



Australian Government



# AUSTRALIA: DESTINATION INNOVATION



## Cover

The Square Kilometre Array (SKA) is a global next-generation radio telescope project involving institutions from over 20 countries. See page 12 for more information.

Artist impression of SKA1 wide-field low-frequency aperture array. Image courtesy of SKA Organisation and Eye Candy Animation.

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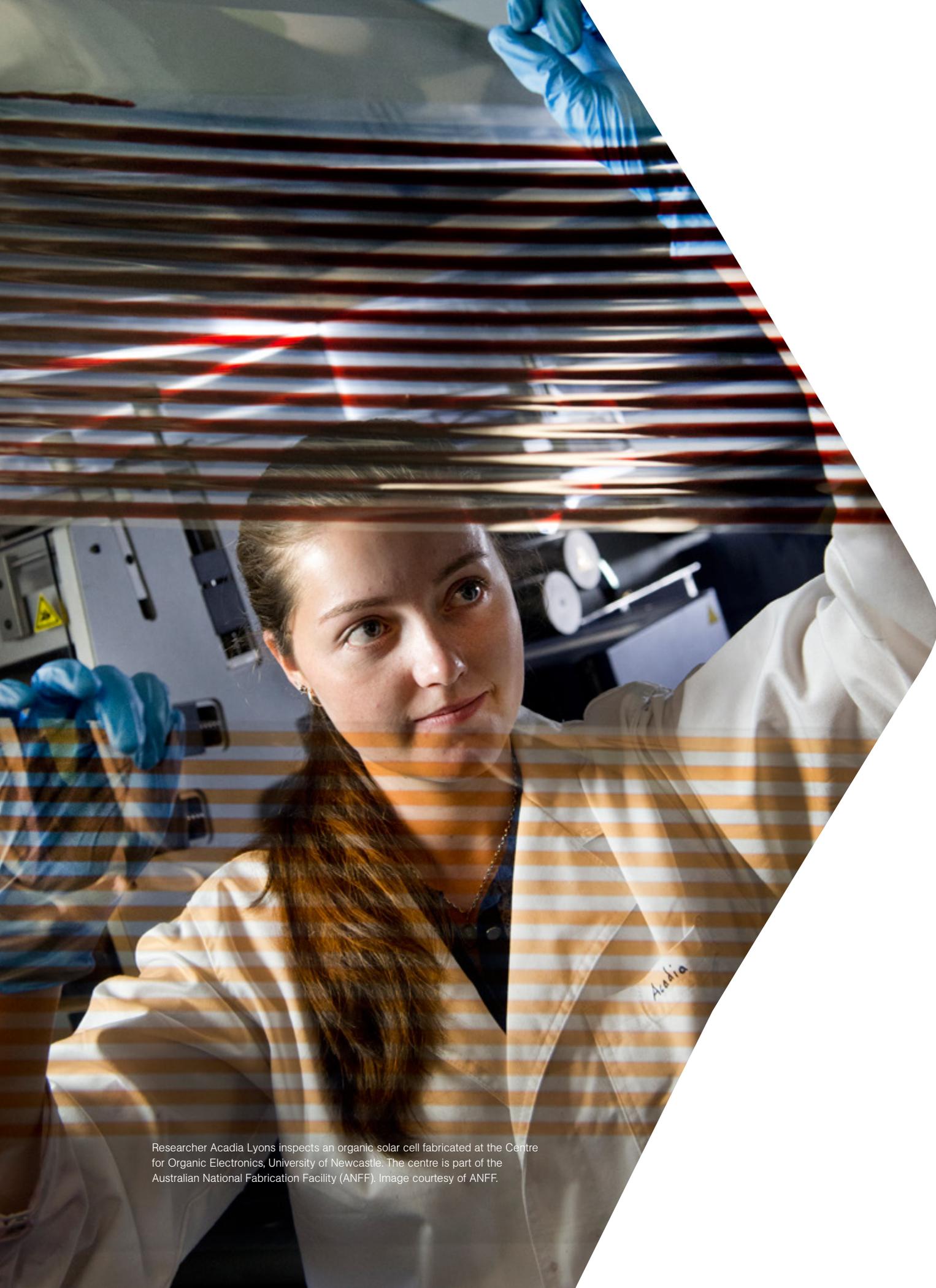
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Researcher Acadia Lyons inspects an organic solar cell fabricated at the Centre for Organic Electronics, University of Newcastle. The centre is part of the Australian National Fabrication Facility (ANFF). Image courtesy of ANFF.

The future prosperity, health and sustainability of the world is closely bound to the human capacity for innovation.

High cost is driving governments and companies to optimise their operations, use resources more efficiently and find smarter ways to engage with customers. At the same time, world populations are growing, ageing and becoming more urbanised.

Global demand for high-value, highly skilled and customised services and new technology is accelerating. Advances in technology – including the way we generate, process and use data – are creating new avenues for optimising productivity and understanding consumer demand and preferences.

**DISTANCE FROM MARKETS IS NO LONGER A BARRIER TO ADVANCED MANUFACTURING.**

The convergence of robotics, big data and machine learning, combined with broadband networks and mobile access, is creating opportunities for any country that has, at its core, a well-educated population, high levels of digital access and an economy driven by innovation and intellectual capital.

In this global environment, where manufacturers and service providers are prepared to invest in developing new solutions that will give them a market edge, Australia has a lot to offer.

Australia is home to some of the world's highest quality scientific research institutions, and provides a fertile setting for technology research and development (R&D) and market testing, robust intellectual property (IP) protections, and a stable political and economic environment.

Recent government initiatives align Australia's tax system, business laws and support for firms with a culture of entrepreneurship and innovation.



**12TH LARGEST ECONOMY IN THE WORLD**

IMF World Economic Outlook, October 2015  
Nominal 2015E



**5TH LARGEST ECONOMY IN THE ASIAN REGION**

IMF World Economic Outlook, October 2015  
Nominal 2015E



**GDP: US\$1.3 TRILLION**

IMF World Economic Outlook, October 2015  
Nominal 2015E



**AAA CREDIT RATING**

Standard & Poor's, Moody's and Fitch



**POPULATION: 23.7 MILLION**

(March 2015) ABS Cat. No. 3101, 24 September 2015

# WHY AUSTRALIA

With 25 years of uninterrupted annual economic growth and AAA sovereign risk profile, Australia is well positioned to build on an impressive record of prosperity.

## A diversified, services-based economy

Australia's services sector is growing faster than any other industry. The sector (excluding construction) accounts for more than 70 per cent of real gross value added (GVA). The country's sophisticated financial services industry is the largest contributor to its economy, generating 9.3 per cent of total GVA.<sup>1</sup>

## Globally significant industries

Australia has particular success in five significant and diverse sectors: agribusiness, education, tourism, mining and wealth management. Ongoing demand across these sectors is expected to drive trade and investment in Australia and internationally.

## A partner for growth in Asia

Australia has strong business and cultural ties with Asia and longstanding trade, investment and research links in Europe and North America. The country's medium- and long-term growth outlook is supported by increasingly strong ties to the rapidly growing Asian region. Recently completed free trade agreements make Australia even more competitive and increase prospects for greater two-way investment.

## Knowledge-intensive

Australia has a higher percentage of employed people in knowledge-intensive services than the US, Japan and South Korea.<sup>2</sup> Professional, scientific and technical services, education and training, and information media and telecommunications together make up almost 15 per cent of total output, reflecting Australia's highly skilled, well-educated and innovative workforce.<sup>3</sup>

## Highly educated

Australia's education system, research expertise and excellence in attracting and retaining human capital are among the best in the world:

- ▶ Secondary education enrolment rate is the world's highest.<sup>4</sup>
- ▶ Almost 40 per cent of the workforce holds a tertiary qualification.<sup>5</sup>
- ▶ Top 10 for the talent of the people it produces, attracts and retains.<sup>6</sup>
- ▶ Ranked second in the United Nations Development Programme's *Human Development Report 2015*, which measures a country's investment in its people.<sup>7</sup>

## Culturally diverse

Australia provides easy access to a smart and culturally aware workforce. Almost 30 per cent of Australia's workers were born overseas.<sup>8</sup> More than 2.1 million Australians speak an Asian language at home – about 10 per cent of the population – and 1.3 million speak a European language in addition to English.<sup>9</sup>



# A WHO'S WHO OF INVESTORS

Australia's sophisticated, knowledge-based and services-intensive economy has attracted some of the world's largest organisations.

Nineteen of the top 20 *FT Global 500* and seven of the top 10 *Fortune 500* companies have operations in Australia.<sup>10</sup> One in four businesses in Australia with more than 200 employees is at least 50 per cent foreign-owned.<sup>11</sup>

Global companies that have invested in Australian R&D include:

- ▶ BAE Systems, EADS and Boeing – specialist aerospace components
- ▶ BASF, Bayer and DuPont – chemicals industry
- ▶ Baosteel – metals
- ▶ Bosch – manufacturing solutions
- ▶ Canon – digital imaging
- ▶ Carl Zeiss Vision – medical and manufacturing
- ▶ Cisco, IBM and Microsoft – ICT and digital technologies
- ▶ DowAksa – carbon fibre
- ▶ GE – health and energy technologies
- ▶ Mahindra Group – electronics and photonics
- ▶ Mondelez International – food
- ▶ Pfizer, Johnson & Johnson, MSD (Merck), Novartis and others – medical and clinical trials
- ▶ Samsung – digital health
- ▶ Siemens – mining and engineering.





## **BOEING LOOKS TO AUSTRALIA FOR INNOVATION**

Boeing, the world's largest aerospace company, has chosen Australia as its largest base for R&D outside the US.

An important partner in Boeing Australia's R&D efforts is the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Boeing and CSIRO have worked together for more than 27 years.

The aerospace giant turned to CSIRO for its innovative ideas, skills and expertise in research. It's a partnership that is paying dividends: CSIRO was named Boeing's R&D Supplier of the Year in 2011 and a joint Boeing–CSIRO project was awarded a CSIRO Excellence Award in 2011.

'We're proud of our partnership with CSIRO, which is known across the globe for the depth, passion and expertise of its people,' says Lane Ballard, Boeing Research & Technology's Vice President of Materials & Manufacturing Technology and co-chair of the Boeing–CSIRO steering committee.

### **'INNOVATION REQUIRES INVESTMENT, AND THE INVESTMENTS WE HAVE MADE WITH CSIRO FOR NEARLY THREE DECADES HAS LED TO SIGNIFICANT ADVANCES IN THE AEROSPACE INDUSTRY.'**

The partnership has delivered a number of technological breakthroughs, including topcoat reactivation technology for re-coating Boeing airliners, airspace and airport congestion simulation tools, and sustainable aviation fuels.

In March 2016, the two organisations announced a new series of joint research projects.

Scientists and engineers in Melbourne and Brisbane, and Boeing sites across the US, will conduct and oversee 22 projects across multiple research domains.

Several areas of joint research include advanced manufacturing materials and chemicals research, secure network communications, 3D imaging and mapping technologies. Successful research projects can be adopted by Boeing's global commercial aircraft manufacturing facilities including Boeing Aerostructures Australia (BAA) in Fishermans Bend. BAA designs and manufactures structural composite components for Boeing's 737, 747, 777 and 787 commercial aeroplanes.

'A partnership with a global company like Boeing helps us direct our research to meet market needs and to see our research in real world applications,' says Dr Keith McLean, Director of CSIRO Manufacturing. 'It also allows us to act as a connector between Australian manufacturers and Boeing's global supply chain, providing a major benefit to local industry.'<sup>12</sup>

**[boeing.com.au](http://boeing.com.au)**

# EXCELLENCE IN RESEARCH AND DEVELOPMENT

Australia is recognised globally for its high-quality research. Despite having only 0.3 per cent of the world's population, Australia contributed almost four per cent of world research publications in 2014, up from 2.6 per cent in 1995.<sup>13</sup>

Australia's strongest categories of published research are multidisciplinary, engineering, space science, materials science, physics, clinical medicine, environment/ecology and geosciences.

## Top-ranked universities

Australia's universities perform highly for the quality of their research in international rankings.<sup>14, 15</sup>

Top-ranked universities include the University of Melbourne, Australian National University, University of Sydney, University of Queensland, University of New South Wales (UNSW), Monash University and the University of Western Australia.

In the 2016 QS World University Rankings by Subject, for instance, Monash University is ranked fourth in the world for studying pharmacy and pharmacology. Worldwide it is topped only by Harvard University, University of Cambridge and University of Oxford in this subject area.<sup>16</sup>

Sixteen of Australia's young universities appear in the 2016 *Times Higher Education's* ranking of the world's top 100 universities less than 50 years old, and half of these are in the top 50. This is a higher number of young universities than any other nation in the world.<sup>17</sup>

University networks include the Group of Eight and the Australian Technology Network of Universities, which brings together five universities focused on industry collaboration: Queensland University of Technology, University of Technology Sydney, RMIT University, University of South Australia and Curtin University.

[go8.edu.au](http://go8.edu.au)

[atn.edu.au](http://atn.edu.au)

**RANKINGS DIFFER ACCORDING TO THE MEASURE USED; HOWEVER, THERE IS NO DOUBT THAT AUSTRALIAN UNIVERSITIES ARE AMONG THE WORLD'S BEST.**

## CSIRO, Australia's national science agency

CSIRO is one of the world's largest and most diverse research organisations. It is one of the very best Australian research institutes<sup>18</sup>, with research publications of a similar high standard to those from leading Australian universities.

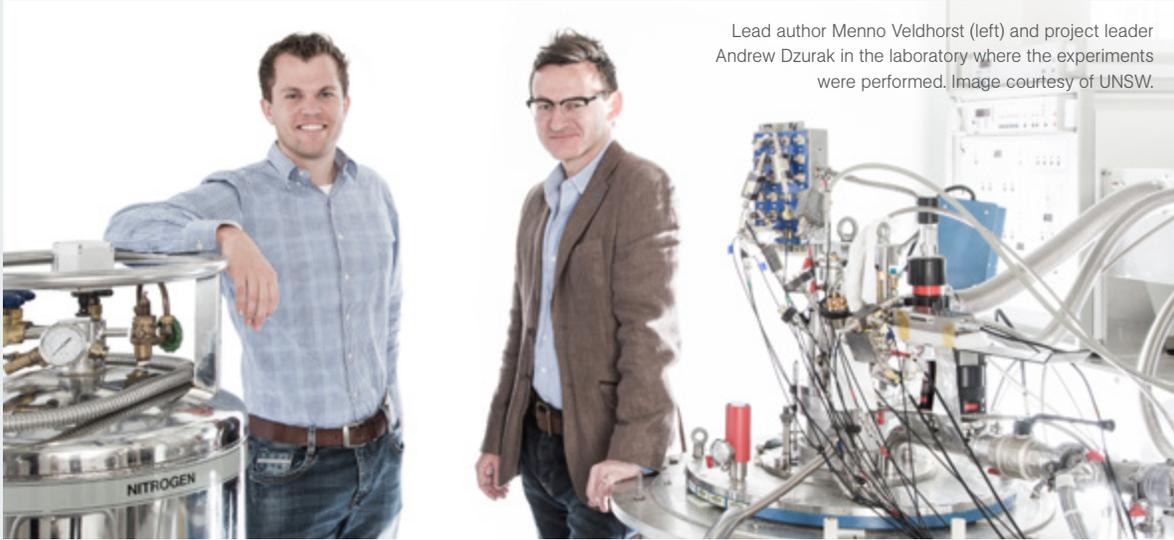
Among Australian research institutes, CSIRO was the largest filer of provisional patents in 2014. Key patented technology areas are plant genetics and modification, polymers, sensors and devices, medical fields, batteries, and gas capture and processing.



The organisation produces 10 per cent of Australia's publications in agricultural sciences, environment and ecology, space sciences, geosciences, plant and animal sciences and material sciences.

CSIRO is a strategic provider to several major Australian and global organisations, including:

- ▶ Boeing – space sciences, advanced materials, energy and direct manufacturing
- ▶ BP, the South Australian Research and Development Institute, University of Adelaide and Flinders University – understanding marine resources in the Great Australian Bight's vast area of ocean and coast
- ▶ GE – resources, energy, healthcare, materials and information and communications technology (ICT)
- ▶ The Gas Industry Social and Environmental Research Alliance (founded by CSIRO and Australia Pacific LNG) – assessing the social, economic and environmental impacts associated with Australia's natural gas industry
- ▶ University of Western Australia and Curtin University – providing solutions to petroleum industry challenges. Woodside Energy, Chevron and Shell are major industry partners through the Western Australia Energy Research Alliance.



Lead author Menno Veldhorst (left) and project leader Andrew Dzurak in the laboratory where the experiments were performed. Image courtesy of UNSW.

## SILICON QUANTUM COMPUTING

In October 2015, a research team at UNSW cleared a final scientific hurdle, putting Australia years ahead of the rest of the world in an international race to build a silicon quantum computer.

The breakthrough, published in high-profile science journal *Nature*, included details of a quantum logic gate built in silicon for the first time, making calculations between two quantum bits of information possible.

'What we have is a game changer,' says team leader Andrew Dzurak, Scientia Professor and Director of the NSW Node of the Australian National Fabrication Facility at UNSW.

**'WE'VE DEMONSTRATED A TWO-QUBIT LOGIC GATE – THE CENTRAL BUILDING BLOCK OF A QUANTUM COMPUTER – AND, SIGNIFICANTLY, DONE IT IN SILICON.'**

'Because we use essentially the same device technology as existing computer chips, we believe it will be much easier to manufacture a full-scale processor chip than for any of the current leading designs, which rely on more exotic technologies.

'This makes the building of a quantum computer much more feasible, since it is based on the same manufacturing technology as today's computer industry.'

During 2015, the team also patented a design for a full-scale quantum computer chip that would allow for millions of quantum bits (qubits), all doing the types of calculations that were demonstrated in their *Nature* paper. This patent won a UNSW Innovation prize, and marked the eve of their entrepreneurial endeavours to bring silicon quantum computers into the world.

'The next step for the project is to identify the right industry partners to work with to manufacture the full-scale quantum processor chip,' says Dzurak.

[anff.org.au](http://anff.org.au)  
[unsw.edu.au](http://unsw.edu.au)

Image courtesy of Cochlear.



## **COCHLEAR'S SUCCESS IS HEARD AROUND THE WORLD**

From the vision of an Australian researcher in the 1970s to the sophisticated technology now used to help hundreds of thousands of people worldwide, the bionic ear is one of the best-known success stories in Australian medical devices.

Hearing solutions provider Cochlear was formed in the 1980s from a collaboration between Professor Graeme Clark and a medical device group, with support from the Australian Government, to develop and market a commercially available cochlear implant.

### **IN 1982, THE FIRST PATIENT RECEIVED A COMMERCIAL MULTICHANNEL COCHLEAR IMPLANT.**

Three decades on, over 400,000 people around the world have received hearing solutions from Cochlear and the company now employs over 2,800 people.

Since the first cochlear implant, Cochlear's range of products has expanded to cater for different types of hearing loss and now includes bone conduction and acoustic implant systems. Cochlear also focuses on adapting its products to better meet the needs of patients in various markets, such as modifying the software used in its devices to be more appropriate for tonal languages. It is also involved in clinical education, and a wide range of ongoing support services for its recipients.

Cochlear continues to explore new technologies, with R&D teams based in Australia, Sweden, Belgium and the US and collaborations with over 100 external research partners in 20 countries.

**[cochlear.com](http://cochlear.com)**

# WORLD-CLASS RESEARCH INFRASTRUCTURE

The Australian Government funds cutting-edge, national research infrastructure to ensure Australia retains high-level science and research capability in areas such as nanofabrication, food production, health, cyber security and sustainable cities.

The National Collaborative Research Infrastructure Strategy (NCRIS) currently supports national research capability through 222 institutions employing over 1,700 highly skilled technical experts, researchers and facility managers. These facilities are used by over 35,000 researchers, domestically and internationally.

Through NCRIS, researchers, government and industry collaborate to deliver practical outcomes such as the nanopatch vaccination method, direct targeting methods for melanoma, disaster mitigation, and unlocking mineral, gas and petroleum deposits.

## THE SQUARE KILOMETRE ARRAY

The Square Kilometre Array (SKA) is a global next-generation radio telescope project involving institutions from over 20 countries.

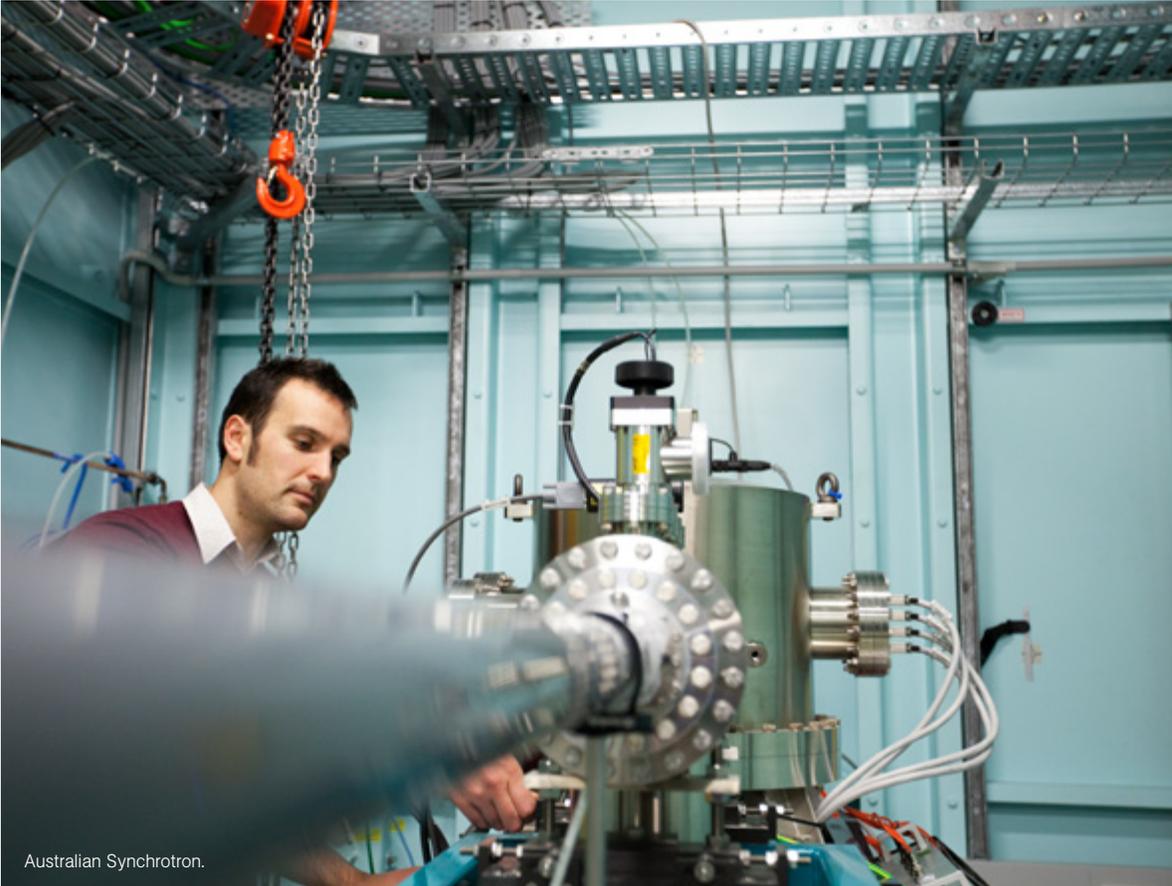
The SKA will be the largest and most capable radio telescope ever constructed. During its 50+ year lifetime, it will expand our understanding of the universe and drive technological development worldwide.

The SKA comprises arrays of receivers in two countries – hundreds of thousands of small antennas scattered over thousands of square kilometres in Australia and hundreds of larger dish-type antennas in South Africa. It will be sensitive enough to pick up the faintest signals from the distant cosmos, allowing scientists to investigate some of the fundamental mysteries of the universe.

As well as major astronomical discoveries, the SKA is set to produce innovative technical and ICT development outcomes. When operational in the 2020s, the data output from the SKA will be greater than that of the entire internet today. The supercomputer needed to handle and interrogate this volume of data hasn't been built yet, a challenge that interests and excites industry and ICT experts the world over.

The Australian Government has committed A\$294 million toward constructing and operating the SKA over the next decade.

[ska.gov.au](http://ska.gov.au)



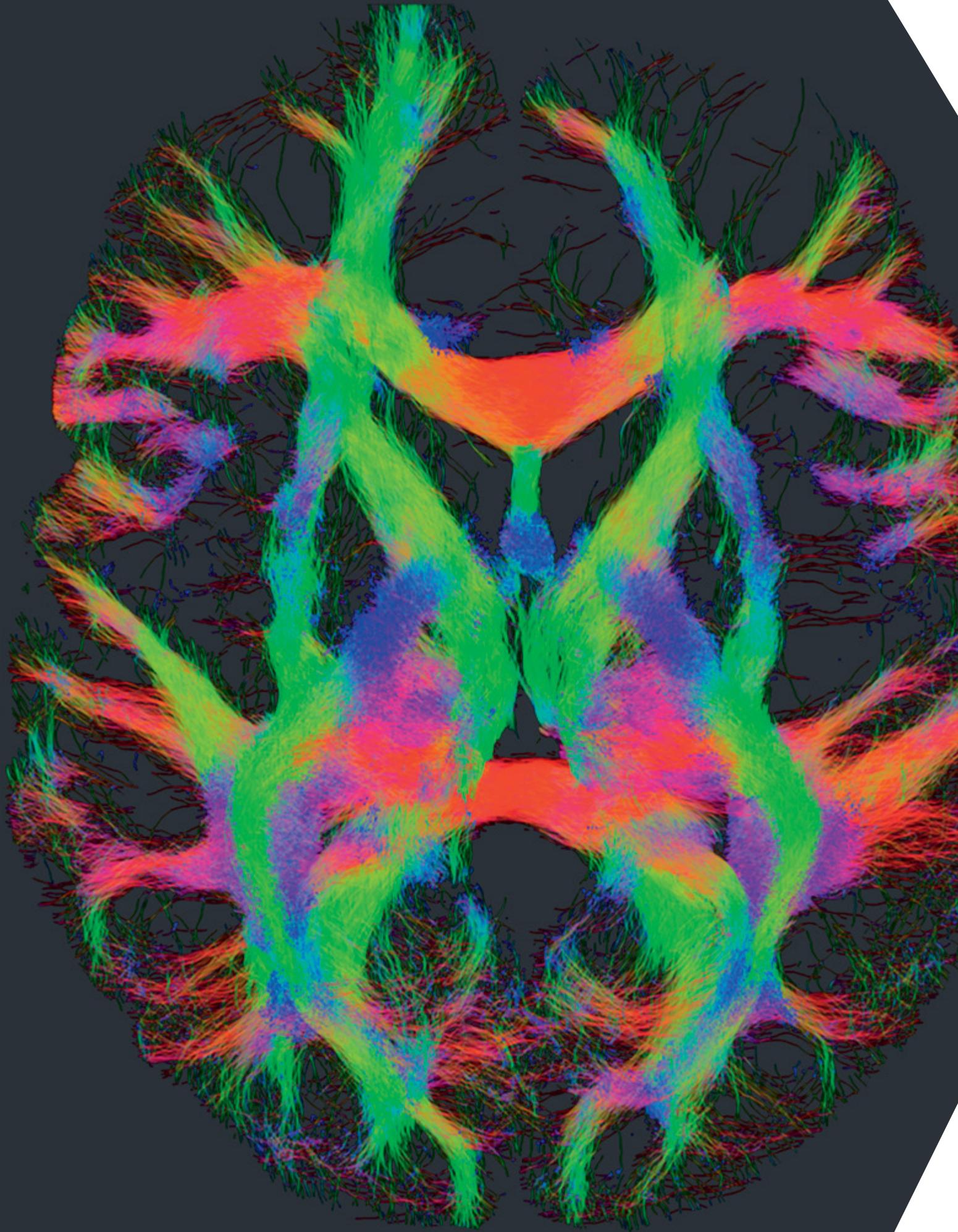
## AUSTRALIAN SYNCHROTRON

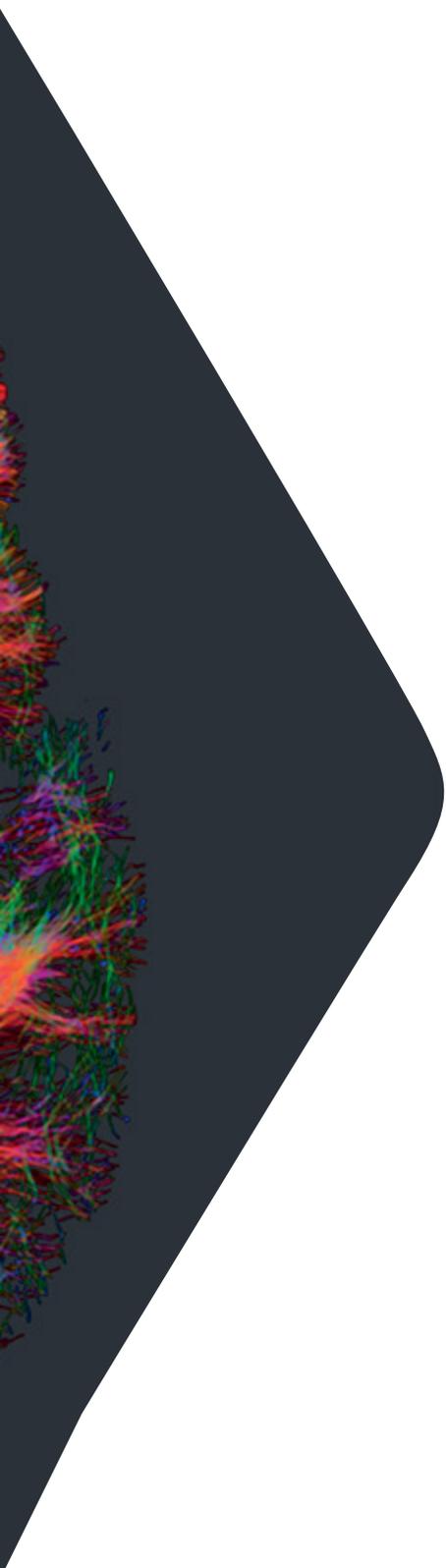
At the Australian Synchrotron, scientists harness light a million times brighter than the sun to reveal unprecedented structural detail of any material, empowering researchers from across Australia and New Zealand to problem-solve and innovate.

Leading researchers partner with the Australian Synchrotron to explore the impacts of greenhouse gases in our atmosphere; fine-tune forensic investigations and archaeological digs; and understand the interplay of drugs and cells in the body to find new treatments for diseases including cancer, Alzheimer's and osteoporosis.

The Australian Synchrotron is operated by the Australian Government through the Australian Nuclear Science and Technology Organisation. A landmark infrastructure in the region, the Australian Synchrotron also facilitates complex industry experiments, helping commercial partners interrupt, boost and manipulate basic processes to overcome technical roadblocks and drive product innovation.

[synchrotron.org.au](https://www.synchrotron.org.au)





The Australian National Imaging Facility provides state-of-the-art imaging capability of animals, plants and materials through leading-edge instruments and specialised expertise in the use of imaging technology at facilities across Australia.

Left: fibre tracts of the brain – Markus Barth, Kieran O'Brien, Farshid Sepehrband.  
Image courtesy of ANIF.

[anif.org.au](http://anif.org.au)

# INVESTING IN INNOVATION

The Australian Government makes a significant annual investment in science, research and innovation – A\$9.7 billion in 2015–16.<sup>20</sup>

Recent initiatives include:

- ▶ Investing A\$250 million into a A\$500 million Biomedical Translation Fund to promote innovation in Australia's strong biotechnology and healthcare sectors.
- ▶ A A\$200 million CSIRO Innovation Fund for co-investment in new startups and accelerator opportunities.
- ▶ Funding of A\$163 million for research-industry partnership grants through the Australian Research Council for 258 research projects, announced in May 2016.
- ▶ Establishing Innovation and Science Australia – an independent body responsible for strategic whole-of-government advice on all science, research and innovation matters.
- ▶ Support for Australian startups to access Landing Pads in global innovation hotspots. These will provide a short-term operational base from which to access customers, entrepreneurial talent, mentors, investors and a wider connected network of innovation hubs.

## **A\$500 MILLION BIOMEDICAL TRANSLATION FUND**

The A\$500 million Biomedical Translation Fund, announced by the Australian Government in late 2015, will invest in promising biomedical discoveries and help bridge the gap between research and commercialisation.

While Australia is a world leader in health and medical research, the challenge has always been to translate success in the laboratory into success at the hospital bedside.

The Fund will be used to stimulate private sector investment in the complex and expensive early stages of biomedical commercialisation.

In recent years, biomedical businesses have had to contend with a decline in venture capital investment. The path to commercialisation is not easy. The lengthy clinical trial process, followed by regulatory and marketing approvals, can take many years and involve the expenditure of many millions of dollars.

The Fund is expected to significantly boost the capital available for commercialising research. Recipient fund managers, selected through a competitive process, will be required to bring at least matching funding from the private sector for investment.



## LANDING PADS FOR AUSTRALIAN STARTUPS

In 2016, Australia is establishing Landing Pads to support Australian startups in global innovation hubs including San Francisco, Tel Aviv, Shanghai, Berlin and Singapore.

Market-ready startups will be immersed in an environment that will help them accelerate the design and development of their product or service business model by exploring in-market business development, investment, mentorship and strategic partnership opportunities.

Landing Pads are administered by the Australian Trade and Investment Commission (Austrade).

**[australiaunlimited.com](http://australiaunlimited.com)**

Image courtesy of The Yield.



## **BOSCH INVESTS A\$2.5 MILLION IN TASMANIAN AGTECH BUSINESS**

In April 2016, The Yield, a Tasmanian agricultural technology business, received a A\$2.5 million investment from Bosch Group, Europe's third largest conglomerate.

This follows on from the Australian Government's A\$1 million grant to The Yield (Entrepreneur's Program: Accelerating Commercialisation Grant) in late 2015.

The partnership brings together the global sensor manufacturer with one of Australia's newest Internet of Things (IoT) technology companies.

The Yield uses sensors, data management and user-friendly apps to create tools for agriculture and aquaculture industries. The Yield's technology enables solutions such as improving on-farm productivity, reducing the cost of compliance with food safety standards, increasing shelf life in the food supply chain, and better risk management for financial services in the food industry.

### **THE YIELD ALREADY HAS A NUMBER OF PILOT PROGRAMS IN PLACE THAT ARE GENERATING IMPRESSIVE RESULTS FOR THEIR CUSTOMERS AND BENEFITS FOR THE ENVIRONMENT.**

The company is partnering with the Tasmanian Shellfish Quality Assurance Program and NSW Food Authority, both of which will use The Yield's data to help oyster growers in Tasmania and NSW.

The Yield has developed an app that uses real-time data to enable oyster growers to manage the risk of disease and reduce unnecessary harvest closure. The company estimates that by using its technology, Tasmania's oyster industry could reduce unnecessary harvest closures by 30 per cent, resulting in approximately A\$1.2 million in potential sales.

**[theyield.com](http://theyield.com)**

# BECOME AN INDUSTRY PARTNER

International partners have numerous opportunities to collaborate with Australian companies and research institutions, invest in or incorporate Australian solutions into existing products and services, or enter into joint ventures to take Australian technologies to the global market.

With a high proportion of researchers, Australia's gross expenditure on R&D places it among the world's leading innovators, including the US, Japan, France, Germany and South Korea.

Australia has expertise at every stage of the global value chain, from the extraction and processing of raw materials, to the development and production of new materials, to design, testing and manufacture.

## Industry Growth Centres

The Australian Government is establishing Industry Growth Centres, an industry-led approach to drive innovation, productivity and competitiveness in areas of competitive strength and strategic priority.

The growth centres are in six industry sectors:

- ▶ Advanced manufacturing
- ▶ Cyber security
- ▶ Food and agribusiness
- ▶ Medical technologies and pharmaceuticals
- ▶ Mining equipment, technology and services
- ▶ Oil, gas and energy resources.

**THE INITIATIVE IS ONGOING WITH  
A\$248 MILLION IN AUSTRALIAN  
GOVERNMENT FUNDING OVER FOUR  
YEARS BEGINNING IN 2015-16.**

Industry Growth Centres enable national action on issues such as deregulation, skills, collaboration and commercialisation. They work to improve engagement between research and industry (and within industry) to achieve better coordination and collaboration of research, as well as stronger commercialisation outcomes in key growth sectors.

**[business.gov.au](http://business.gov.au)**



## **BUSINESS OPPORTUNITIES IN CYBER SECURITY**

The global cyber security market is currently worth US\$71 billion and is growing at around 8 per cent a year.

The Australian Government recently announced a A\$230 million Cyber Security Strategy that contains 33 new initiatives, including more than 100 new jobs to boost the Government's cyber security capacity and capabilities.

Initiatives include a national cyber partnership between government, researchers and business. Funding of A\$38.8 million over four years for the Australian Cyber Security Centre will enable its growth and partnerships with the private sector.

### **THE GOVERNMENT IS SPENDING A\$30 MILLION TO 2019–20 FOR AN INDUSTRY-LED CYBER SECURITY GROWTH CENTRE, WHICH WILL CREATE A NATIONAL CYBER SECURITY INNOVATION NETWORK.**

The Growth Centre will work closely with industry sectors across Australia, creating business opportunities and focusing on hubs in existing areas of capability and thematic clusters emerging in the states and territories.

The NSW hub will be at the Australian Technology Park, leveraging CSIRO's Data61 advanced cyber capability. Victoria will house its Growth Centre node in Melbourne with the recently announced Oceania Cyber Security Centre, Oxford's Global Cyber Security Capacity Centre and Data61.

This investment complements the provisions of the Australian Government's 2016 Defence White Paper, which commits A\$400 million and approximately 800 specialist jobs over the next decade to improve Australia's cyber and intelligence capabilities.

[cybersecuritystrategy.dpmc.gov.au](http://cybersecuritystrategy.dpmc.gov.au)

## Cooperative Research Centres (CRCs)

The CRC Program supports industry-led collaborations between industry, researchers and the community.

Australia has over 20 CRCs linking researchers with industry, in sectors as diverse as innovative manufacturing, cancer therapeutics, spatial information and plant biosecurity.

The program aims to:

- ▶ improve the competitiveness, productivity and sustainability of Australian industries
- ▶ foster high-quality research to solve industry-identified problems
- ▶ encourage and facilitate small and medium enterprise (SME) participation in collaborative research.

The CRC Program has two elements:

- ▶ CRCs, which undertake medium- to long-term, industry-led and high-quality collaborative research
- ▶ CRC Projects (CRC-Ps), which undertake a short-term, industry-identified and industry-led collaborative research project.

There are currently 33 CRCs commercialising leading-edge research taking place in Australian universities and research institutions.

**[business.gov.au](http://business.gov.au)**

## Australian Research Council (ARC) Centres of Excellence

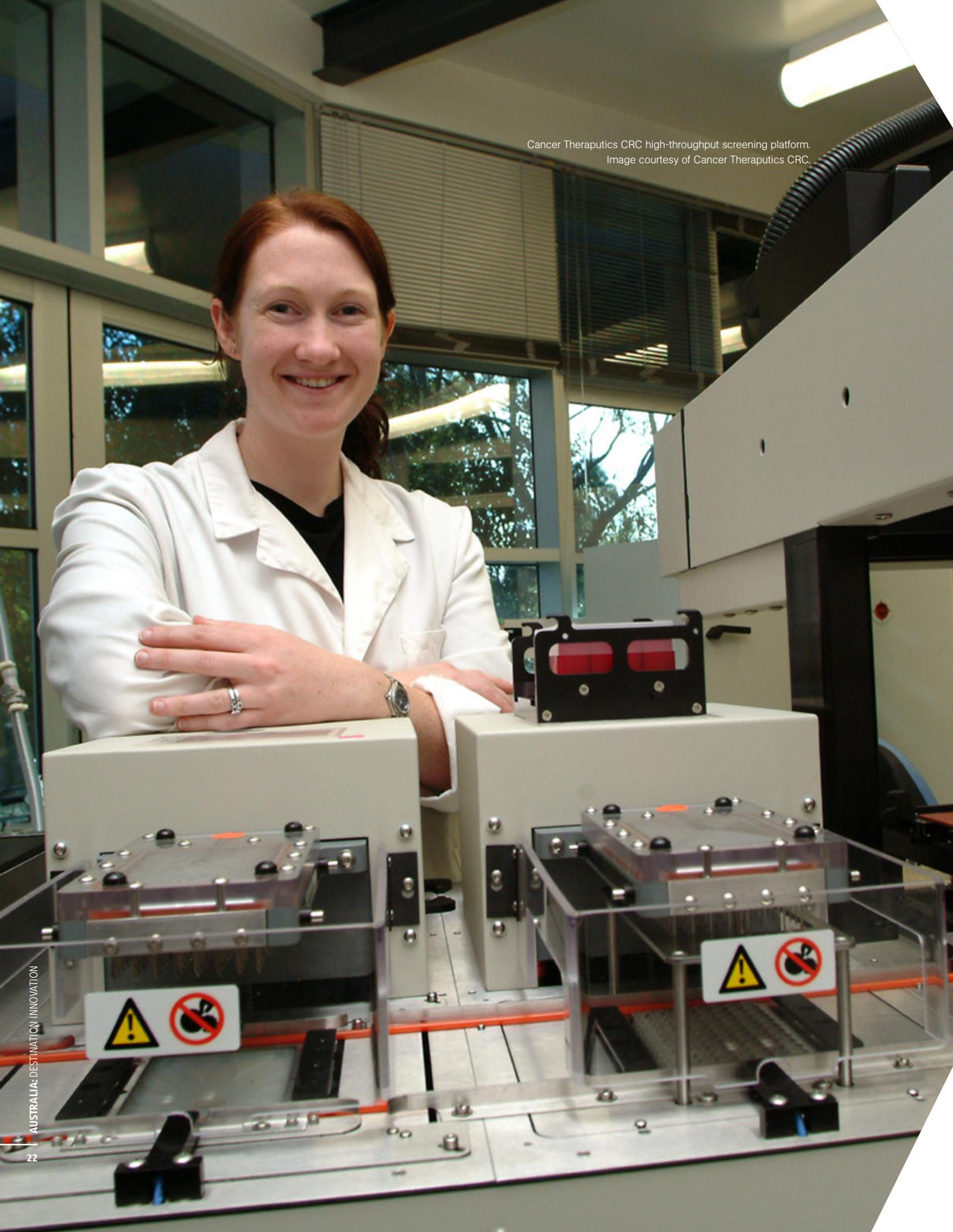
ARC Centres of Excellence are prestigious foci of expertise through which high-quality researchers maintain and develop Australia's international standing in research areas of national priority.

Each centre collaborates with partners from the university sector and other organisations around the globe, facilitating international knowledge transfer that greatly enhances their research outcomes.

Centres of Excellence are typically funded over a period of up to seven years, allowing them the flexibility to undertake comprehensive research programs that tackle big challenges.

**[arc.gov.au](http://arc.gov.au)**

Cancer Therapeutics CRC high-throughput screening platform.  
Image courtesy of Cancer Therapeutics CRC.





## **AUSTRALIAN CANCER DRUG LICENSED IN A\$730 MILLION DEAL**

Cancer Therapeutics CRC (CTx) is in the business of finding cures for cancer.

In early 2016, a promising new cancer drug developed in Australia by CTx was licensed to US pharmaceutical company MSD (known as Merck in the US and Canada) in a deal worth A\$730 million.

The drug, which was developed with support from the UK-based Wellcome Trust and Cancer Research Technology (CRT), has potential clinical applications in both cancer and non-cancer blood disorders.

CTx was founded in 2007 and received an initial seven years of funding from the CRC Program. It is a collaborative partnership that translates Australia's innovative research discoveries into new cancer drugs ready for clinical development.

## **CTX WAS AWARDED A FURTHER SIX YEARS OF CRC PROGRAM FUNDING FROM JULY 2014.**

CTx's R&D platform spans the full range of technologies required to discover small molecule hits and develop them to clinical candidates. Critically, each of CTx's novel drug discovery projects is underpinned by leading medical researchers with cutting-edge expertise in the target biology.

The deal with MSD provides potentially significant financial returns, which will be shared between CRT, CTx and the Wellcome Trust, with the majority being returned to CTx and its Australian research partners including CSIRO, Monash University, Peter MacCallum Cancer Centre and the Walter and Eliza Hall Institute.

**[cancercrc.com](http://cancercrc.com)**

# ADVANCED MANUFACTURING AND TECHNOLOGIES

Australia provides opportunities to transfer new technologies and improve productivity through commercialisation of globally competitive research in advanced materials, digital technology and medical technologies.

## ADVANCED MATERIALS

Australia has a successful track record in the production and use of advanced materials in a range of sectors, including construction, biomedical, resource extraction and transportation.

Facilities such as the Australian National Fabrication Facility, the Melbourne Centre for Nanofabrication and Carbon Nexus connect Australia's best researchers with state-of-the-art facilities to provide industry with new solutions to increasingly complex problems.

### Carbon fibres

Australia has a critical mass of academic expertise and industrial application, which is already being used by local companies like Carbon Revolution and Quickstep, and international investors like DowAksa to optimise the carbon fibre development process and create strong, lightweight products.

### Titanium

CSIRO is looking at new ways to extract titanium using more cost-competitive techniques, and is also using titanium, due to its relative inertness, as an input material for implantable body parts.

### Photonics

Australian researchers in the areas of electro-materials and photonics, such as the University of Sydney's Institute of Photonics and Optical Science, and Deakin's new BatTRI-Hub, are looking to optimise both the storage and conductivity of electricity.

### Polymers

Australia has excellent capabilities in fundamental polymers science and a proven track record in technology development.

Advanced machining of titanium. Image courtesy of the University of Queensland.



## ADVANCED TITANIUM MANUFACTURING FOR AIRCRAFT AND MEDICAL DEVICES

The F-35 Joint Strike Fighter aircraft is the centrepiece of new defence programs being developed by Australia, the US and eight other partner countries.

Since 2005, researchers at the University of Queensland's Centre for Advanced Materials Processing and Manufacturing (AMPAM) have been working in close collaboration with Australian manufacturers. These manufacturers now play a key role in producing the precision components used in the construction of the F-35 Joint Strike Fighter aircraft.

The AMPAM research group, headed by Associate Professor Matt Dargusch (who is also Chief Technology Officer of the Defence Materials Technology Centre), has developed and transferred technologies that shorten the time it takes to manufacture titanium components, significantly reducing the cost of production.

New technologies being developed include hybrid machining processes, additive manufacturing and metal injection moulding for the advanced manufacture of titanium components. These technologies are leading towards greater affordability in the manufacture of titanium components.

AMPAM researchers are also working closely with Cook Medical to develop new and improved manufacturing processes for medical devices.

[uq.edu.au/research](http://uq.edu.au/research)

Carbon fibre CR9 aftermarket wheel for performance cars. Image courtesy of Carbon Revolution.





## THE CARBON FIBRE REVOLUTION

The world is searching for stronger, lighter materials – such as carbon fibre and its composites.

In 2014, Carbon Nexus, the A\$34 million, open-access carbon fibre/composite research facility opened at Deakin University in Geelong, Victoria.

Carbon Nexus was developed with the support of the Australian Government and the Victorian Government as part of the Australian Future Fibres Research and Innovation Centre. It contains state-of-the-art research and analysis labs, unique pilot-scale and research-scale carbonisation lines, and a multidisciplinary team that researches the manufacture and use of carbon fibre.

Carbon fibre composites – materials where the carbon fibre is embedded in a polymer matrix – are increasingly used across a range of industries. In Boeing's 787 Dreamliner, carbon fibre composites are helping improve fuel economy by 20 per cent and reduce CO<sub>2</sub> emissions, also by 20 per cent.

### A THRIVING INNOVATION HUB HAS EMERGED AROUND THE CARBON NEXUS FACILITY AT THE GEELONG TECHNOLOGY PRECINCT.

Businesses forming this hub include Quickstep, currently manufacturing parts for Lockheed Martin's international F-35 Lightning II Joint Strike Fighter program. Quickstep has developed innovative composite manufacturing processes and is setting up a new automotive business unit, as well as relocating its R&D activities to Geelong.

Carbon Revolution is another business located in the Geelong Technology Precinct. It produces the CR9 aftermarket range of wheels for performance cars such as Audi, BMW, McLaren and Porsche. Carbon Revolution is also supplying the world's first mass-produced, single-piece carbon fibre wheel to Ford for its US-built Shelby GT350R Mustang.

At least a dozen other carmakers are now testing Carbon Revolution's products. The company plans to produce 250,000 wheels a year by the end of the decade at its Geelong production facility, and has plans for further expansion beyond that, which may involve operations outside Australia.

[carbonnexus.com.au](http://carbonnexus.com.au)

[carbonrev.com](http://carbonrev.com)

[quickstep.com.au](http://quickstep.com.au)

# DIGITAL TECHNOLOGY

Australian industry is technology-ready and actively collaborating with research leaders to develop digital technologies to disrupt business models, reduce cost and improve efficiency.

Digital technology is forecast to contribute A\$139 billion to the Australian economy in 2020, up 76 per cent from A\$79 billion in 2014. The vast majority of this growth (97 per cent) is expected to take place outside of the traditional information, media and telecommunications industries.<sup>21</sup>

With a track record in world-class ICT and digital technology R&D, Australia has particular strengths in sensing and monitoring, data analytics and automation. These capabilities are applied in industries that have traditionally been important to the Australian economy such as agriculture and mining, as well as across the services sector in emerging fields such as logistics, finance, environmental management and cyber security.

Australia is consistently ranked as a leading ICT economy in the Asia-Pacific region. The nation's ICT spending has grown significantly and become increasingly sophisticated.

## AUSTRALIA'S TRACK RECORD IN DIGITAL TECHNOLOGY

- › WiFi – Wireless LAN
- › Enabling technology in Google Maps
- › Ultrasound technology
- › Point-to-point speed detection
- › Black box flight recorder
- › Kernel – anti-hacking software inside most smartphones
- › Robotic visual horizon – technology that enables planes to maintain horizon when performing complex manoeuvres

## A culture of early adoption

Australians are keen adopters of new technologies. Over two-thirds of Australians own a contactless payment card<sup>22</sup>, 69 per cent of Australians are active daily on social media sites<sup>23</sup> and Australian e-commerce sales surpassed A\$10 billion in 2015.<sup>24</sup>

Australian businesses are following suit, embracing e-commerce, e-marketing, social media and 3D printing to better serve the demands of local and global customers and cost-effectively establish their own global value chains. Australian company freelancer.com is an example.

Financial technology (fintech) is a particular strength in Australia, with nine Australian companies appearing in KPMG's 2015 global Fintech 100.<sup>25</sup>



Image courtesy of Atlassian.

## **ATLASSIAN TRANSFORMS SOFTWARE DEVELOPMENT**

In late 2015, Atlassian listed on the US NASDAQ Stock Market and raised US\$634 million, making it the most successful Australian listing ever on a US market.

Founded in Sydney in 2002, enterprise software company Atlassian has grown from startup to employer of more than 1,400 people worldwide.

Atlassian products are primarily used by software developers and project managers. They include software applications for project- and issue-tracking, collaboration and content sharing, distributed version control, and code quality checking.

Atlassian currently has more than 51,000 clients including BAE Systems, CSIRO, NASA, Twitter and the US Department of Defense.

**[atlassian.com](https://atlassian.com)**

## Big data analytics and quantum research

Australia is pioneering new solutions for the storage and analysis of large data sets, working on global big data research projects such as the Square Kilometre Array, which will produce one exabyte of data per day when fully operational (see page 12).

Australia is also a world leader in quantum computing, with Australian researchers in 2015 successfully producing a two-qubit quantum chip in silicon, a world-first achievement (see page 10).

## THE AUSTRALIAN GOVERNMENT IS COMMITTED TO OPTIMISING THE USE AND REUSE OF PUBLIC DATA, WITH ALL NON-SENSITIVE DATA SETS REQUIRED TO BE MADE AVAILABLE BY PUBLIC AGENCIES VIA DATA.GOV.AU.

The Government's Digital Transformation Office (dto.gov.au) is a standalone agency created to lead the government in transforming public services to improve user experience.

## Automation and simulation

With a large landmass that includes a variety of environmental landscapes and varying density of human population, Australia offers a unique test case for automation, simulation and visualisation technologies.

Australia's leading industries, including the mining, manufacturing and agriculture sectors, are embracing remote automation, simulation and visualisation technologies to improve resourcing and production efficiency.

## SURVEYMONKEY OPENS ASIA-PACIFIC HQ IN SYDNEY

The world's largest survey platform, the US\$2 billion tech startup SurveyMonkey, has opened its Asia-Pacific headquarters in Sydney.

SurveyMonkey's web-based survey services enable users to create polls, customise survey questions, distribute questionnaires online, and collect responses in real time.

The Sydney office is SurveyMonkey's largest investment outside the US and Europe. The move into Australia was driven not only by considerable in-country demand, with more than 50,000 businesses now using the service, but also because Sydney will now serve as the hub for the company's Asian strategy.

[surveymonkey.com](https://www.surveymonkey.com)



Image courtesy of Zendesk.

## **ZENDESK SOFTWARE: HELPING BUSINESSES IMPROVE CUSTOMER SERVICE**

Zendesk, the global cloud-based customer service software company, chose Melbourne as its Asia-Pacific headquarters.

The startup, founded in Denmark, saw a huge opportunity in the Asia-Pacific region as businesses adopt cloud technology and focus on improving customer service.

'Asia-Pacific is a region which is undergoing massive change and experiencing significant growth,' says Michael Hansen, Vice President and APAC Managing Director of Zendesk.

'It is embracing new technologies faster than other regions. We were attracted to Australia as many Australian companies are early adopters when it comes to technology.'

**HANSEN ADDS THAT WHILE ZENDESK HAS OFFICES IN TOKYO AND MANILA, IT CHOSE MELBOURNE AS ITS ASIA-PACIFIC HEADQUARTERS DUE TO ITS COST-EFFECTIVENESS AND AVAILABLE TALENT.**

'There is a large pool of highly educated and skilled multicultural employees in Australia, and it is an excellent open market for new technologies,' he says.

In November 2015, Zendesk announced a major partnership with the Victorian Government that will accelerate the creation of up to 175 new tech jobs in Victoria.

**[zendesk.com](http://zendesk.com)**

## Intelligent transport systems

Logistics and transport is the backbone of Australian industry, contributing more than 10 per cent of GDP.

The sector is technology-ready and actively collaborating to explore new solutions across road, rail, port and air operations, including through centres such as the Transport and Logistics Living Lab.

### DATA61 TRANSPORT AND LOGISTICS LIVING LAB

CSIRO's Data61, Australia's largest digital research powerhouse, is host to the Transport and Logistics Living Lab (TALLL) at its headquarters in the Australian Technology Park, Sydney.

TALLL is a collaboration hub for industry, research and government – sharing information and collaborating on joint projects to drive Australia's productivity.

As a knowledge hub, TALLL facilitates connections within the transport and logistics sector to innovate and apply best-practice with the goal of making the sector more productive, efficient, greener and safer.

TALLL's industry-driven approach can address pain points such as transport inefficiencies, blockages at interfaces, lack of standardisation and fragmented visibility of end-to-end transportation processes. It explores new ways to orchestrate transport and logistics services across multiple service providers, modes of transportation and countries.

## Sensor technology

Australian scientists are working closely with industry to develop next-generation sensor networks, to optimise asset management, maintenance and performance.

Ground-breaking projects such as Sense-T in Tasmania and University of New England's SMART Farm in NSW (see page 34) are seeing Australian researchers and farmers design new sensor and visualisation technologies to manage and monitor agricultural conditions, resources and production in real-time or remotely.

Australia is a pioneer in the development of sensor-based health technologies, including sensors for applications ranging from home healthcare to health monitoring and driver safety.



Autonomous haulage trucks, West Angelas minesite. Christian Sprogøe Photography. Image courtesy of Rio Tinto.

## RIO TINTO'S AUTONOMOUS HAUL TRUCK TECHNOLOGY

Rio Tinto is the largest owner and operator of autonomous haul (AHS) trucks in the world.

Currently there are 71 autonomous trucks operating across Rio Tinto mine sites in Australia at Yandicoogina, Nammuldi and Hope Downs 4. The fleet has now driven 11.6 million kilometres, which is equivalent to driving around the Earth's circumference 290 times. They respond to GPS directions to deliver loads 24 hours a day supervised by remote operators.

Rio Tinto remains focused on optimising productivity through autonomous technology. These technologies are a key part of the Mine of the Future™ program, which is designed to find new ways to mine and extract minerals more efficiently while reducing environmental impacts and most importantly, further improving safety.

Rio Tinto's fleet of AHS trucks has moved 480 million tonnes of material in the Pilbara, Western Australia.

'In 2012, ore was loaded autonomously into a crusher at our Yandicoogina operations – making it the first autonomous mine in Australia,' explains Andrew Harding, Rio Tinto Chief Executive Iron Ore, China, Korea and Japan.

'These new technologies bring value and productivity benefits through decreased variability, improved schedule efficiency and early identification of bottlenecks in the system. The autonomous truck fleet also delivers significant savings in maintenance, tyre life and fuel. It significantly reduces employee exposure to the hazards and risks associated with operating heavy equipment.'

[riotinto.com](http://riotinto.com)



The SMART Farm Command Centre. Image courtesy of UNE.

## SMART FARM: THE FUTURE OF FARMING

The University of New England (UNE) has transformed 'Kirby-Newholme', a 2,900-hectare commercial farm in northern NSW into a SMART Farm (Sustainable Manageable Accessible Rural Technologies Farm).

SMART Farm serves as a test site for new technologies and provides access to the latest data streaming from a range of field, animal and machinery sensors. These technologies aim to revolutionise the way farms are managed.

**THE FARM INCLUDES AN INNOVATION CENTRE, LOCATED IN THE MIDDLE OF THE FARM, WHICH SERVES AS A RESEARCH, EDUCATION AND OUTREACH FACILITY FOR THE SMART FARM ITSELF AND GLOBAL ADVANCES IN AGRICULTURE RESEARCH AND DEVELOPMENT.**

Hosting UNE's Precision Agriculture Research Group, the innovation centre includes a farm command centre, and visitor and teaching spaces with a seminar room and offices.

UNE is collaborating with numerous Cooperative Research Centres (CRCs), small-to-medium enterprises as well as national and state departments of agriculture and environment on projects that showcase the benefits of broadband connectivity for agriculture and rural communities. These projects include developing and deploying remote and terrestrial wireless sensor networks for monitoring machinery, plants, soil and animals.

One hundred wireless monitoring stations each sample soil moisture, soil temperature, soil electrical conductivity, and air temperature every five minutes. A smaller number of other sensors, such as weather stations and light sensors, are also deployed across the farm.

[une.edu.au](http://une.edu.au)



## DRONES PUT TO WORK ON FARMS

A new centre launched by industry and UNSW will bring the power of networking, artificial intelligence – and even sensor-laden drones – to the farm gate.

Known as Innovation Central Sydney, it is a partnership between UNSW and Cisco, along with Data61, the National Farmers' Federation, the NSW Farmers' Association, the NSW Department of Primary Industries and ATP Innovations.

Innovation Central will focus on developing new uses for IoT technologies in agriculture as well as smart cities: from monitoring crop nutrition, soils, weeds and diseases using imaging sensors on drones, to bus shelters that stream data to smartphones and provide transport updates on their exterior.

The centre will be based at Australian Technology Park in Sydney, with a new innovation hub based at UNSW, the latter focusing on cyber security – ensuring that autonomous IoT devices are not hacked.

Scott Hansen, Director-General of the NSW Department of Primary Industries, says agriculture may be an ancient industry, but it had always adapted and innovated.

'Productivity used to be based on how many cows, how many crops you had – we then modernised and moved to how many staff you could employ,' he says.

'Since industrialisation, machines [have been] replacing that manual labour. We're at the next wave of utilising technology to better use the natural resource assets to control the machines in a more efficient and effective manner.'

[unsw.edu.au](http://unsw.edu.au)

# MEDICAL TECHNOLOGIES

A major contributor to international advances in medical technologies (medtech), Australia offers investment opportunities ranging from discovery research to product development partnership.

Australia has:

- › outstanding medical science
- › strong intellectual property protection
- › a robust regulatory regime
- › fast-tracked clinical trials
- › expertise in successfully commercialising medical technologies.

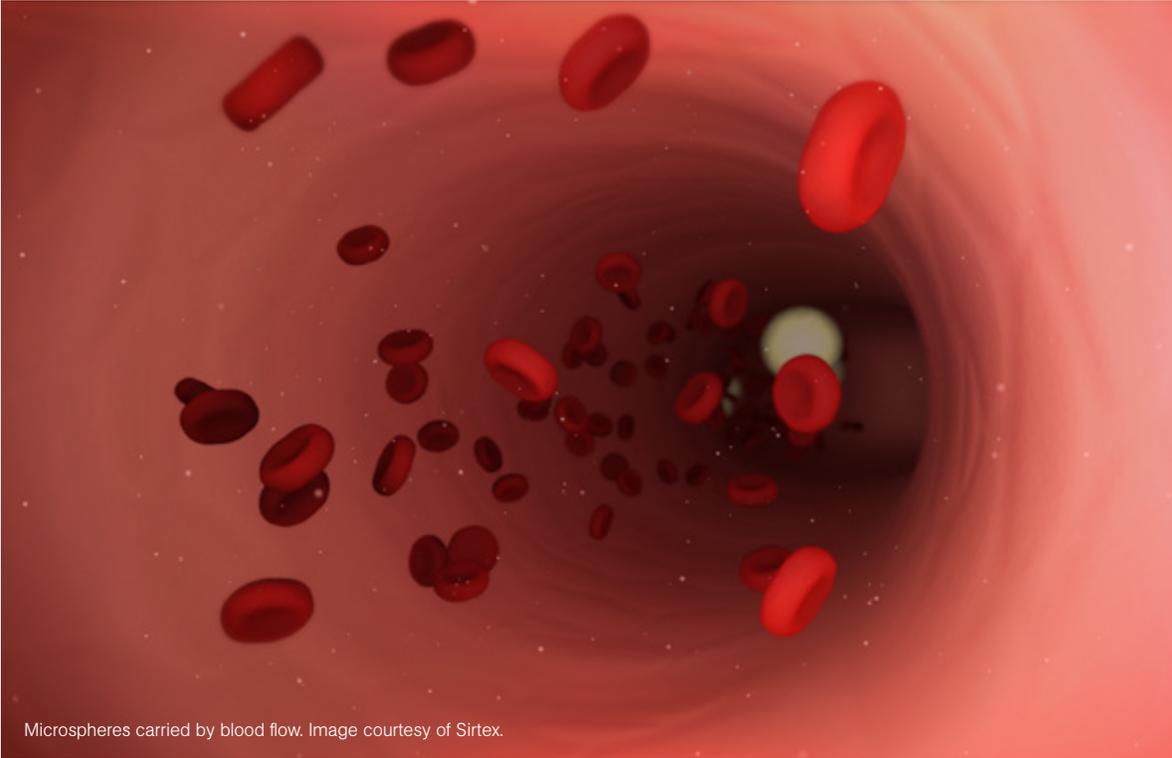
Australia has world-class researchers developing medical technologies, devices and pharmaceutical goods. Australia's track record includes discovering and commercialising the vaccine now known as Gardasil, in conjunction with Merck (also known as MSD), which led to the incidence of HPV-associated disease dropping by around 75 per cent around the world. Over the next 30 years, a corresponding reduction in cervical cancer incidence is expected.<sup>26</sup>

Australia's medtech industry encompasses medical devices, diagnostics, medical imaging equipment and digital health applications. There are over 500 companies with nearly 87,000 products listed on the Australian Register of Therapeutic Goods generating revenues of more than A\$10 billion annually.<sup>27</sup> The country is ranked eighth in the world for technological specialisation and 13th for medical device patents.<sup>28</sup>

In biotechnology, Australia ranks fourth in the 2015 *Scientific American* Worldview Scorecard.<sup>29</sup> The ranking is based on each nation's aggregate performance in biotech productivity, IP protection, enterprise support, intensity, education/workforce, foundations, and policy and stability.

## AUSTRALIA'S MEDTECH INVENTIONS<sup>30</sup>

- › Ultrasound scanner
- › Cochlear implant (bionic ear)
- › Artificial heart valve
- › Continuous positive airway pressure (CPAP) machine (for treating sleep apnoea)
- › Multifocal contact lens
- › Extended-wear contact lenses
- › Spray-on skin for burns victims
- › Transdermally delivered insulin
- › 3D-printed scaffolds (used to grow cartilage from stem cells)
- › Handheld bio-pen



Microspheres carried by blood flow. Image courtesy of Sirtex.

## **SIRTEX MEDICAL TREATS CANCERS WITH SMALL-PARTICLE TECHNOLOGY**

Sirtex Medical Limited is an ASX-listed company that develops and delivers effective oncology treatments using small-particle technology. It manufactures in the US, Germany and Singapore.

Its main product is a targeted radioactive treatment for liver cancer called SIR-Spheres® Y-90 resin microspheres. Treatment goals aim to increase the time to progression, extend overall patient survival, and potentially downsize or downstage tumours for liver resection, ablation or transplantation.

To date, Sirtex has supplied approximately 61,000 doses of SIR-Spheres Y-90 resin microspheres to treat liver cancer patients in over 950 medical centres in more than 40 countries. SIR-Spheres Y-90 resin microspheres are approved for supply in key markets such as Australia, the European Union and US.

**[sirtex.com](http://sirtex.com)**

## A strong culture of collaboration

The medtech industry has a large number of small and medium-sized enterprises, with global multinational companies making up about 20 per cent of the sector.

It is characterised by fast development cycles, fostered by a strong culture of collaboration and cross-disciplinary problem-solving between the academic and corporate sectors.

Australia's diverse manufacturing skills base and world-class infrastructure means it can contribute to entire value chains.

This includes R&D, clinical trials, medical training and simulation, mobile computing platforms, clinical analysis of imaging and patient data, and telehealth solutions.

Investors will find quality universities, public and private research institutions and infrastructure and world-leading companies such as CSL (see page 43), ResMed and Cochlear (see page 11).

Areas where Australia has particular strengths in R&D include human therapeutics, tropical medicine, medical devices and digital health.

## A\$20 billion for medical research

The Australian Government has set up a Medical Research Future Fund (MRFF), which is expected to reach A\$20 billion by 2019–20.

Through the MRFF, the Australian Government will provide the resources and the opportunities for our best and brightest medical scientists to look for and find more ways to 'beat' diseases that profoundly affect the lives of Australians every day.

It is expected the MRFF will eventually provide around A\$1 billion a year in additional funding for health and medical research.

## A LEADER IN CLINICAL RESEARCH

Australia is one of the world's leading destinations to undertake clinical research.

About 1,000 new clinical trials for medicines and medical devices commence in Australia each year, representing an estimated A\$1 billion in foreign direct investment to Australia.<sup>31</sup>

Investors can benefit from:

- high-quality clinical facilities with state-of-the-art equipment for testing and analysis
- a fast, pragmatic regulatory pathway and reciprocal arrangements with regulatory authorities such as the US Food and Drug Administration and the European Medicines Agency
- strong intellectual property protection
- generous R&D tax incentives
- ethnically diverse patient cohorts, as a result of Australia's multicultural population
- well-characterised tissue banks, for use in precursor studies ahead of full clinical trials
- counter-seasonality, providing opportunities to trial medications for illnesses occurring the following season in the northern hemisphere.

Clinical trials of medicines and medical devices are subject to Australian Government regulation, administered by the Therapeutic Goods Administration.



Cogstate iPad Card Task. Image courtesy of Cogstate.

## COGSTATE GUIDES CLINICAL DECISIONS

Cogstate is a cognitive science company delivering software and services to improve the measurement of cognition in clinical trials, academic research, healthcare and brain injury.

The ASX-listed company is based in Melbourne and commercialises rapid, reliable and highly sensitive computerised cognition tests that detect and monitor cognitive change in areas such as Alzheimer's disease, schizophrenia, depression, sports injuries, as well as cognitive change related to drug treatment.

Cogstate clients include leading biopharmaceutical companies, military and elite sporting organisations, physicians and patients, academic institutions and public-private partnerships. Cogstate solutions are used in clinical trials in 47 countries, and are available in more than 65 languages.

**[cogstate.com](http://cogstate.com)**



Lab 22. Image courtesy of CSIRO.



## **ANATOMICS AND CSIRO: WORLD LEADERS IN TITANIUM-ADDITIVE 3D BIOMATERIAL MANUFACTURING**

Founded in 1996, Anatomic is an Australian-owned medical device company that pioneered computed topography (CT) scan-derived surgical implant technology.

In collaboration with technology from CSIRO and RMIT University, Anatomic has also developed titanium implants. In 2014, the company made world headlines after custom-printing a titanium heel implant that allowed a cancer patient to keep his leg.

In 2015, Anatomic designed and manufactured a 3D-printed titanium sternum and rib implant, which was printed at Lab 22, CSIRO's metal additive manufacturing (3D printing) facility. A patient in Spain suffering from cancer in the chest received the 3D-printed titanium sternum and rib implant.

### **ANATOMICS USED HIGH-RESOLUTION CT DATA TO CREATE A 3D RECONSTRUCTION OF THE PATIENT'S CHEST WALL AND TUMOUR, ALLOWING THE SURGEONS TO PLAN AND ACCURATELY DEFINE RESECTION MARGINS.**

Using Lab 22's Arcam electron beam metal printer, Anatomic manufactured the implant out of a surgical-grade titanium alloy. The printer works by directing an electron beam at a bed of titanium powder in order to melt it. This process is then repeated, building the product up layer-by-layer until the implant is completed.

CSIRO's Lab 22 offers companies:

- › metallic 3D printing (e.g. titanium, aluminium)
- › advanced machining for improved profitability
- › surface engineering for enhanced performance
- › laser-assisted additive deposition
- › laser heat treatments.

**[anatomics.com](http://anatomics.com)**

## COOK MEDICAL PIONEERS MEDTECH MANUFACTURING

Cook Medical is one of the world's largest privately owned medtech manufacturers. It is the pioneer of medical devices used to perform minimally invasive procedures – predominantly for aortic intervention and reproductive health.

The company manufactures advanced endovascular grafts for the treatment of aortic aneurysms and also manufactures endovascular grafts that are custom-made for individual patients.

The company assists reproductive health with EchoTip® needles, which incorporate technology that makes the needle tip clearly visible under ultrasound during the IVF process.

Cook Medical Australia's products use technology pioneered and patented locally. The company provides its products to 135 countries around the world and approximately 92.5 per cent of its Australian-manufactured goods are exported overseas.

Cook Medical's locations throughout the Asia-Pacific region operate in keeping with local culture and provide regional support and interaction. To enhance this, the company established an Asia-Pacific New Technologies team to identify opportunities for medical device innovation across the region.

[cookmedical.com](http://cookmedical.com)

## AUSTRALIAN PAIN DRUG INNOVATION COMPANY SPINFEX SOLD TO NOVARTIS

In 2015, Switzerland-based Novartis announced it had entered into an agreement to acquire Spinifex Pharmaceuticals, a US- and Australian-based company developing a peripheral approach to treat neuropathic pain.

The technology around which Spinifex is founded was developed by Professor Maree Smith and Dr Bruce Wyse at the University of Queensland, where they identified AT<sub>2</sub> receptor antagonists as inhibitors of neuropathic pain in preclinical models.

Recognising the commercial potential of an improved treatment for chronic pain, the technology was spun-out of the University of Queensland into Spinifex Pharmaceuticals Pty Ltd in 2005.

In 2014, Spinifex relocated its substantial operations to the US following positive results from the company's Phase 2 trial in Post Herpetic Neuralgia (PHN) – a painful condition that can develop following herpes zoster or 'shingles'.

'Neuropathic pain is a chronic and debilitating condition with high unmet need,' says David Epstein, Head of Novartis Pharmaceuticals. 'EMA401 [the Spinifex technology] could provide a novel, differentiated treatment approach to provide relief for patients and healthcare providers worldwide.'

Spinifex was acquired by Novartis in mid-2015 for an upfront payment of US\$200 million, with significant further milestone payments.

[novartis.com](http://novartis.com)

CSL Biotech Manufacturing Facility, Broadmeadows, Victoria. Image courtesy of CSL.



## **CSL, AUSTRALIA'S LARGEST BIOPHARMACEUTICAL COMPANY**

CSL is Australia's largest and best-known biotechnology company. Valued at over A\$45 billion, the biotherapeutics company employs more than 16,000 people in 30 countries.

CSL's success is based on developing a global business with a sustainable competitive advantage, investment in R&D, and the development of a culture of innovation.

**IN 1986, CSL'S ANNUAL INVESTMENT IN R&D WAS US\$3 MILLION, IN 2015 IT WAS US\$462.7 MILLION.**

CSL is Australia's largest private-sector investor in medical research with expertise in protein-based therapies and vaccines.

R&D highlights of the last 30 years for CSL include its collaboration with the University of Queensland on the HPV vaccine, Gardasil (launched globally in 2006 and making a significant contribution to public health), the development of world-leading intravenous and subcutaneous immunoglobulin products, the development of best-in-class novel recombinant coagulation factors (which will be launched globally in 2016) and the creation of a high-quality R&D pipeline including novel recombinant monoclonal antibodies and proteins to treat serious diseases.

**[csl.com.au](http://csl.com.au)**

# HOW AUSTRADE CAN HELP

The Australian Trade and Investment Commission – Austrade – contributes to Australia’s economic prosperity by helping Australian businesses, education institutions, tourism operators, governments and citizens as they:

- › develop international markets
- › win productive foreign direct investment
- › promote international education
- › strengthen Australia’s tourism industry
- › seek consular and passport services.

## What we provide

Austrade generates market information and insight, promoting Australian capabilities, developing policy, making connections through an extensive global network of contacts, leveraging the badge of government offshore and providing quality advice and services.

Specifically, we:

- › help Australian companies to grow their business in international markets, including through administration of the Export Market Development Grants (EMDG) scheme and the TradeStart program
- › provide coordinated government assistance to attract and facilitate productive foreign direct investment into Australia
- › promote the Australian education sector in international markets and assist Australian education providers with market information
- › provide advice to the Australian Government on its trade, tourism and investment policy agenda
- › develop policy, manage programs and provide research to strengthen Australia’s tourism industry and to grow Australia’s tourism market share
- › deliver Australian consular, passport and other government services in designated overseas locations
- › manage the Building Brand Australia program to enhance awareness of contemporary Australian skills and capability and enrich Australia’s global reputation.

[austrade.gov.au](http://austrade.gov.au)  
[info@austrade.gov.au](mailto:info@austrade.gov.au)

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