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Placing Australia securely within the network of global research and innovation is essential. Earlier this year, Innovative Research Universities (IRU) published recommendations for the creation of an Asian Research and Innovation Network outlining the potential for Australia in contributing to and benefiting from increasingly developed Asian networks.

Australia produces approximately 3% of world research output yet represents only 0.3% of the world's population. 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. In contrast, Asia's share of global research and development expenditure was forecast to reach almost 40% in 2014.

Increasingly, conducting high-level research requires the involvement of teams of researchers working within multiple institutions across many countries. IRU is actively engaged in integrating Australia's education and research with the world around us and improving outcomes both domestically and internationally.

Strengthening Research Across Asia: An Asia Research and Innovation Network is available to download here.

Examples of IRU – Innovation in Action

Environmentally Friendly Concrete – James Cook University (JCU) – Fibercon

Global plastic production every year is more than 300 million tons, out of which only 5% is currently being recycled, leading to burgeoning plastic pollution. Traditionally, steel mesh is used in concrete footpaths to control shrinkage cracks and enhance its robustness. A team of researchers at JCU led by Dr. Rabin Tuladhar and sponsored by Fibercon, has developed recycled polypropylene fibres from industrial plastic wastes which can be used to replace steel mesh in concrete footpaths and precast elements. Use of recycled plastic fibres in concrete has two fold benefits – it eliminates the need for steel mesh in concrete footpaths, saving cost and labour time, and most importantly, it recycles plastic wastes and saves significant amount of CO_2 associated with the steel production. Comprehensive life cycle assessment showed that the production of recycled plastic fibre produces 90% less CO_2 and eutrophication (contamination of water bodies with nutrients) compared to steel required to achieve equivalent reinforcement. This fibre has already been used to construct a 100m long concrete footpath at James Cook University and precast concrete drainage pits designed by Fibercon. The collaboration recently won the prestigious Australian Innovation Challenge (2015) in the Manufacturing, Construction and Innovation category.

Watchmaking technology - Flinders University – Bauselite and Bausele

Flinders University has partnered with Australian manufacturer Bausele to take on the world in a highly competitive industry – watches. Research has shown that wherever there is a high degree of advanced manufacturing, such as medical devices, there is often also a skilled watchmaking workforce.

Flinders University initiated the relationship and quickly linked its Centre for NanoScale Science and Technology to Bausele. Through the partnership, they evolved a new lightweight black ceramic, a material previously difficult to produce in the industry. Bauselite is now used in Bausele's flagship

watch. It is also undergoing licensing negotiations to be sold to other watchmakers. Inspired by this partnership, Flinders Partners has created a company to specifically manufacture Bauselite.

Liver Fluke Vaccine – La Trobe University - Virbac (Australia) Pty Ltd

Liver Fluke is an internal parasite in sheep and cattle which causes blood loss and liver damage. It is responsible for annual losses of over US $3.2 billion to the livestock and food industries worldwide. Parasite resistance to drugs threatens liver fluke control. Professor Terry Spithill and his team at La Trobe University are working with Virbac (Australia) Pty Ltd to develop a new vaccine against liver fluke which will be effective against drug resistant parasites. Protection against the parasite means more resilient livelihoods for farmers in Australia and throughout the world.

The Malaria Research Program (Indonesia) -Menzies School of Health Research (Charles Darwin University) – Indonesian Government

Malaria is a major cause of death in the Asia-Pacific, infecting around 500 million people each year of whom up to 600,000 die. Almost half of Indonesia's population of 250 million live in malaria endemic areas with 15 million people seeking treatment for clinical malaria each year and a high prevalence of multidrug resistance to both P. vivax and *P. falciparum.*

The Malaria Research Program in Indonesia investigated the occurrences of drug resistance and advance understanding of how parasites result in severe diseases and death. PT Freeport Indonesia, a mining company, has been a key player and supporter of this study.

Over the last 20 years, the collaboration has had an immense impact on the health of the Timika population, especially in vulnerable pregnant women and infants. A Deloitte's report (2012) valued Menzies economic contribution in the region through research on malaria at $297m, with a return on investment factor of 72. In Mimika district, these studies and resulting policy and treatment changes resulted in: a 49% reduction in malaria, fivefold reduction in hospital admissions, and threefold reduction in perinatal mortality.

Model for Assessing Pilots Performance (MAPP) – Griffith University – Air New Zealand

Historically, pilot training focused on flying skills and associated aircraft knowledge. However, accident inquiries over the last 50 years have illustrated a change in the percentage mix of pilot-versus machine-related accidents. Associate Professor Tim Mavin at Griffith University designed and implemented a new training and capacity identification program called MAPP to overcome this important safety concern and make pilots better decision-makers and create better communications and management systems. Associate Professor Mavin's research and innovation focuses on investigating and improving how skills are taught and assessed in aviation, and more recently in other aviation professions, such as air traffic control and engineering. Air New Zealand, QantasLink and ADF Airlines have engaged MAPP to design competency assessment and education programs for pilots to improve and streamline pilot training. This new assessment system has helped pilots reflect on and learn from their own performance. From a company's perspective, they have documented a continual decrease in piloting errors and improved outcomes in safety management.

Agriculture at Christmas Island - Murdoch University – Department of Infrastructure and Regional Development

The Australian Government Department of Infrastructure and Regional Development, through a grant under the Indian Ocean Territories Community Development Program, has provided resources to Murdoch University with which to undertake the scientific research required to introduce Agriculture to Christmas Island (CI). This investment has been matched in cash by Christmas Island Phosphate (CIP - Phosphate Resources Limited), and the project is called MINTOPE- an acronym for Mining to Plant Enterprises. Murdoch University provided in-kind contributions to the project.

Seven hectares of land at two disused mine sites were cleared of regrowth vegetation in 2015 and prepared for broad-acre cropping. These procedures captured the rainfall in the soil profile and ensured minimal water erosion for crop use. Soil nutritional deficiencies were corrected and growth was outstanding, with 70 tonnes fresh weight of sorghum and 24 tonnes of cowpea produced in 7 weeks. Grain yields exceeded several tonnes per hectare with lablab (Dolichos Lablab) the outstanding performer. The strategic dimension of MINTOPE is to ultimately reduce the CI economic dependence on imported products using on-island resources and output whilst increasing export opportunities where possible. The MINTOPE project also forms part of CIP's broader strategy to explore the productive rehabilitation potential of its mining leases where active material extraction no longer occurs.

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For comment contact

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