



# SCIENCE AND INNOVATION SECTOR



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## SUMMARY

- Science and innovation cut across the whole economy and is important to every industry.
- India, like Australia, needs the outputs from science and innovation to advance productivity and maintain economic growth. Science and innovation also hold solutions to many shared challenges, ranging from managing water to delivering infrastructure, health and education services over distances.
- India is emerging as a global hub for research and development.
- While a world leader in some areas, Australia's performance internationally in innovation and commercialisation is not as strong as it could be.
- Australia has much to gain from engaging with India in science and innovation. Pairing Australia's research and development base with India's scale and record of frugal innovation could be a productive partnership. Collaboration also helps facilitate deeper engagement across all sectors of the economy.
- Scientific achievement and collaboration enhances Australia's reputation, has an important soft diplomacy role and strengthens our credentials as a quality education provider.
- Australia should build on successful research collaborations and seek to promote engagement between our start-up networks. Scaling up the AISRF should be central to these efforts.
- Government support and funding is often crucial to success, especially in a time-consuming and challenging environment like India.

# 1.0 OUR SCIENCE AND INNOVATION AGENDAS

## KEY JUDGEMENT

Science and innovation will be crucial to India maintaining its economic growth out to 2035. Despite relatively low funding levels, India is making significant advances. It benefits from a large talent pool and several world-standard technology clusters and start-up ecosystems. India is attracting increasing rates of investment in research and development. Australia is also looking to prioritise science and innovation to stay competitive out to 2035 and has much to gain from partnerships with India.

## 1.1 Changes in science and innovation out to 2035

Science and innovation are fundamental to economic growth, with research and development a big determinant of total factor productivity, especially when researchers are well connected with consumers.

Many technological advances have been made in the last 20 years, including a digital communications revolution driven by exponential increases in computer power. By 2035, scientific developments and innovation will have again reshaped the technologies which help deliver economic productivity

- the science of information and data is perhaps the most fundamental research topic of the century<sup>108</sup>
  - advances in technologies to analyse information and data will hasten progress in physics, chemistry, biology, social science and economics
- current trends point to the advent of a suite of new digital technologies, such as machine learning, optimisation, artificial intelligence, robotics and distributed ledgers<sup>109</sup>
- the imperative to meet global challenges such as climate change and water scarcity will also set the direction of scientific endeavour.

Communications technologies and globalisation will continue to offer greater opportunity for collaboration in scientific research but also more competition in commercial development. For many

economies, intellectual property is already the greatest economic resource.

Against this backdrop, knowledge-intensive companies that innovate and export will remain the most profitable, competitive and productive.

## 1.2 India's science and innovation agenda

India's public spending on research has been stagnant at around 0.8 per cent of GDP for over a decade

- in 2015, the spend was 0.9 per cent of GDP, compared to 1.9 per cent in China, 2.7 per cent in the United States and 0.6 per cent in Australia
- with some important exceptions, India has often piggybacked off the innovations of advanced economies and applied them in an Indian setting
- but despite relatively low funding, India performs well on innovation relative to its GDP per capita.<sup>12, 110</sup>

Encouraging trends are emerging in India

- India has become a global research and development hub for sophisticated sectors like network equipment, medical equipment, aerospace, automotive, biotechnology and computation
  - India has 25 innovation centres and has been ranked as the top innovation destination in Asia

- » the country accounts for 27 per cent of Asia's new innovation centres<sup>111</sup>
- in 2017, India ranked 60 on the Global Innovation Index, up from 81 in 2015, driven by increased investment from private institutions and improvements in the capture and use of data
  - the 2017 Global Innovation Index ranked India second for innovation quality for middle income countries.

India attracts foreign investment in research and development from countries around the world

- India is the third-largest destination for imported research and development and has the sixth largest (private plus public) research and development spend globally ranking ahead of France and the United Kingdom<sup>112</sup>
  - India receives 15 per cent of United States overseas research and development spending, as does China
- close to 800 leading companies from around the world have set up research and development centres in India
  - Google Capital (a venture capital fund financed by Alphabet Inc) has announced it will establish its first office outside the United States in India
  - in 2015 Rio Tinto established its big data Analytics Excellence Centre in Pune
- the research ecosystem in India presents a significant opportunity for multinational corporations across the globe due to
  - access to technical talent
  - low wages
  - proximity to regional markets
- internationalised Indian companies are seeking to bring new resources and technologies to markets by investing domestically in new solutions, including in data analytics and fintech.

India has a vibrant entrepreneurial scene that is producing numerous affordable innovations

- such as the world's cheapest tablet computer (Aakash) and affordable medical diagnostic devices
- India is home to nine so-called 'unicorn' start-ups valued at more than USD1 billion (including in e-commerce and online retail)
- India was home to 3,100 start-ups in 2014 and is projected to climb to more than 11,500 by 2020<sup>113</sup>
- India's National Association of Software and Services Companies reported a 40 per cent increase last year in the number of active incubators and accelerators, with more than 30 new academic incubators established under the government's Startup India – Stand-up India initiative.<sup>113</sup>

This progress is, at least in part, the product of regulatory and policy changes by the Indian Government to accelerate innovation growth

- under Prime Minister Modi, India has placed a high priority on science and technology for economic growth and aims to push total research and development spending beyond 2 per cent of GDP
- India's budgetary allocations for science and innovation in 2017–18 included funding for the following departments:
  - Department of Science and Technology: \$1 billion on topics including advanced manufacturing, waste management, biomedical devices, electric mobility, Smart Grid and energy storage<sup>12</sup>
  - Department of Biotechnology: \$450 million for mission programs on ocean biology, bio pharma product development, agri-tech solutions, start-up innovation eco system, clean energy and epidemic preparedness<sup>12</sup>
  - Ministry of Earth Sciences: \$350 million for topics covering water plants and the monitoring of the coastal marine systems of the Indian Ocean<sup>12</sup>

## CASE STUDY: IITB-MONASH RESEARCH ACADEMY: AUSTRALIA-INDIA RESEARCH COLLABORATION

A growing number of corporations, governments and institutes are turning to India for effective, high impact solutions to some of the world's biggest challenges, from climate change and renewable energy to biotechnology.

Recognising India's status as an emerging research and global technological powerhouse, the Indian Institute of Technology Bombay (IITB) and Monash University collaborated to form a joint venture research academy. Opened in 2008, the IITB-Monash Research Academy enables:

- formation of multi-disciplinary research teams across Australia and India, challenging the traditional individual/discipline-oriented research agenda
- long term engagement of industry commitments structured around major research challenges
- provision of a compelling value proposition to students while simultaneously responding to talent challenges in both countries
- Monash to respond to prevailing opportunities quickly via an in-market presence.

Monash has noted the particular challenges of working across two national contexts in the higher education sector, citing the importance of aligning governance and academic expectations.

Their engagement also enabled Monash to develop a joint PhD program reflecting the research priorities of both nations and the establishment of their own multi-disciplinary purpose-built facility in India (within IITB) for up to 300 Monash students and staff.

The Academy has successfully fostered deeper collaboration across the higher education sector. It has recruited 250 students, launched 420 joint collaborative projects and produced 600 research publications and industry funded projects to the tune of \$14 million in committed contracts. The collaboration has also seen a 585 per cent increase in co-publications from 2012-17.

In 2018 the first start up from the Academy, Convalesce, has been selected for the Acceleration Program of IndieBio, a world-leading life science accelerator based in Silicon Valley, San Francisco. The team will receive \$250,000 in seed funding, lab and co-working space, dedicated mentorship, and becomes part of a network of IndieBio alumni, investors, biotech entrepreneurs, press and corporate partners. Founders engage with customers and partners, pitch to investors, and turn science into a real product people pay for.

This is an important milestone for the joint venture which due to its collaboration with industry heavyweights including CISCO, Orica, InfoSys, TATA, Reliance, SABIC and BHP Billiton, typically already sees graduates secure employment before graduation in industry and academia.



- the Indian Government's 'Start-up India' policy, released in January 2016, offers income tax exemptions for the first three years of a start-up's operations
  - other campaigns like 'Digital India', 'Make in India' and 'Skill India' are contributing to India's startup ecosystem
- India's financial inclusion reforms are providing support to the IT industry and helping India leapfrog technologies and processes
- government investments in space and nuclear science have led to notable achievements, such as the Mars Orbiter and a heavy lift launch vehicle for satellites ('GSLV Mk-III')
- NITI Aayog is directing efforts to ensure science and technology are harnessed to build a powerful innovation sector through incubation facilities and quality higher education
  - it launched the Atal Innovation Mission in 2016, providing a platform for the promotion of innovation hubs, grand challenges, start-up businesses and other self-employment activities, particularly in technology-driven areas
  - it also promotes innovation through a platform for innovative idea generation by setting up Atal Tinkering Labs at schools and incubation centres to nurture innovative start-up businesses.

### 1.3 Australia's science and innovation agenda

Like India, Australia aims to sustain a strong science and innovation agenda to remain competitive and keep pace with changes out to 2035.

Australia ranked 23rd on the Global Innovation Index in 2017

- seventh in university rankings and sixth on intensity of local competition
- but Australia is not a leader in the start-up world and has a mixed record of commercialisation.

The Australian Government's National Innovation and Science Agenda aims to harness new sources of economic growth to deliver future prosperity for Australia. The Agenda focuses government efforts on four pillars:

- Culture and capital: Initiatives are intended to encourage investment into innovative, high-risk, early-stage Australian firms. They include new tax incentives for venture capital investors investing in early-stage innovation companies and co-investment funds to commercialise research into new products and services (the \$500 million Biomedical Translation Fund and the \$200 million CSIRO Innovation Fund).
- Collaboration: Change funding incentives to allocate more university funding to research conducted in partnership with industry and for investment in long term research infrastructure. To maintain world-class research infrastructure, the Agenda sets out a plan to invest \$2.3 billion over 10 years, funding the National Collaborative Research Infrastructure Strategy, the Australian Synchrotron (accelerator technology) and Square Kilometre Array.<sup>109</sup>
- Talent and skills: Promote coding and computing in schools to develop problem solving and critical reasoning skills necessary for high-wage jobs. Link to other innovative economies to attract more entrepreneurial and research talent from overseas. An initial total of \$36 million over four years (2016–20) has been allocated towards a Global Innovation Strategy to improve international science and research collaboration.
- Government as an exemplar: Innovate the way government services are delivered and make it easier for small businesses to supply to the government. To drive the agenda in government, a new sub-committee of the Cabinet was formed. An independent advisory board, Innovation and Science Australia, was established in 2015.<sup>109</sup>

Future investments to strengthen Australia's innovation system will be informed by:

- the 2016 National Research Infrastructure Roadmap

- Innovation and Science Australia's 2030 Strategic Plan, 'Australia 2030: Prosperity through innovation'
- the Australian Government's Digital Economy Strategy, which is still being developed.

Australia's Industry Growth Centres Initiative is an industry-led approach driving innovation, productivity and competitiveness by focusing on areas of competitive strength and helping transition them to high value and export-focused industries

- Growth Centre objectives include working with industry to increase collaboration and commercialisation and improve international engagement capabilities
- Growth Centres are established across six industry sectors:
  - Advanced Manufacturing
  - Cyber Security
  - Food and Agribusiness
  - Medical Technologies and Pharmaceuticals
  - Mining, Equipment, Technology and Services
  - Oil, Gas and Energy Resources.

## 2.0 OPPORTUNITIES FOR PARTNERSHIP

India and Australia share research priorities because we face shared challenges in improving productivity, sustainability and the health of our citizens. Better science and innovation outcomes can be achieved by working together. Collaboration with India in research and development, and in supporting businesses and start-ups take forward new innovations, presents opportunities to:

- attract investment
  - by providing prospective Australian innovators an additional pathway to attract investment (Australian venture capital as a proportion of GDP remains less than half the OECD average), helping to grow the innovation sector in Australia
- combine complementary skills and expertise to develop new innovations
  - by leveraging Australian expertise in such areas as agri-tech, health-tech, water management, energy efficiency and renewables, with Indian expertise including in data analytics, biotech, and mobile applications
  - by combining Australian research and technology with India's record of frugal innovation to scale up innovations or create new products
- open new markets across the economy (potentially in partnership with Indian innovators)
  - by adapting innovations to the requirements of the large Indian market
  - by using India as a launching pad to other potential regional and global markets
- attract talent and skills to Australia
  - research relationships and joint projects open pathways for leading Indian scientists and researchers to participate directly in the Australian economy
  - bringing Indian start-ups to Australia has potential benefits for Australia
    - » if they succeed in finding a market in Australia for their innovation, they could bring investment capital to establish their operation in Australia, generate employment, and introduce new technologies that could contribute to productivity and economic growth
- support our education sector and education linkages
  - establishing people-to-people links in research is essential to Australia's education and training engagement with India [see Chapter 3: Education Sector]



## CASE STUDY: AUSTRALIA-INDIA STRATEGIC RESEARCH FUND

The Australia-India Strategic Research Fund (AISRF) is Australia's largest fund dedicated to bilateral science collaboration. Since its inception in 2006, the Australian Government has committed more than \$80 million which, together with the Indian Government, has helped support over 300 collaborative research projects, fellowships and workshops in a variety of areas from agricultural research to nanotechnology. It has built strong and productive research partnerships in areas of science, technology and innovation between Australian and Indian researchers and institutions. Two examples of the fund's many success stories include:

### Supporting women in STEMM careers

Like many other countries, Australia and India face significant challenges in attracting women to studies in STEMM, and retaining them in STEMM careers. In 2016, the AISRF provided funding to the Australian Academy of Science (AAS) to organise a Women in STEMM workshop on the basis of their experience promoting gender equality through the Science in Australia Gender Equity (SAGE) initiative, and in recognition of the AAS' strong ties with their Indian counterparts.

Held over two days, over 70 dignitaries from India, Australia and the United Kingdom met in New Delhi to promote and increase the participation and progression of women in STEMM careers. The workshop developed practical action plans and best practice models to foster entrepreneurial cultures, capacities and access to STEMM activities, business and industry. The workshop also showed there is a clear opportunity for Australia to become a regional leader on this issue.

### World-leading research for disease diagnosis

Of the two billion people in the world infected with the highly contagious bacteria that causes Tuberculosis (TB), around a quarter of them are in India. Accurate diagnosis is critical to controlling TB but the current diagnostic tests are expensive, slow and rely on access to centralised laboratories.

With AISRF funding, Australian and Indian researchers have teamed up to tackle the issue. CSIRO, Australia's scientific research agency, has been working to develop a portable point of care diagnostic tool. This tool uses chemiresistor sensors; a proven fluid analysis technology. To adapt the technology for TB diagnosis, researchers need to test large numbers of TB samples. India's Institute of Microbial Technology in Chandigarh uses CSIRO's sensors to analyse infected and healthy samples from their collection.

While it is early days, preliminary results of this partnership suggest that sensors could soon be reliably adapted to diagnose TB. CSIRO has also been working with an Australian biomedical company to design and produce a portable device to house the chemiresistor sensors for use in the field.



PROFESSOR VEENA SAHAJWALLA, A LEADING RESEARCHER AND PIONEERING INNOVATOR AND FORMER AISRF PROJECT MANAGER, IN HER LAB. [UNIVERSITY OF NEW SOUTH WALES]

- build trust and relationships
  - beyond the research and commercialisation outcomes themselves, collaboration in science and innovation can entrench working relationships with Indian governments and businesses in priority sectors and states
  - science and innovation plays an important role in building the image of Australia and its businesses
- regulatory cooperation
  - there is scope to share regulatory experience and lessons learned
    - » this could focus on the technology sector and how to regulate for disruptive technologies, but could also include sharing the Australian experience of regulating more traditional sectors.

## 2.1 Collaboration

### PARTNERSHIPS THAT CAN SUPPORT COLLABORATION

Businesses: such as Australian companies or multinationals establishing research and development operations in India

- or co-development of new products, for example designed in Australia and manufactured in India at low cost.

Start-ups and entrepreneurs: are large contributors to job creation and innovation in both countries. Matching start-ups with investors or with established businesses in their chosen sector enables start-ups to grow, reach new markets, and learn from the best

- for Australian start-ups, India is an important destination for three reasons: accessing a large market; finding talent such as co-founders, engineers, managers, scientists; and developing strategic partnerships with other multinational corporations that have a base in India.

Government: the main mechanism for government support of Australia-India collaboration in science and innovation is the AISRF, co-funded by both

governments. Established in 2006, the AISRF is Australia's largest bilateral science fund. It helps link top universities and research institutions in Australia and India to deliver tangible outcomes to the end users of scientific innovation

- the AISRF is an important and highly successful element of the Australia-India bilateral partnership
  - it strengthens Australia's national research fabric by linking with Indian research skills, expertise and networks
  - it sustains Australia's engagement with India in areas where the Indian Government is seeking closer links and is willing to commit financial resources
  - it also has important symbolic value and is well known in scientific communities in both countries
- highlights of the AISRF include:
  - to date, both governments have committed a total of more than \$100 million to support 300-plus collaborative activities such as research projects, workshops and fellowships
  - the AISRF promotes the development of international research expertise and skills by supporting high-performing early and mid-career researchers from Australia and India to work at leading institutions in the other country
  - it has supported key institutional and industry partnerships including the Monash and IIT Bombay Research Academy; CSIRO and Council of Scientific and Industrial Research – the leading publicly funded research agencies in both nations
  - the 'Grand Challenge Fund' component of AISRF facilitates meaningful industry engagement
- unlike Australia's scientific fund with China, the AISRF is not ongoing, meaning it provides less certainty – this must be fixed.

India has bilateral cooperation agreements with a range of other countries on science and technology. With the United Kingdom, Israel and Canada, India engages through the Global Innovation Technology Alliance (GITA), a bilateral public and private partnership model (a '2+2 model') for funding industrial research

- GITA is a not-for-profit public-private partnership company promoted jointly by India's Department of Science and Technology and the Confederation of Indian Industry
- it encourages industrial investments in innovative technology solutions and connects industrial and institutional partners for collaborative industrial research and development projects, providing funding for technology development, acquisition, customisation and deployment
- industry and governments in both countries invest in the project.

## 3.0 CONSTRAINTS AND CHALLENGES

There are several constraints to greater Australian collaboration with India in science and innovation.

### 3.1 Constraints

#### FUNDING

While science and innovation contribute to economic growth and business competitiveness, development requires upfront costs

- prioritising funding from either the public or private sector can be a persistent challenge
- Australia's venture capital sector continues to develop but remains small in comparison to other developed economies, making it harder to go from research to commercialisation.

#### DELAYS IN THE GRANTS OF PATENTS IN INDIA

According to World Intellectual Property Organisation data, the average time for a patent application to be actioned in India is six years from the date the applicant requests examination

- patent applications by residents in India doubled to 12,579 from 2007 to 2015 – but patents granted fell from 3,173 to 822 over the same period due to there being too few official patent examiners<sup>10</sup>
- in contrast, patents granted to residents in China rose from 31,945 to 263,436 from 2007 to 2015.

#### INTELLECTUAL PROPERTY PROTECTION

Although Indian law provides protection for IP rights, there are concerns over enforcement. A major source of concern is bureaucratic delay, with a backlog of cases in both civil and criminal courts, where cases can run for five years or more. There is also a lack of transparency, particularly at a local level. Damages are routinely awarded in cases involving copyright and trademark infringement, but are less common in patent cases

- the risk of IP loss may be mitigated by partnering with major Indian companies or multinationals, who have an interest in protecting IP.

#### COMPETITOR COUNTRIES

The United States and Europe remain top choices for collaboration for Indian scientists, although Australia has recognised areas of expertise (including around water, coal and conservation agriculture)

- several European countries and Israel are already establishing their own accelerator facilities in Bengaluru.

#### A FRAGMENTED SYSTEM

While some Indian states are research or start-up intensive, India lacks a well-functioning national ecosystem for start-ups

- India's education sector suffers from limited international collaborations, and a low focus on research.

## LOW RATE OF AUSTRALIAN COLLABORATION

Australia's rate of collaboration between industry and researchers (at 2–3 per cent) is currently the lowest in the OECD. Australian businesses do not have as much internal research expertise as key comparator countries

- at 43 per cent, Australia's proportion of researchers employed in business is significantly lower than countries such as Germany (56 per cent), South Korea (79 per cent) and Israel (84 per cent).

## INDIA CAN BE A DIFFICULT MARKET TO ENTER

Unlike more traditional technology hubs such as Silicon Valley or London, where processes are more familiar to Australian institutions

- understanding India's dynamic technology sectors is not easy, and navigating India's state and central bureaucracies can be challenging.

## REGULATIONS

The reason the Indian technology sector has thrived is because it has not been stifled by over-regulation

- but many other sectors where science and technology are fundamental inputs are over-regulated [*for example, see Chapter 5: Agribusiness Sector and Chapter 8: Health Sector*].

# 4.0 WHERE TO FOCUS

Given the enabling nature of science and innovation across the economy, engagement should be targeted at the nexus of each of our priority sectors with priority Indian states.

At the same time, several cities stand out and should be the areas of focus of science and innovation collaboration in general, including start-up networks

- 66 per cent of start-ups are concentrated in three cities: Mumbai, Bengaluru and New Delhi
- Hyderabad, Chennai and Pune are the next biggest centres for start-up ecosystems.<sup>113</sup>

## 4.1 Key Cities

### BENGALURU

- The IT sector in Bengaluru is two decades old and has a high level of maturity.
- Bengaluru hosts the largest technology cluster in India and the fourth-largest technology cluster in the world, spread across sectors including IT and IT-enabled services,

pharmaceuticals and biotechnology, defence, aerospace and agri-tech.

- The number of start-ups in Bengaluru rivals those in the global top technology cities.
- The majority of Fortune 500 companies have research and development centres in Bengaluru, searching for innovative products and solutions.
- Bengaluru is also home to India's space program.

### MUMBAI

- Mumbai's proximity to global capital flows and India's investors supports an emerging startup ecosystem, particularly for business to business innovations.
- As India's fintech capital, fintech is driving Mumbai's startup economy.
- The Society for Innovation and Entrepreneurship, hosted by Indian Institute of Technology, Bombay promotes entrepreneurship and industry partnership.

## NEW DELHI NATIONAL CAPITAL REGION (NCR)

- New Delhi NCR captures the most startup funding of any Indian city.
- The capital region's start-up scene is strengthened by the presence of firms with easy access to foreign investors, government agencies and seed funding.
- The city has leading education, research and scientific institutions and a skilled workforce. It is a major hub for information technology enabled services, e-commerce, business process outsourcing and design work.

## HYDERABAD

- Hyderabad is becoming a global destination for tech business and entrepreneurs. Telangana provides a state focus on innovation through a formal innovation policy.
- T-Hub, a state government backed start-up incubator, is bringing together Hyderabad's established start-up ecosystem, academics and corporates.
- The city's industrial, information technology and biotechnology clusters have led to a strong research and development capability and facilitated an entrepreneurial ecosystem.



## RECOMMENDATIONS

Funding will be key to supporting joint research and development projects. Supporting connections among scientists, researchers and start-ups can also help combine Australian and Indian strengths in research or technology with application and development.

### 67. Scale up the Australia India Strategic Research Fund

67.1 Double the current total funding for the AISRF, remove funding from the Australian aid program, and make funding ongoing (that is, make Australia's contribution \$10 million per annum).

67.2 Consider three possible revisions to the AISRF

- larger projects along the lines of the 'Grand Challenge Fund' which has been conducted in the past
- more direct funding to ensure all PhD students on projects spend time in the other country; this forms lifelong networks that build on and exceed the valuable institutional networks that AISRF collaboration already brings
- while maintaining a necessary focus on industry partnerships and commercialisation, increase investment in priority areas of fundamental science; for example, joint activities in gravity waves or quantum computing which could deliver long term benefits.

### 68. Explore a suitable model to fund industrial research and development beyond the AISRF

In addition to the fundamental research undertaken through the AISRF, there is scope to consider funding models that encourage early stage commercialisation, noting that Australian small and medium sized enterprises in particular find it difficult to collaborate with researchers in international markets.

68.1 Explore the option of collaborating with India through its GITA

- the 2+2 model for funding industrial research encourages greater industry buy-in and has a focus on commercialisation
- before such a program is conceived, the Australian Government should make a medium to long term commitment to engage with the market, test appetites and build partnerships
  - lessons could be learnt from other countries' experiences with GITA in the next two to three years.



### 68.2 Use global funding to support research and development initiatives with India

- work to maximise the potential of research partnerships through multinational and multilateral approaches, including international funders such as the Gates Foundation, Wellcome Trust and the World Health Organization
  - targeting either development issues important to India, or global issues important to both countries, such as climate change or water management.

### 68.3 Establish Joint Research Centres of Excellence across key sectors

- India and Australia could join forces to provide seed funding for Joint Research Centres of Excellence. This could be built on the Australian Program of Cooperative Research Centres. Several million dollars would be needed per centre from each side.
- In order to give these a recognisable identity and align with Australian and Indian priorities, a centre could be established for key sectors identified in this Strategy: Agribusiness, Resources and Energy, and Health (all priorities for greater investment in science and technology in NITI Aayog's Three Year Action Agenda, and also all areas of Australian excellence)
  - Universities and research institutes should be encouraged to co-invest in the centres to build long term relationships with Indian partners. This would encourage the development of sustainable and deep linkages, which are critical for collaborations to succeed in the long term.
  - The TERI University-Deakin University Nanobiotechnology research and development centre is a good model to replicate. A good international example to consider is the China-University of New South Wales Torch Precinct.

## 69. Use Australia's Industry Growth Centres to support links in Science and Innovation

Put India in the top tier of target countries for each of Australia's six Industry Growth Centres

- the Industry Growth Centres seek to boost sector productivity by:
  - increasing collaboration and commercialisation
  - improving access to global supply chains and international opportunities
  - enhancing management and workforce skills
  - optimising the regulatory environment
- as part of their focus on international opportunities, engagement with India should be given priority.

## 70. Provide support to start-ups

70.1 Establish an 'Innovation Bridge' of reciprocal exchanges of delegations comprising 10 or so market-ready start-ups to explore partnerships and investment opportunities

- this is an extant, proven model in India
- delegations would be selected by a panel, including representatives from both countries to ensure good prospects in each market
- governments would provide soft landing support following the visit (work space in an appropriate government-funded incubator/accelerator and access to all of its support programs)
- this recommendation would lend itself to funding from the Australia-India Council and to partnership with state governments and Industry Growth Centres.

70.2 Establish an Australian 'landing pad' in India

- add India to the five existing landing pads under Australia's National Innovation and Science Agenda which offer 90-day residencies in a co-working space and introductions to investors, business networks and strategic partners
- Bengaluru presents itself as the obvious city to host an Australian landing pad and options should be explored to co-locate with an existing Indian start-up warehouse
- unlike more traditional technology hubs, understanding and navigating India's business environment and bureaucracies can be challenging
  - this is precisely why the presence of an Australian start-up landing pad accessing the best advice available and with the assistance of an Australian coordinator is important
- there is an appetite among the Indian accelerators and incubators to host Australian start-ups
  - for these start-ups, it would be an opportunity to validate their product or idea in the Indian market, build partnerships and linkages with mentors, other start-ups and investors, with the goal of entering the Indian market or scaling business globally.

- 70.3 Establish a start-up landing pad in Australia specifically for Indian companies
- supporting Indian start-ups to establish themselves in Australia can nurture joint ventures and bring ideas, technology and investment capital from India
  - the objective is to find an Australian partner or collaborator
  - the landing pad could be co-located with an existing Australian incubator or accelerator, ideally in partnership with a state government and a business organisation, such as the AIBC or The IndUS Entrepreneurs (TiE)
  - access to the landing pad would be subject to normal visa requirements
  - globally focused Indian start-ups (for example ride-sharing company Ola) will look to come to Australia regardless so this landing pad would focus on start-ups at an earlier stage of development.
- 70.4 Promote opportunities for Australian and Indian incubators to share knowledge and expertise through the Expert-in-Residence component of the National Innovation and Science Agenda's Incubator Support program
- this program provides funding for an exchange of experts between Australian and international incubators
  - Austrade could build connections with Indian incubators and help facilitate introductions to interested Australian incubators
  - these partners could then apply for funding through the Expert-in-Residence program to deliver projects that build collaboration between Australian and Indian start-ups.

## 71. Support people to people links in Science and Innovation

- 71.1 Promote Australia's science diplomacy in India
- the Australian Minister for Science, the Chief Scientist, CSIRO and Questacon, as well as university leaders, should be encouraged to visit India to promote Australian strengths and build relationships with counterparts.
- 71.2 Successful AISRF case studies (including Indian diaspora researchers) should continue to be promoted in both Indian and Australian media.
- 71.3 Sponsor exchanges in science and innovation and between research institutes using AISRF funding.
- 71.4 Continue support for the Women in STEMM program
- building on its successful workshop funded by the AISRF, the Australian Academy of Science could be supported to assist Indian science academies in implementing the Athena SWAN Charter (an evaluation and accreditation program to enhance gender equity in STEMM).

## 72. A joint India–Australia institute for regenerative and sustainable agriculture

Establish a joint cooperative research centre between Australia and India to support a multi-disciplinary approach to grow and apply knowledge on soil health and the impact of soil on the environment

- this could include the combination of:
  - expertise in soil nutrients, fertilisers and greenhouse gases from agriculture
  - soil biome and soil molecular biology
  - agronomy
  - plant-soil interaction and nutrient efficiency
  - smart fertilisers
  - integrated approach to soil modifiers
  - sensors and automation of monitoring
  - new distribution techniques
- this centre should be co-funded by Australia and India to ensure outcomes are accessible, widely beneficial and given the best chance of commercialisation
- this centre should be co-funded between the Commonwealth and state governments and industry.