Innovative Research Universities

# Strengthening Research Across Asia:

## An Asia Research and Innovation Network

# Overview

**Conducting high-level research in the digital age increasingly requires the involvement of teams of researchers, multiple institutions and many countries.**

As a country with a proportionally strong research output and proximity to Asian partners, Australia stands to contribute and benefit significantly from better research and innovation networks across the countries of Asia.

**Strengthening Research Across Asia: An Asia Research and Innovation Network** is the second paper released by the Innovative Research Universities (IRU) as part of the IRU Research Series. The IRU has identified four crucial issues for the Australian research system each of which address the Government's aims to improve the commercial outcomes from research.  They are:

1. Promoting **industry driven research** to complement Australia's extensive university led research outputs;
2. Strengthening Australian interaction with the expanding economies of **Asia** through linked research systems and support for industry in those countries;
3. Emphasising **translational research**. Translational research tests the findings of basic research in practical, real world contexts to put the research to work improving products and processes, feeding back the outcomes into the next stages of the underlying research;
4. Encouraging **regional and outer urban research ecosystems** that see research conducted throughout Australia with benefits delivered to communities and industries.

The following Statement will explore the way ahead for creating a strong Asia Research and Innovation Network.

# IRU Recommends

**1** The Australian Government work with the Governments of interested countries to:

- > establish an Asia Research and Innovation Network,
- > invest in information and communication technologies that allow research projects by geographically dispersed teams
- > encourage international research and innovation through Government research programs, and
- > support researcher mobility between countries, including at the postgraduate student level, building on the growing undergraduate interchange highlighted by the New Colombo Plan.

**2** The Asia Research and Innovation Network should:

- > act as a vehicle to promote research and innovation, breaking down current barriers and national mindsets,
- > work to understand the connections and differences among research priorities across the region,
- > finance a multilateral research scheme to support major research projects undertaken within the region (perhaps based on the EU Horizons 2020 model) drawing on the capability of the two Australian research councils and like bodies in partner countries, and
- > support enhanced mobility of researchers at all levels within the region.



# The Challenge

**Placing Australia securely within the network of global research and innovation is essential.** This involves being positive about Australia's capability to continue to be a significant player in world terms and realistic that we will be one among many players in an ever more complicated set of global research and innovation networks.

Australia produces about three per cent of world research output.[1] As benchmarks for comparison Australians represent only 0.3% of the world's population[2] and Australian economic activity is approximately 2.1% of world GDP.[3] Hence Australia's research output is relatively strong but as a small contributor to the global research effort it cannot operate independently of research across the world.

Conducting high-level research increasingly requires the involvement of teams of researchers working within multiple institutions across many countries. This has led to international research collaborations growing at a significant rate.

The paradox is that while many research issues increasingly require the interaction of considerable resources to be pursued effectively, the rapid changes in digital technology and their impact on communications means that researchers from all universities can be effective members of world wide networks. While researchers remain part of local networks and respond to issues of local importance, the co-location of researchers with related research interests is less important than previously.

Historically collaborations have been primarily with developed nations in Europe and North America. Changes in the balance of economic activity mean current growth is greater in Asian and other currently smaller economies. In part this is due to significant recent investments in research capability by East and South Asian governments seeking to raise economic output, with the contribution of Asian nations to the global research effort rapidly growing.

**Table 1: Share of Total Global Research and Development Spending**

| | 2012 | 2013 | 2014 | $ billion (2014) |
|---|---|---|---|---|
| **Americas (21)** | **34.5%** | **34.0%** | **33.9%** | **$542.4** |
| U.S. | 32.0% | 31.4% | 31.1% | $497.6 |
| **Asia (20)** | **37.0%** | **38.3%** | **39.1%** | **$625.6** |
| China | 15.3% | 16.5% | 17.5% | $280.0 |
| Japan | 10.5% | 10.5% | 10.2% | $163.2 |
| India | 2.7% | 2.7% | 2.7% | $43.2 |
| **Europe (34)** | **23.1%** | **22.4%** | **21.7%** | **$347.2** |
| Germany | 6.1% | 5.9% | 5.7% | $91.2 |
| **Rest of World (36)** | **5.4%** | **5.3%** | **5.3%** | **$84.8** |

*Source: Gruber and Studt, 2014 Global R&D Funding Forecast, December 2013*

[1] Office of the Chief Scientist, http://www.chiefscientist.gov.au/2012/04/can-australia-afford-to-fund-translational-research/

[2] ibid

[3] World Bank estimates of GDP 2013, http://data.worldbank.org/data-catalog/GDP-ranking-table

Asia's share of global research and development expenditure was forecast to reach almost 40% in 2014 (see *Table 1: Share of Total Global Research and Development Spending*).[4] Investment in research in many countries of Asia approaches and exceeds Australia's investment in research. According to forecast figures for 2014, Australia's Gross Expenditures on R&D were lower than that of China, Japan, South Korea and India.[5]

The quality of the research output is rising but with considerable variation across different countries and universities within them. Greater cooperative support for research should work to the advantage of all countries.

So far, Australia has maintained its relative position through our ability to contribute to the Asian growth economies. On current trends China will be the highest volume collaborating country with IRU researchers by 2020 as measured by joint publications, overtaking both the United Kingdom and United States as shown in *Table 2: IRU Publications 2009-2013: Collaborations with international researchers*. Collaborations with other Asian nations are increasing at similar rates. IRU members, with a foundational commitment to engagement with Asia, are especially well placed to benefit from this changing global research dynamic.

This poses a challenge to traditional Government programs which retain a focus internal to Australia. We need to stimulate better outcomes through more programs that encourage global interaction and through joint programs with other countries, particularly those in Asia.

The generation of world standard research systems across Asia gives Australian researchers significant opportunities to work with talented researchers sharing significant pieces of research infrastructure, to improve research outcomes across all participating countries.

The developed and rapidly developing economies of Asia are of significant, and growing importance to the Australian economy. This is well recognised by successive Australian Governments which have targeted the close connection of Australia's economy with those of Asia. For example the New Colombo Plan's core goal is "deepening Australia's relationships in the region, as well as ensuring a more Asia-aware Australian workforce for the future."[6]

> "We need to stimulate better outcomes through more programs that encourage global interaction and through joint programs with other countries"

Science and research provide major avenues for building and improving relationships at the individual and international level. Collaborative research provides an "environment for the participation and free exchange of ideas between people, regardless of cultural, national or religious backgrounds."[7]

**Table 2: IRU Publications 2009-2013: Collaborations with international researchers**

| Collaborating Country | 2009 | 2010 | 2011 | 2012 | 2013 | 2020 Proj. |
|---|---|---|---|---|---|---|
| United States | 666 | 739 | 897 | 984 | 1115 | 2745 |
| United Kingdom | 513 | 484 | 607 | 664 | 756 | 1490 |
| China | 215 | 266 | 369 | 424 | 573 | 3185 |
| Germany | 156 | 200 | 272 | 316 | 322 | 1145 |
| Canada | 201 | 223 | 304 | 305 | 319 | 716 |

*Source: SCOPUS*

[4] http://www.battelle.org/docs/tpp/2014_global_rd_funding_forecast.pdf?sfvrsn=4

[5] http://www.battelle.org/docs/tpp/2014_global_rd_funding_forecast.pdf?sfvrsn=4

[6] http://www.dfat.gov.au/new-colombo-plan/about.html

[7] https://royalsociety.org/~/media/Royal_Society_Content/policy/publications/2010/4294969468.pdf

# The EU example

The EU provides a strong example of support for cross-country research. The EU has been working towards creating a European Research Area for a number of years. The European Research Area envisages a unified research area open to the world in which researchers, scientific knowledge and technology circulate freely. Its objectives include more effective national research systems, optimal transnational cooperation and competition, EU-wide competitions for funding, collaboration on the operation of key-research infrastructures and an open labour market for researchers.

The EU's current Framework Programme for Research and Innovation, Horizon 2020 with a budget of $110 billion over 7 years, aims to secure Europe's global competitiveness and drive economic growth and job creation, using scientific excellence and industrial leadership to tackle societal challenges. Horizon 2020 is open for participation to all researchers, including applicants from non-EU countries.

In addition to Horizon 2020, the EU has other research programmes such as the Marie-Curie actions, which are open to all researchers at all stages of their careers, irrespective of nationality and which supports industrial doctorates. Other programmes include COSME (Programme for the Competitiveness of Enterprises and SMEs), the Third Health programme which aims to complement the policies of the Member States to improve the health of EU citizens and reduce health inequalities, the Research Fund for Coal and Steel (RFCS) and the Consumer Programme (supporting actions to ensure a high level of consumer protection).

> The European Research Area is the product of over 50 years of cooperation between European nations.

The European Research Area is the product of over 50 years of cooperation between European nations. Through ASEAN and APEC there are groupings of countries in Asia and the Pacific which could assist in establishing a similar research network.

# Australian Government programmes

Currently there are few Australian research funding programmes that are dedicated to supporting collaborative research in Asia. Two exceptions are the Australia-China Science and Research Fund and the Australia-India Strategic Research Fund. These programmes support a small number of researchers in strategic fields, with an emphasis on translational research. In addition there are some individual scholarships through schemes such as the Endeavour Fellowships, with most targeting research students rather than established researchers.

The Chief Scientist, Professor Ian Chubb, has called for a forward-looking plan for an Asian-Area Research Zone[8] mirroring the European Research Area (ERA) that would encourage researchers, knowledge and technology to circulate freely within and between member states.

IRU member universities have themselves sought to further research collaboration by launching a programme of research funding with partner universities in the Malaysia Research University Network.

## An Asia Research and Innovation Network

To strengthen the collaborative activity across the research systems of the countries of Asia, including Australia, Australia should encourage the development of formal mechanisms for cross country research at the national level. Collaboration at the national level is important to demonstrate a clear commitment to the region and ensure the diplomatic benefits of research collaboration and maximised.

An Asian Research and Innovation Network would foster collaboration, fund major cooperative projects and investments in research infrastructure and engage industry throughout the region in the research effort.

First steps could include:

- dedicated multilateral **research and development funding** streams between participating nations in Asia;
- a programme supporting **researcher mobility**, incorporating all stages of the research career, between the nations of Asia; and
- a programme supporting access to major **research infrastructure** for researchers in Asia to improve efficiency of investment.

These are each explored in the following sections.

**RESEARCH FUNDING** An Asia level research grant programme would highlight the value from cross country research projects, rewarding the leading researchers in participating countries. These kinds of initiatives need to be significantly enhanced, led by the respective research agencies of each country with the Australian Research Council and the National Health and Medical Research Council, the Australian exemplars.

Two ways in which support for Asian collaborative research can be enhanced are:

1. the creation of a funding stream through a multilateral Asian research network. All participating nations would contribute to the fund, with contributions based on reasonable factors to ensure developing nations are not disadvantaged. Projects would focus on shared strategic research priorities for the

[8] Office of the Chief Scientist, http://www.chiefscientist.gov.au/wp-content/uploads/STEM_AustraliasFuture_Sept2014_Web.pdf

region including strengthening industry driven research. This approach would have the added benefit of bringing together senior research leaders from across the region to develop funding strategies and select successful projects; and

2. enhanced Australian (and other) government funding schemes dedicated to building collaborative research with the region as a whole, or with selected nations on a bilateral basis. Funding would need to build sustained and effective collaboration.

**RESEARCH INFRASTRUCTURE** The growing complexity of research questions means that ever larger, and more expensive research infrastructure is needed to support this effort. It makes basic economic sense for Australian researchers to access research infrastructure internationally where this is available rather than requiring investments be made in country. In return Australian facilities should be available to researchers based in other countries.

The Australian Government has renewed support for the facilities established through the National Collaborative Research Infrastructure Initiative through to June 2017, and indicated its determination to put in place a long term investment in research. We will get greater value from its investment through considered alignment with the research infrastructure investment of other countries of the region and agreements for shared access.

**RESEARCHER MOBILITY** The Government's New Colombo Plan has been created with the clear goal of building links between Australia and Asia. Understanding that effective relationships are built over time, the programme supports students to build lifelong links with counterparts in Asia.

The research training experience will necessarily inform the future researcher's collaboration through the creation of professional networks. Researchers who have an experience of working closely with colleagues in other countries and institutions will have a greater capability to collaborate effectively as their career progresses. Connections made at the earliest stages of a researcher's career will also have the best potential to develop and grow into successful long terms collaborations.

Researcher mobility is already supported with China via the Young Scientist Exchange Programme of the Australia-China Science and Research Fund and with India via the Fellowship Fund of the Australia-India Strategic Research Fund. While these initiatives are welcome, the numbers are few.

As such, the IRU recommends the New Colombo Plan be extended to research students and postdoctoral researchers or a similar programme be created.

The scheme should encourage placements in both research institutions and industry, consistent with the need to encourage the breadth of research outcomes. An Asia focused scheme would give Australian PhD students exposure to business and business culture in very large and rapidly growing Asian markets.

# The IRU Research System Series

Strengthening Research Across Asia: An Asia Research and Innovation Network is the second statement in the IRU Research statement series.

Positioned within easy reach of Asian counterparts, Australian institutions and universities stand to benefit and contribute significantly to the existing and developing Asian networks, given the right support and opportunity.

Innovative Research Universities (IRU) is a policy group actively engaged in integrating Australia's education and research with the world around us and improving outcomes both domestically and internationally.

IRU members have a foundational commitment to engagement with Asia and enjoy long-established links with Asian counterparts. As opportunities for Australian interaction with Asia grow across all disciplines and areas of activity, IRU members lead the way in collaborative teaching, language, research and policy initiatives.

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The group comprises six comprehensive research universities; Charles Darwin University, Flinders University, Griffith University, James Cook University, La Trobe University and Murdoch University. Through research and the creation of graduates, IRU universities strengthen the social and economic prosperity of their regions, the nation and the globe.