required to submit for assessment could be substantially reduced and capped. The money spent on meeting the onerous administrative burden of the existing assessment system could be better invested in research and redirected to provide additional research grants. This is in line with the Government's objectives to reduce the burden of unnecessary red tape, reporting and administrative burden to facilitate a stronger and prosperous economy.[6] At present:

- There is a significant administrative burden and cost to the public purse in processing the large quantities of research publications submitted to ERA for assessment, by multiple universities across multiple research categories. As identified above, institutions must submit every eligible publication by every single member of staff.
- The burden on ERA committees in having to carefully sift through and evaluate such quantities of research could be eased considerably to allow greater and more valuable engagement with a selected sample of quality research publications.
- There are significant administrative costs to universities in having to process, compile and submit all research publications which could be alleviated and better invested in actual research activity. This is additional to the administrative burden placed on universities to

[5] Australian Research Council - Australian Government, *Excellence in Research for Australia 2012: National Report* (2012), at http://www.arc.gov.au/pdf/era12/report_2012/ARC_ERA12_Introduction.pdf

[6] For example see Prime Minister of Australia Media Release, 'Reducing red tape to build a strong and prosperous economy, at https://www.pm.gov.au/media/2014-03-19/reducing-red-tape-build-strong-and-prosperous-economy; Christopher Pyne Media Release 'Government to reduce red tape in higher education', at http://www.pyneonline.com.au/media/media-releases/government-to-reduce-red-tape-in-higher-education

engage staff to meet the substantial reporting requirements for the Higher Education Research Data Collection (HERDC)[7] (see commentary below).

Reform Proposal: There should be a maximum number of research outputs permitted in each four-digit FoR code for ERA assessment. This would compel universities to increasingly direct research investment to those top researchers who will contribute the outputs that will be included in the ERA. Additionally, it would cut unnecessary red-tape and create greater efficiency in the ERA assessment process, alleviating much of the administrative burden and cost incurred in administering the current ERA assessment scheme.

Focusing on Research Quality over Quantity

ACU considers that research and innovation in Australia would be better served by having a greater focus on research quality over research quantity in research assessment and administration. This would more effectively advance the Australian Research Council's objectives for high quality research, by freeing up additional resources which could be redirected and better invested in research activities and support for quality researchers. The current research assessment and reporting requirements are administratively burdensome and expensive. Research submission requirements can also create biases against disciplines that have larger cohorts of teaching staff with a primary role to teach rather than engage in substantial research (e.g. where all research outputs must be reported on, as required under the current ERA assessment scheme; discussed above). To highlight the magnitude of the research administrative burden, "the median estimated staff effort on the HERDC research publications collection in 2011 was 547 days, making it the most labour intensive of all of the DIISRTE reporting requirements...This effort of course is separate from and additional to the effort associated with the ERA."[8] The administrative burden has further and substantially increased in recent years through the introduction of the Sustainable Research Excellence (SRE) block grants scheme and the ERA.[9]

Strategic Research Intensification: Supporting universities to develop research specialisations and niche areas of research for national innovation and advancement

ACU supports a diversified research landscape in Australia where universities are funded to undertake quality research and play to their research strengths.

Universities should be supported to conduct quality research in their identified areas of speciality and to develop niche areas of expertise in line with their particular strengths and strategic objectives.

Universities that are growing need to be supported and allowed sufficient time to develop their research strengths, where they have a real capacity to do so.

ACU recognises that all universities cannot produce quality research in all areas. The benefit, however, of supporting competition and diversity within Australia's innovation system is that institutions are compelled to play to their respective strengths, which creates a dynamic research sector with a greater capacity to boost innovation.

[7] See Department of Education, Australian Government, 'Higher Education Research Data Collection', at https://education.gov.au/research-block-grants-calculation-methodology
[8] PhillipsKPA, *Review of Reporting Requirements for Universities – Final Report* (2012), at 105.
[9] PhillipsKPA, *Review of Reporting Requirements for Universities – Final Report* (2012), at 105.

Some of the most valuable research findings and endeavours have come from universities that have had the opportunity and support to develop their particular research specialities, or to pursue niche areas of research. Much of this research often takes place in Australia's smaller, younger and/or regional universities. It is important to recognise that institutional research priorities and strengths are often influenced by the unique circumstances of individual universities. For instance, an institution's research priorities may stem from, complement or be shaped by the particular geographic location(s) in which the university is established; they may be designed to advance the particular mission of the university; they may have been developed to address areas of community need; or a combination of these and other factors. The bottom line is that supporting a diverse university and research system is essential to producing diverse and valuable research outcomes that advance innovation in Australia.

To illustrate:

- The University of the Sunshine Coast (USC) (established as a university only in 1996) has engaged in exceptional research in niche areas, including aquaculture, and sub-tropical and tropical hardwoods and continues to grow its research profile. For example, USC aquaculture researchers have been engaged, through the Seafood Co-operative Research Centre, in the spawning of the first southern bluefin tuna - *Time* magazine 'hailed it as the second most important invention of 2009'.[10]

- James Cook University (JCU) is now recognised as a world leader in tropical health and medical research and biotechnology. JCU makes a significant contribution to the health and economy of the community of northern Australia. JCU's unique location - surrounded by the ecosystems of the rainforests of the wet tropics, the dry savannahs, and the Great Barrier Reef – has driven its research strengths and focus on the tropics, and enables researchers and students from Australia and overseas to study in a "diverse physical environment unparalleled by any university in the world."[11] The tropical region, which includes Northern Australia, accounts for more than 40 per cent of the world's population – a figure which is projected to grow to 50 per cent by 2050.[12] JCU's Australian Institute of Tropical Health and Medicine (AITHM) brings together a wide range of internationally recognised research experts in areas such as the control of vector borne diseases (dengue fever, malaria, and lymphatic filariasis), Group A streptococcal infection, and amphibian and aquatic infections.

- University of Wollongong: The 'Simulation, Modelling, Analysis, Research and Teaching' (SMART) initiative at the University of Wollongong draws on the University's proven research strengths in the areas of engineering, commerce, informatics, law, and science to holistically assess infrastructure solutions.[13] The research supports greater understanding of the interconnection and interdependencies of infrastructure assets and systems to drive multi-disciplinary infrastructure research and education. The SMART facility houses 30 integrated laboratories, a simulation and modelling hub, rail logistics research centre and 200 higher degree research students; and Australia's first professorial chairs in infrastructure economics, infrastructure governance, infrastructure systems, and infrastructure modelling and simulation. This is one of the largest facilities of its type in the world. SMART is unique and is starting to play a major role nationally and internationally. For instance, the Universities of Oxford and

[10] Hare, J., 'Pressure grows for teaching-only unis' *The Australian* (2 February 2011), at http://www.theaustralian.com.au/news/nation/pressure-grows-for-teaching-only-unis/story-e6frg6nf-1225998355456

[11] James Cook University, 'About JCU', at http://www.jcu.edu.au/about/

[12] Liberal Party of Australia, 'Coalition commits $42 million to tropical medicine at JCU', at https://www.liberal.org.au/latest-news/2013/08/22/coalition-commits-42-million-tropical-medicine-jcu

[13] University of Wollongong, 'Vision', at http://smart.uow.edu.au/vision/index.html

Stanford recently invited the SMART unit to join them on major infrastructure bodies to assist them in advising their respective governments on critical infrastructure issues.[14]

- University of New England (UNE) (Australia's oldest regional university)[15]: UNE conducts research into precision agriculture which encompasses strategic responses to agricultural management practices, new enterprise and technological developments that can create advances in agriculture; such as in crop production. UNE's Precision Agriculture Research Group (PARG), formed in 2002, conducts multi-disciplinary research and runs numerous externally-funded research projects involving organisations such as the Grains Research and Development Corporation (GRDC), Meat and Livestock Australia (MLA), Grape & Wine Research & Development Corporation (GWRDC), and Sugar Research and Development Corporation (SRDC). Researchers are equipped with some of the latest agricultural technology, and promote both industry-led research and research-led teaching.[16] Two UNE research students recently received international recognition at the 12th International Conference of Precision Agriculture at Sacramento USA, receiving outstanding graduate student awards.[17]

- Deakin University (Deakin): Deakin's Institute for Frontier Materials (IFM) advances the University's research strengths in material science with a focus on innovative manufacturing technologies, and energy efficiency, resource and infrastructure sustainability, to address complex problems in the areas of energy, health, environment and manufacturing.[18] The IFM was established to "address some of the major challenges facing society through innovations in materials design and performance.[19] Deakin is also engaged in ground-breaking research in nanotechnology, a research area which "many believe will have a bigger impact on the future of humanity than the Internet".[20] Research at Deakin's $1.9 million world-class the facility will have implications for developments in clean energy, environmental protection and health care, fibres and a number of other application areas. Deakin's facility houses the world's most powerful Atomic Force Microscope, the only one of its kind in Australia.[21]

- Australian Catholic University (ACU): With the nation's largest cohort of nursing students, ACU has achieved an outstanding profile in selected areas of research such as cardiovascular nursing. ACU ranks as number 3 on the world database, SciVal, produced by Elsevier. The University also has distinctive strength in, for example, positive psychology and education, where it is arguably the nation's leading research institution. ACU's Institute for Positive Psychology and Education also houses the research team that established the nation's most

[14] Smart Infrastructure Facility – University of Wollongong, 'About SMART', at http://www.smartmasterclass.com/page.aspx?pid=383
[15] University of New England, 'About UNE', at http://www.une.edu.au/about-une
[16] University of New England, 'Precision Agriculture Research Group', at http://www.une.edu.au/about-une/academic-schools/school-of-science-and-technology/research/precision-agriculture
[17] University of New England, 'Precision Ag students scoop top awards at International Conference' (23 July 2014), at http://blog.une.edu.au/parg/2014/07/23/precision-ag-students-scoop-top-awards-at-international-conference/
[18] Deakin University, 'The Institute for Frontier Materials', at http://www.deakin.edu.au/research/ifm/about-us/index.php
[19] Deakin University, 'The Institute for Frontier Materials', at http://www.deakin.edu.au/research/ifm/about-us/index.php
[20] Deakin Research Communications – Deakin University, 'The little science takes big steps at Deakin' (17 August 2009), at http://www.deakin.edu.au/research/stories/2009/08/17/the-little-science-takes-big-steps-at-deakin; Deakin Research Communications – Deakin University, 'Deakin enters the nanotechnology big league' (15 March 2010), at http://www.deakin.edu.au/research/stories/2010/03/15/deakin-enters-the-nanotechnology-big-league
[21] Deakin Research Communications – Deakin University, 'Deakin enters the nanotechnology big league' (15 March 2010), at http://www.deakin.edu.au/research/stories/2010/03/15/deakin-enters-the-nanotechnology-big-league

successful program in support of Aboriginal and Torres Strait Islander researchers (as measured by ARC Discovery Indigenous grants (see Behrendt report reference to UWS—this team is now at ACU).

- University of Tasmania (UTAS): The UTAS Institute for Marine and Antarctic Studies (IMAS) has a vision to position UTAS as the leading institution for marine and Antarctic studies, and advances the University's research strengths in these fields.[22] Research at UTAS covers a number of important areas including sustainable fisheries and aquaculture, coastal and estuarine ecology, marine biodiversity, Southern Ocean marine habitats, ocean governance and policy, and the Antarctic environment. IMAS hosts over 200 staff and 140 graduate students, supports 107 higher degree research students, and also offers specialised short courses in niche research areas.[23] It is playing an important role in pursuing multidisciplinary and interdisciplinary work to "advance understanding of temperate marine, Southern Ocean, and Antarctic environments", and in facilitating sustainable development for the benefit of Australia and the rest of the world.[24]

Promoting Strategic Research Intensification

ACU promotes the adoption of strategies that support research intensification across all universities as this can produce:

- Greater concentrations of research excellence.
- Competitive, efficient and strategic allocation of resources.

Quality research is facilitated by a concentration of quality researchers. Analysis of the research assessment exercises carried out in the UK since the mid-1980s demonstrates a correlation in most disciplines between a critical mass of researchers and the quality of their research. Critical mass provides the collegiality, interactions, team projects, and breadth of approach that drive much high quality research as well as a strong research environment for research higher degree candidates.

ACU recently implemented a research intensification strategy to boost its research performance in strategically identified and targeted research areas. To underpin its plan for research intensification, ACU abolished its multiple existing research centres and groups in 2013 and set about establishing five new Research Institutes to align with the mission of the University:

- Institute for Health
- Learning Sciences Institute of Australia (LSIA)
- Institute for Positive Psychology and Education (IPPE)
- Institute for Religion and Critical Inquiry
- Institute for Social Justice

ACU's research intensification strategy is a whole of university approach involving Institutes and Faculties. It has involved the appointment of high profile, externally sourced, leaders to assume the directorships of these institutes, and to work with high calibre Institute members and Centre/Program leaders. The strategy involves:

- Strategically directing research funding to research proposals judged by external panels as being of excellent quality.
- Highly selective recruitment of researchers to form the membership of ACU's research institutes, based on assessment that requires that each academic staff member has:
    - The capacity to make a significant contribution to the research programs of an institute.

[22] University of Tasmania, 'About IMAS', at http://www.imas.utas.edu.au/about-imas
[23] University of Tasmania, 'About IMAS', at http://www.imas.utas.edu.au/about-imas
[24] University of Tasmania, 'Institute for Marine and Antarctic Studies', at http://www.imas.utas.edu.au/home

  - A demonstrated record of outstanding research aligned with one or more of the programs of an institute - normally demonstrated by success in attracting grant income (category 1, national competitive grant schemes) leading to outputs published in leading national or international journals and with prestigious book publishing houses.
- Internal capacity building to support and enable high achieving early career and mid-career researchers to contribute to specific research programs, led by more experienced researchers; and to provide a clear pathway from a faculty into an institute.
- Staff membership of an institute is reviewed annually, as part of the academic staff member's Performance Review and Planning process.

Universities Must Research

An essential and defining characteristic of a modern Australian 'university' is an active engagement in research. Research activity is fundamental to the conception of universities as the bastions of scholarship and inquiry-based learning, which fuels innovation and innovative thinking.

Recently there has been some questioning of the relative role of universities in the research landscape. One argument which has been canvassed is that only some universities should engage in research, while others should focus purely on teaching. ACU considers that such a proposition should be strongly refuted on two main public policy grounds.

First, it would significantly diminish the strength, research breadth and international competitiveness of the university sector. If fewer universities were funded and supported to engage in research, this would shrink Australia's research base. It would also severely dampen the diversity of the research sector, which stimulates innovation across a broad range of fields and communities across the nation.

Second, it would be counter to the evolved modern conception of universities as institutions that advance scholarship, which is facilitated through research and teaching. The seminal work of John Henry Newman in *The Idea of a University* and his conception of university teachers "was very much one of individuals of great scholarship and learning, whose natural outlet today certainly would be in both teaching and fundamental research."[25]

Universities today play an indispensable role as intellectual engines that educate and produce quality graduates that will drive the future Australian workforce, foster active inquiry, and advance research-led innovation across the nation. As the Group of Eight has articulated in its submission to the present Inquiry:

> The purpose and role of a university is not to produce students equipped to move into a particular job or type of job; it is to prepare students to live in a complex and unpredictable world in which they will need to respond to situations, challenges and opportunities which we cannot forecast, and take advantage of them; and produce graduates who are flexible, resilient and have the self confidence necessary to take responsibility for their own actions.
> …
> A pervasive research culture is important because it enables universities to focus on learning rather than teaching, thinking as well as doing, debate not just assertion…
>
> A good university is one that provides an exciting environment, one that stimulates the passion and motivation of its students by exposing them to zealous and motivated educators in

[25] As Greg Craven identifies "We must remember…that Newman's writing really pre dated the final triumph of research within the great university constructs of the nineteenth century."; Craven, G., *The Idea of an Australian Catholic University* (2008) [Inaugural Lecture, 22 May 2008, St Mary's Cathedral Crypt], at http://www.acu.edu.au/__data/assets/pdf_file/0006/438378/20080522_VC_Inaugural_lecture.pdf

> a setting permeated by the creation of new knowledge and the application of rigorous debate. The benefits of this learning go beyond the provision of particular disciplinary information – which is readily available elsewhere and will often quickly become out of date. University education aims to support the balanced development of the whole person. Achieving this outcome requires the application of rigorous standards of academic excellence and an emphasis on generic characteristics such as curiosity, probity, rational inquiry, and placing a higher reliance on evidence than on authority; it is also an outcome of the academic environment as a whole, requiring an academic community that transcends disciplines and builds on the interactions that take place outside any formal teaching arrangements.[26]

It is, perhaps, grounded in a realisation of this fundamental connection between research, teaching and learning that Australian universities are by definition required to engage in activity that:[27]

- Demonstrates the commitment of teachers, researchers, course designers and assessors to the systematic advancement of knowledge.
- Demonstrates sustained scholarship that informs teaching and learning in all fields in which courses of study are offered.

What are the links between research and teaching?

The advancement of scholarship, which calls upon universities to facilitate academic inquiry and achievement at the highest levels, requires an engagement in both research and teaching. The links between teaching and research are "multiple, diverse, dynamic and discipline-specific."[28] Recognising this complexity, the connection between university research and teaching – supporting scholarship and enquiry-based learning – can be said to be conceptualised in at least five broad ways[29]:

- Research informs the content of the courses being taught. Research that is at the fore of the particular discipline being taught as well as the research of the individual academic teaching in the classroom can enrich course content and student engagement.
- Students can be taught research methods, which support their learning.
- Students can be engaged in active, research-based learning, which can be found in degree programs that are predominantly structured around problem-based or inquiry-based learning but which can be implemented at the level of the individual course where students undertake a research project.
- Students can be engaged in discovery research, normally where students work (often one-on-one or as part of research teams) with academics to undertake discovery research or complete dissertations.
- The research-teaching nexus encourages academics to engage in pedagogical research, or the scholarship of teaching and learning.

Universities, through their research activities, afford students the opportunity to be taught by the brightest minds and 'expert authorities' in their areas of study – perhaps even by those that have written the material or textbooks being taught. While every student in every field may not always be directly taught by these active researchers, involvement and exposure to a scholarly community has flow-on benefits to university teaching and learning. Additionally, non-research teaching staff may also build upon their own knowledge through the interactions they can have with their research active colleagues, which also benefits student learning.

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[26] Group of Eight submission to the Senate Inquiry into Australia's Innovation System (2014).
[27] *Higher Education Standards Framework (Threshold Standards) 2011 (Cth).*
[28] University of South Australia, 'Teaching-research nexus', at http://w3.unisa.edu.au/academicdevelopment/engagement/nexus.asp
[29] Wuetherick, B., 'Unpacking the teaching-research nexus and its influence on academic practice', *Academic Matters - The Journal of Higher Education* (October 2009), at http://www.academicmatters.ca/2009/10/unpacking-the-teaching-research-nexus-and-its-influence-on-academic-practice/

Wider implications of the research-teaching nexus

Universities attract and house some of the best minds across a broad and diverse range of fields of research, which if diluted or diminished could negatively impact on Australia's research and innovation capabilities. Under the current system, the research and teaching activities of universities are finely balanced and work in a complementary manner to support quality research and teaching, which underpin and support Australia's innovation system by building research and workforce capacity:

- Every Australian university is required to undertake research in at least three broad fields of study[30];
- Universities require a critical mass of students to cross subsidise their research activities, and consequently must build sufficient public standing, capacity and momentum to retain their status as an 'Australian university';
- The core research activities or research strengths of universities are often aligned with their areas of teaching. For example, ACU's teaching strengths in Health Sciences and Education (ACU is a major provider of nursing and teaching graduates in Australia), are also our core areas of research focus;
- Universities that develop research strengths in important niche areas may also offer specialised courses in these areas. For instance, James Cook University (JCU) which specialises in tropical health and medical research offers the only Master of Public Health and Tropical Medicine in Australia; an important area which builds capacity in addressing public health and tropical medicine issues.[31] Similarly, the University of New England (UNE) which has developed research capacity in precision agriculture offers Australia's only dedicated Graduate Certificate in Precision Agriculture;
- Every Australian university is required to undertake research "that leads to the creation of new knowledge and original creative endeavour" in at least the broad fields of study in which they offer masters or doctoral degrees by research.[32] If research funding and support is only directed to a select few universities, there will be far-reaching implications for the future Australian research workforce as fewer universities will be able to meet the requirements to take on research students. This would lead to a decline in research capability and innovation, and have wider economic implications for the nation.

Building International Research Engagement and Collaboration

It is not financially viable or advantageous for Australia to seek to build research expertise and leadership in all areas of research. The reality also is that Australia is a small country, and there is a limited pool of researchers in any given research area in the country. There is significant advantage to be gained from tapping into research talent and advances overseas by collaborating with the world's leading researchers and research institutes.

At ACU, we have been actively working to lift our research networks and widen our external reach to boost research in our core areas of strength. A particular strategy we have adopted to build our international research engagement and collaboration has been to offer fractional appointments to leading international researchers, to actively engage them in research in Australia through ACU. This builds strong professional relationships and substantial research connections and opportunities for ACU researchers to engage in collaborative research projects with their international counterparts. It also concurrently, albeit indirectly, opens up ACU researchers' access to the flow-on benefits of international research grants secured by these fractional appointees overseas and particularly, to the

[30] *Higher Education Standards Framework (Threshold Standards) 2011 (Cth).*
[31] James Cook University, 'Master of Public Health and Tropical Medicine, at http://www-public.jcu.edu.au/courses/course_info/index.htm?userText=74204-&mainContent=home#.U88DjhDYSwk
[32] *Higher Education Standards Framework (Threshold Standards) 2011 (Cth).*

cutting-edge research projects in ACU's core research areas. Developing and securing more fractional appointments of leading international researchers to work in Australian universities is an efficient way to leverage the best minds in Australia and the rest of the world.

Additionally as part of our research intensification strategy, and recognising the strategic benefits that international research collaborations offer to Australian research, ACU requires its new research institutes to achieve the research performance that will enable them to establish collaborations with national and international concentrations of high quality researchers in the relevant fields. The appointment of professorial fellows on a part-time basis is a key strategy in facilitating these international partnerships, and is especially important in developing opportunities for early-career and emerging researchers who should benefit from opportunities to visit the prestigious institutions from which the professorial fellows will be coming. Equally, ACU is strengthening its research institutes through the recruitment of exceptional researchers based full-time at ACU. The institutes will carry a significant responsibility for strengthening ACU's research performance, profile and reputation into the future.

As articulated, there are significant benefits to be accrued by supporting and cultivating international research collaboration to advance innovation in Australia. The following are core benefits accrued through international research engagement and collaboration:

- Supports resource efficiency - the skills, knowledge and facilities required to advance particular research projects are not always housed in an individual research institution or researcher. Research collaboration and the pooling of resources can produce research outcomes more efficiently.
- Facilitates the transfer of knowledge and skills – Engagement in international research collaboration can transfer new knowledge to Australian researchers more quickly and increase the likelihood of it being utilised and translated into outcomes that benefit the community.
- Stimulates creativity - Collaboration supports the cross-fertilisation of ideas that may in turn "generate new insights or perspectives that individuals, working on their own, would not have grasped or grasped as quickly."[33] Such benefits are likely to be the largest when the collaboration involves partners from more divergent backgrounds.
- Extends research networks and lifts productivity – Fostering international collaboration can extend the contacts individual researchers have with other researchers in their research fields around the world, who they can contact for information or advice to further their research and enhance research productivity.
- Enhances research impact and dissemination - Using the increased network capability, findings can be "disseminated more widely, either formally through publications and conference presentations or informally through discussions. The chances are greater that literature review searches will produce one of the collaborating authors, increasing the likelihood that the results of the research will be located and used by others."[34] Consequently, the findings are likely to have greater impact.

[33] Katz, J., Martin, B., 'What is research collaboration?', 26 *Research Policy* 1 (1997).
[34] Loan-Clarke, J., and Preston, D., 'Tensions and benefits in collaborative research involving a university and another organisation', (2002) 27(2) *Studies in Higher Education* 169; Eastern Michigan University, 'Collaborative Research'.

Appendix A - Australian Catholic University (ACU) Profile

Australian Catholic University (ACU) is a publicly funded university, open to people of all faiths and of none. ACU operates as a multi-jurisdictional university with seven campuses across four states and one territory. ACU campuses are located in North Sydney (NSW), Strathfield (NSW), Canberra (ACT), Melbourne (Victoria), Ballarat (Victoria), Brisbane (QLD) and Adelaide (SA).[35]

ACU is the largest English speaking Catholic university in the world.

While teaching, learning, and research at ACU is inspired by 2000 years of Catholic intellectual tradition, ACU is a diverse institution, attracting students and staff from a diverse range of faiths and backgrounds.

Today, ACU has more than 30,000 students and over 1,800 staff.[36]

ACU graduates demonstrate high standards of professional excellence and are also socially responsible, highly employable and committed to active and responsive learning. ACU graduates are highly sought after by employers, with ACU graduates securing a 95 per cent employment rate which is higher than the national average (employment rate within four months of degree completion).[37]

ACU has built its reputation in the areas of health and education and is a major producer of nursing and teaching graduates in Australia. ACU enrols the largest number of undergraduate nursing students in Australia, and the second largest number of undergraduate teaching students in Australia,[38] serving to meet significant workforce needs in these areas. Under the demand driven system, ACU has sought to focus and build on these strengths.

On 1 January 2014, ACU consolidated its previous six faculties into four: Faculty of Health Sciences; Faculty of Education and Arts; Faculty of Law and Business; and Faculty of Theology and Philosophy. This has involved realigning ACU's academic structures around key areas of strength, identity, and areas of growing demand for the University. These new arrangements are creating a more efficient and competitive structure focused on the needs of industry and employment partners. They strengthen the quality of offerings and interdisciplinary work through ACU, while aligning learning, teaching and research outcomes. ACU is also moving towards the adoption of a shared services model, where suitable, to improve efficiencies and internal processes and to better allocate resources.

ACU is committed to targeted and quality research. ACU's strategic plan identifies a well-defined focus on areas that align with its mission and reflect most of its learning and teaching: Theology and Philosophy; Education; Health and Wellbeing; and Social Justice and the Common Good. To underpin its plan for research intensification, in 2013 ACU abolished its existing research centres and groups and set about establishing five new Research Institutes, to align with the mission of the university. The strategy has involved the appointment of high profile leaders to assume the directorships of these institutes, and to work with high calibre Institute members and Centre/Program leaders.

- Institute for Health
- Learning Sciences Institute of Australia (LSIA)
- Institute for Positive Psychology and Education (IPPE)
- Institute for Religion and Critical Inquiry
- Institute for Social Justice

[35] Australian Catholic University, 'ACU expands to Adelaide' (29 October 2013), at http://www.acu.edu.au/connect_with_acu/newsroom/news/media_releases/repository/acu_expands_to_adelaide
[36] Staff numbers are full-time equivalent (FTE) figures.
[37] *Graduate Destination Survey (GDS) 2012.*
[38] Hobsons, *The Good Universities Guide 2014 to Universities, TAFEs and Higher Education Providers* (2013).