



Australian Government  
Australian Trade and Investment Commission



# Investment opportunities in digital technologies in Australia



## Cover

A 2.5mm-wide sensor, about the size of a match head, manually attached to a Native Amazonian bee (*Melipona fasciculata*). The Global Initiative for Honey bee Health (GIHH) is an Australian-led collaboration between the Commonwealth Scientific and Industrial Research Organisation (CSIRO), international researchers, farmers and beekeepers, and industry partners including Intel, Japan's Hitachi Chemicals, and Brazilian mining company, Vale.

Data collected from micro-sensors will help GIHH improve honey bee health and keep them pollinating food crops into the future. To date, GIHH has tagged over 100,000 bees. In the next 12 months, that number should exceed one million. Image credit Dr Georgio Venturieri, EMBRAPA/CSIRO.

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13-14-721. October 2016.

# Australia. Smart. Connected.

Between 2014 and 2020, the contribution of digital technologies to Australia's economy is forecast to grow 75 per cent to A\$139 billion.<sup>1</sup>

Almost all of this growth (97 per cent) is predicted to take place outside the information, communications and technology (ICT) sector.

The Australian economy is in transition – digital technologies are being applied across the economy in sectors not traditionally thought of as heavy technology users, and in new industries.

Driven by efficiency gains and a diverse range of applications, Australia's digital transition is reshaping sectors such as financial services, agribusiness, life sciences and resources and energy.





**12TH LARGEST ECONOMY  
IN THE WORLD  
US\$1.3 TRILLION**

IMF World Economic Outlook, October 2015  
Nominal 2015E



**TOP TRADING PARTNERS:  
CHINA, JAPAN, US, SOUTH  
KOREA AND SINGAPORE**



**TIME ZONE BRIDGE  
FROM THE US  
TO ASIA AND EUROPE**



**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 consecutive growth, globally significant industries and a track record of excellence in research and development (R&D), Australia offers growth opportunities for foreign investment in digital technologies.

Australia's economic transition (following the boom in commodity prices and mining investment) is driving opportunities in digital technologies across almost every sector of the economy.

Australia's history of undertaking leading-edge scientific research, as well as its thin domestic capital markets, have created unique commercialisation opportunities for foreign companies to invest in and leverage Australia's innovative thinking and R&D strengths in digital technologies.

## An economy of scale

The Australian economy is the world's 12th largest, despite the fact it is home to just 0.3 per cent of the world's population.<sup>2</sup>

Australia's economic growth has outperformed other major advanced economies and its medium- and long-term growth outlook is supported by strong ties to the rapidly growing Asian region.

Australia's services sector (excluding construction) accounts for more than 70 per cent of real gross value added (GVA).<sup>3</sup> Its sophisticated financial services industry is the largest contributor to the sector, generating 9.3 per cent of the country's total GVA.

Through its network of free trade agreements, existing business ties and strong cultural links, Australia provides a base for expansion into fast-growing Asian nations. Ten of the country's top 12 export markets are in Asia.<sup>4</sup>

## A CONNECTED NATION

Almost nine in 10 Australian adults actively use the internet and almost all businesses are connected.<sup>5</sup>

Australian consumers are technology-savvy and are willing to adopt and buy new technologies. Online consumers spend an average of 24.2 hours a week on the internet.<sup>6</sup>

In 2014–15, Australians' four most popular online activities were:

- › banking (72 per cent)
- › social networking (72 per cent)
- › purchasing goods or services (61 per cent)
- › entertainment (60 per cent).<sup>7</sup>

In the 12 months to May 2016, Australians spent A\$19.9 billion on online retail.<sup>8</sup> Almost 90 per cent of Australian households use mobile phones to access the internet<sup>9</sup>, making it one of the most mobile-connected countries in the world. Mobile phone subscriptions currently exceed 21 million.<sup>10</sup>

By 2020, the average Australian household will have around 29 internet-connected devices – up from nine devices in 2015 – and will spend A\$3.2 billion on connected devices and services by the end of the decade.<sup>11</sup>

## World-class technology R&D

Australia has world-class scientific and academic institutions, high levels of investment in R&D, modern ICT infrastructure and strong intellectual property (IP) protection.

Australian universities rank among the world's best; the 2016 Academic Ranking of World Universities has six Australian universities in its global top 100.<sup>12</sup>

Across 22 scientific research fields, almost 80 per cent of Australia's major scientific research publications have a relative impact of at least 20 per cent above the global average.<sup>13</sup> Australia's strongest categories of published research include multidisciplinary, engineering, space science, physics and computer science.<sup>14</sup>

Australia is ranked 12th (out of 128 countries) by the International Property Rights Index, ahead of the US and UK. Australia also offers a generous R&D tax incentive.

## Educated labour force

Ranked in the world's top 10 for the talent of its people<sup>15</sup>, Australia's education system, research expertise and excellence in attracting and retaining human capital are among the best in the world.

Almost 40 per cent of Australia's workforce holds a tertiary qualification<sup>16</sup> and the nation is the third most popular destination for international students, most of whom are enrolled in business and technology-related courses.

Almost 30 per cent of Australia's workers were born overseas.<sup>17</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>18</sup>

In 2015, about 629,000 ICT workers were employed in Australia, with 53 per cent in professional services, public administration and financial services.<sup>19</sup> One in five students enrolled in an Australian university is studying a STEM (science, technology, engineering and maths) subject.

### R&D TAX INCENTIVE

Are you eligible for an R&D tax incentive? Companies performing eligible R&D activities can apply for:

**43.5%**



#### REFUNDABLE TAX OFFSET

for eligible entities with an aggregated turnover of less than A\$20 million (unless they are controlled by tax-exempt entities) (for income years from 1 July 2016)

#### NON-REFUNDABLE TAX OFFSET

for all other eligible entities (for income years from 1 July 2016)



**38.5%**

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

### SILICON QUANTUM COMPUTING

In October 2015, a research team from the Australian Research Centre for Quantum Computation and Communication Technology (CQC2T) 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.

CQC2T is headquartered at the University of New South Wales (UNSW). It focuses on demonstrating the fundamental building blocks of a silicon-based solid-state quantum processor and an optical processor.

The Australian Government announced a A\$70 million agreement to establish a consortium to develop a prototype silicon quantum integrated circuit. This investment complements the A\$25 million from UNSW and A\$10 million each from the Commonwealth Bank of Australia (CBA) and Telstra.

[cqc2t.org](http://cqc2t.org)



Established under the National Collaborative Research Infrastructure Strategy, the Australian National Fabrication Facility (ANFF) links eight university-based nodes to provide researchers and industry with access to state-of-the-art fabrication facilities. Image courtesy of University of New South Wales.







## Globally significant industries

Australia is globally successful in five significant and diverse sectors: education, resources and energy, wealth management, tourism and agribusiness. Demand across these sectors is expected to drive trade and investment in Australia and internationally.

### AUSTRALIA'S GLOBALLY SIGNIFICANT INDUSTRIES



#### Foreign students in tertiary education

**3rd largest**

(Source: UNESCO, Institute for Statistics)



#### Fuels and mining

**Top 5**

(Source: WTO statistics database)



#### Wealth management

**7th largest**

(Source: Investment Company Institute, Worldwide Mutual Fund Assets and Flows)



#### Tourism

**11th largest**

(Source: UNWTO Tourism Highlights 2015 Edition)



#### Agricultural products

**Top 14**

(Source: WTO Statistics Database)

## Large and expanding digital economy

Digital technologies are forecast to contribute A\$139 billion to Australia's economy in 2020, up from A\$79 billion in 2014.<sup>20</sup>

Australia's digital economy is expected to expand from 5 per cent to 7 per cent of gross domestic product (GDP).<sup>21</sup>

Australia ranks 16th out of 143 countries for the ability of its businesses and wider communities to use ICT for supporting growth, competitiveness and development.<sup>22</sup>

### GLOBAL THINKING: ATLASSIAN

Australian technology companies have a reputation for 'thinking globally' – developing digital technologies that address worldwide issues.

Founded in Sydney in 2002, enterprise software company Atlassian employs over 1,400 people worldwide.

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

The company currently has more than 51,000 clients including Twitter, NASA, CSIRO, US Department of Defense and BAE Systems. In late 2015, Atlassian listed on the US NASDAQ Stock Market.

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

# CSIRO: Australia's national science agency

CSIRO is one of the world's largest and most diverse research organisations.

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.

IN 2015

**CSIRO**



**RANKED IN THE TOP**



**OF THE  
WORLD'S  
SCIENTIFIC  
INSTITUTIONS  
IN 15 OF 22 FIELDS<sup>23</sup>**

**1%**

## DATA61: CSIRO'S DIGITAL RESEARCH GROUP

In 2016, the Australian Government created Data61, a digital research group within CSIRO.

CSIRO's track record for ICT innovation includes developing WiFi, the world's best-known technology for connecting to the internet. Data61's data-centric R&D program includes analytics, cyber-physical systems, decision sciences, software and computational systems, and engineering and design.

Data61 works with businesses to develop innovative solutions to real challenges. It has more than 90 corporate partners including Boeing, Rio Tinto, Minetec, Catapult Sports, Tip Top and Sydney Water.

[data61.csiro.au](http://data61.csiro.au)



# Investment opportunities: collaborative R&D

As a global hotspot for ICT innovation, Australia provides opportunities for investment in digital technologies that combine advanced R&D in ICT with strong cross-sectoral research capabilities.

Australia's ICT R&D sector:

- › is internationally experienced, with a track record of achieving world-leading outcomes
- › is collaboration-ready, with extensive global links and commercial and academic research partnerships in place
- › has the necessary infrastructure and connectivity for digital discovery
- › operates in a stable and transparent environment, with strong governance, cyber security and IP protection
- › has access to an ideal test market and a diverse, geographically dispersed and technology-ready population.

Australia is an advanced and stable base for exporting technology and services to larger regional and global markets. It has a lower risk profile than other competitive locations in the Asia-Pacific region.

## Presence of global companies

Leading technology companies investing in ICT R&D collaborations in Australia include Boeing, Cisco, GE, IBM, Infosys, Microsoft and SAP.

### THEY CHOSE AUSTRALIA: CISCO

Cisco, the US network and connectivity giant, is investing US\$15 million over five years in an Australian innovation centre.

The Cisco Internet of Everything Innovation Centre has hubs in Perth and Sydney and will be one of eight centres globally. Research focus areas include agriculture, astronomy, resources and smart cities.

Cisco first established an office in Australia in 1994. The company employs around 1,130 people across its Australian operations and supplies and supports generic inter-networking products, technologies, system support and related financing activities.

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

Institution	Applications	Industry partners
Australian Centre for Field Robotics, based at the University of Sydney	Autonomous systems for agriculture, intelligent transport, marine, mining, defence, bio-systems and social robotics	BAE Systems, Brambles, Komatsu, Qantas, Renault, Rio Tinto, Toyota
Australian Research Council (ARC) Centre of Excellence (CoE) for Aerospace Automation, based at Queensland University of Technology	Remote sensing, cooperative systems, enabling technologies, robust autonomy for agriculture, environment and emergency/rescue operations	ARS Electronica, Boeing, Ergon Energy, Northrop Grumman, rpde, Telecom Bretagne, Thales
ARC CoE for Quantum Computation and Communication Technology, based at UNSW	Quantum physics, communications security, computing capability	IBM, Lockheed Martin, Commonwealth Bank, Telstra, QuintessenceLabs
ARC CoE for Mathematical and Statistical Frontiers, based at the University of Melbourne	Mathematical and statistical models for analysing big data sets	AT&T Labs Research
Capital Markets Cooperative Research Centre	Technology solutions for capital and health markets	Health insurers, insurance companies, regulators, stock exchanges, technology companies, universities
Data to Decisions Cooperative Research Centre	Analytics, decision support, big data, security analytics	BAE Systems, Boston Consulting Group, Genex, PwC, SAS, Unisys



# Investment opportunities: data centres

From 2011–16, technological developments, coupled with exponential growth in internet use and connectivity, have driven double-digit annual growth (17.2 per cent) in Australia's data storage services industry. This trend is expected to continue for the next five years.<sup>24</sup>

Increased internet use by retail clients, the rapid uptake of audio and video content streaming services and the push towards cloud computing have created high demand for data storage.

Business outsourcing is expected to continue driving industry growth. Companies and government departments concerned about energy and property costs are outsourcing their IT operations to specialised industry players. From 2015–20, internet traffic in the Asia-Pacific region will increase 2.7 fold.

**By 2020, the Asia-Pacific region will have approximately 11.7 billion connected devices. Of that, Australia will have 230 million – 9.3 per person.<sup>25</sup>**

## Cloud-computing ready

In 2016, Australia ranked sixth ahead of Singapore, the UK and South Korea in BSA's Global Cloud Computing Scorecard, which compares the cloud-computing readiness of 24 countries that account for 80 per cent of the world's IT markets.<sup>26</sup>

This ranking reflects Australia's commitment to developing cloud-computing laws, regulations and standards that enable international cooperation, free trade and interoperability. The Asia Cloud Computing Association's 2016 Cloud Readiness Index places Hong Kong, Singapore, New Zealand and Australia above markets such as Germany, the UK and US.<sup>27</sup>

### THEY CHOSE AUSTRALIA: EQUINIX

Equinix operates four data centres in Sydney and one in Melbourne, providing interconnected facilities that give clients access to a range of network and cloud service providers worldwide.

The US company recently completed a A\$121 million investment to construct a fourth data centre in Sydney, bringing its total Sydney footprint to over 24,200 square metres.

In Sydney, Equinix runs a business hub for more than 600 companies and offers direct access to over 225 cloud service providers, including Amazon Web Services, IBM, Microsoft and Oracle. Financial service providers, such as Chi-X and Bloomberg, as well as Sydney's growing electronic payments industry, use Equinix's facilities.

Equinix's Sydney data centres are globally connected with direct links to the trans-Pacific Southern Cross submarine cable, PIPE Pacific Cable network from Australia to Guam, and the new Hawaiki submarine cable system. These direct, high-capacity links provide Equinix's clients with increased speed and performance.

Equinix's investments are helping to meet a growing demand for premium data consumption and cloud services, as well as for greater connectivity for businesses.

Founded in 1998, Equinix Inc. operates 146 data centres across 40 markets on five continents.

**equinix.com**



## Cyber security

Australia's political and economic stability, robust legal and IP protections, and skilled workforce, position the country as an ideal environment for advanced research in cyber security.

The presence of IP-sensitive sectors such as financial services and banking, insurance, defence and advanced manufacturing is driving cyber security investment and research. Companies such as Cisco, IBM and NEC have established R&D centres in Australia with research components in advanced cyber security.

The Australian Government is also investing in cyber security. Its industry-led Cyber Security Growth Centre will contribute to the nation's network of cyber security innovation.

The Cyber Security 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, co-located with the Oceania Cyber Security Centre, Oxford's Global Cyber Security Capacity Centre and Data61.

### THEY CHOSE AUSTRALIA: OXFORD UNIVERSITY

Oxford University's Global Cyber Security Capacity Centre (GCSCC) is establishing its first ever international office in Melbourne. Oxford's GCSCC audits national cyber security risks and capabilities to help countries plan investments and strategies that improve their digital security.

The GCSCC office will be co-located with a new Oceania Cyber Security Centre, which is supported by the Victorian Government. It will bring together eight Victorian universities, the Melbourne-based Defence Science Institute and private sector partners.<sup>28</sup>

[oxfordmartin.ox.ac.uk](https://oxfordmartin.ox.ac.uk)

# Investment opportunities: fintech

Building on the country's sophisticated financial services sector and ties to Asia, Australia has one of the world's most dynamic financial technology (fintech) markets.

With assets of more than A\$7 trillion<sup>29</sup> – over four times the country's nominal GDP – Australia's financial sector offers access to one of the Asia-Pacific region's largest pools of bank assets, as well as the world's third largest pension asset pool.<sup>30</sup>

- › Australia's big four banks are among the top 50 globally in terms of asset size.<sup>31</sup>
- › Australia's A\$2 trillion pension assets are expected to grow to A\$4.5 trillion over the next decade and are a major driver behind the country's globally significant funds management industry.<sup>32</sup>
- › Australia's financial markets are among the largest and most sophisticated in the Asia-Pacific region with total annual turnover exceeding A\$135 trillion<sup>33</sup> (84-times nominal GDP).
- › The country has the third largest liquid stock market in the Asian region and ninth largest in the world<sup>34</sup> and its debt securities market is third largest in the region.<sup>35</sup>
- › Australians are among the world's highest users of contactless payment systems. Digital payments technologies are widely used by vendors servicing all demographics.
- › Revenue from financial technologies is forecast to grow to US\$4.2 billion by 2020, with the greatest opportunities in security, cloud, managed services, artificial technology, biometrics and data storage.<sup>36</sup>

## Subsectors:

insurance, loans, e-commerce, payment systems, quantum computing, security and verification

## Growth areas:

analytics, blockchain, cyber security, mobile banking, open-source compliance systems, policy modelling, real-time transaction analysis, robo-advising, visualisation

## Facilitating market entry and testing

The Australian Treasury and National Science and Innovation Agenda (NISA) encourage early-stage investment from foreign and domestic startups looking to develop ideas in Australia to bring to the global market.

The Australian Government has extended a 20 per cent tax offset for early-stage investments to a total investment value of A\$200,000 (per investor/per year), and capital gains tax exemptions for qualifying investments held for at least 12 months. The newly created Fintech Advisory Group helps companies raise venture capital funding, develop and provide financial products and access more financial data.

The Australian Securities and Investment Commission (ASIC)'s Innovation Hub assists startups developing innovative financial products or services to navigate the regulatory system. Through the hub, eligible businesses can request guidance from ASIC on the licensing process and key regulatory issues. It is designed to help startups understand options and prepare applications for licences or legal waivers.

ASIC has signed agreements with the UK Financial Conduct Authority and the Monetary Authority of Singapore, which give fintech companies entering these markets regulatory guidance and support as they develop internationally.

## NASDAQ USES AUSTRALIAN TECHNOLOGY

In 2010, NASDAQ-OMX acquired SMARTS, Australian market surveillance technology that is used by more than 40 exchanges and regulators and 110 brokers covering over 120 markets worldwide.

The NASDAQ and SMARTS teams are key collaborators with globally recognised research centres in surveillance and compliance, including the Capital Markets Cooperative Research Centre (CMCRC).

[business.nasdaq.com](https://business.nasdaq.com)  
[cmcrc.com](https://cmcrc.com)





## Distributed ledger technologies

Australia's major banks belong to the R3CEV consortium, a partnership of over 50 of the world's leading financial institutions that is designing and delivering advanced distributed ledger (blockchain) technologies for global financial markets. Non-banking institutions from Australia include Macquarie Group, Australian Securities Exchange (ASX) and Telstra.

### THEY CHOSE AUSTRALIA: ONDECK

US company OnDeck, a non-bank small business lender, is collaborating with Australia's largest bank, Commonwealth Bank (CBA), to make it easier for CBA's small business customers to obtain financing.

OnDeck entered the Australian market in 2015 with CBA and MYOB, the online accounting software provider, as its distribution partners.

OnDeck Australia and the CBA received the FinTech Bank Collaboration of the Year award at the inaugural Australian FinTech Awards. Held in July 2016, the awards recognise innovation in Australia's finance industry.

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

## Startup networks

Private sector organisations such as Tyro FinTechHub and Stone & Chalk are supporting domestic and international startups from their headquarters in Sydney. Stone & Chalk partners include American Express, Ernst and Young, IBM, KPMG and Thomson Reuters.

Google-backed, Silicon Valley startup Ripple Labs, which is developing digital ledger technology, was among the first startups to join Stone & Chalk. Chinese startups use Stone & Chalk as a base from which to expand into Western markets, while helping to educate Australia-based startups on launching into China.

Fintech Australia, formed in 2015, is a national industry association with over 70 specialist startup, venture capital fund and accelerator members.

### THEY CHOSE AUSTRALIA: TRURATING

British fintech startup truRating launched in Australia in early 2016. The company's point-of-payment ratings system allows customers to quickly rate a business in terms of experience, service, value, atmosphere or product when making a payment. Australian companies using the technology include retailers and restaurants.

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

## THEY CHOSE AUSTRALIA: BOSCH

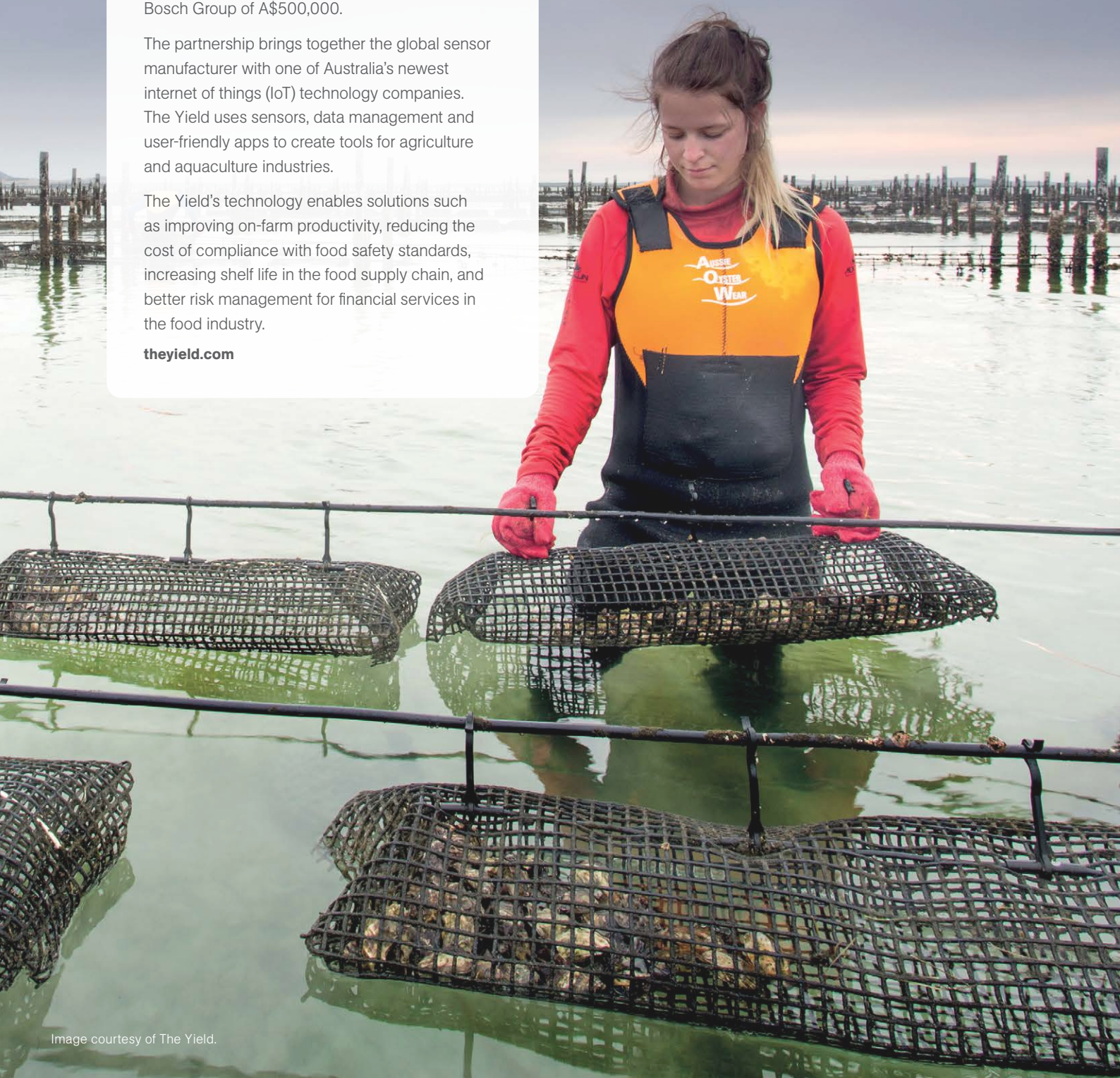
In April 2016, The Yield, an agtech business in Tasmania, Australia, received a further A\$2.5 million investment from Bosch Group, Europe's third largest conglomerate.

This follows the Australian Government's A\$1 million grant to The Yield (Entrepreneurs' Program: Accelerating Commercialisation Grant) in late 2015, and a seed investment by the Bosch Group of A\$500,000.

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.

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





# Investment opportunities: agtech

Unprecedented demand for Australian agricultural products is creating growth opportunities for international ICT companies with expertise in agribusiness and food technologies (agtech).

Global food consumption is expected to grow 75 per cent between 2007 and 2050, with half of the increased demand coming from Asia.<sup>37</sup> Australia's proximity to Asia and reputation for safe, quality agricultural produce and premium processed foods mean the country is well placed to capitalise on this growth.

This sector demands digital technologies to help boost productivity, advance R&D, improve transport and processing infrastructure efficiency, and maximise sustainable use of resources.

Australia offers:

- › close trade ties with Asia – eight of Australia's top 10 export destinations are in the region with more than 50 per cent of agricultural exports going to Asia<sup>38</sup>
- › a diverse and growing agricultural industry – turnover of A\$173.4 billion in 2013–14 with product exports totalling A\$41.6 billion<sup>39</sup>
- › strong demand for technology to improve productivity, expand sales and maintain exports
- › the right mix of geography, climate, regulatory policy and market settings to support edge innovation across the food and beverage supply chain.

Agtech can help Australia's agribusiness and food industries seize increasing export opportunities by delivering economies of scale, advanced production and processing techniques, efficient resource distribution and providing links into regional and global distribution networks.

## Subsectors:

**Meat** – technologies that contribute to labour saving, such as automation.

**Grain** – co-development of new technologies that benefit Australia's reputation as a reliable supplier of high-quality grains. Examples include technologies to reduce water use and precision farming.

**Dairy** – R&D and commercialisation of new transport and logistical processes to improve the movement of temperature-sensitive dairy products – from farm to processor and from processor to consumer.

**Horticulture** – advanced technologies to increase the scale and productivity of fresh fruit and vegetable production operations, including new cultivation and harvesting technologies that increase competitiveness and access to global export opportunities.

**Aquaculture** – innovation that improves efficiency, sustainability and cost-competitiveness while maintaining high-quality product and assurance standards. This industry seeks technologies that can increase the level of automation to minimise the impact of labour costs and enable scalability.

## Growth areas:

analytics, sensors and monitoring, IoT, predictive maintenance

## FUTURE OYSTERS RESEARCH

The Australian Government's Cooperative Research Centre (CRC) program is providing A\$3 million in CRC Project (CRC-P) funding for future oyster industry research, in addition to A\$11 million allocated by industry and research partners.

The Future Oysters CRC-P is led by Australian Seafood Industries, an industry-owned company.

CRC-P research partners are developing disease prediction models for diseases such as Pacific Oyster Mortality Syndrome, and Winter Mortality and QX-virus in Sydney Rock Oysters and Pacific Oysters.

As an industry partner, The Yield (see page 14) will contribute by providing data and a pathway to commercialisation.

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



# Investment opportunities: resources and energy

Australia is a global leader in the resources and energy sector, and provides opportunities for investment in exploration, operations and maintenance technologies.

In the ten years to 2014–15, the country's total resources and energy exports exceeded A\$170 billion, with most exports going to Asian countries such as China, Japan and South Korea.<sup>40</sup> Australia has the world's largest share of iron ore, gold, zinc, nickel and uranium reserves.<sup>41</sup>

Australia offers:

- › an industry of scale, located close to growth markets
- › a critical mass of international firms and industry
- › a demand for technologies to improve productivity and efficiency
- › access to world-class R&D.

Lower commodity prices and a need to continue reducing production costs are placing pressure on this sector. The industry has shifted its focus to digital and technology innovations to remain competitive. Australia is seeking technologies to improve productivity and safety, cut costs, enable plant and equipment efficiencies, and bridge large geographical distances.

## Automation

Significant research in mining automation is being undertaken by the Australian Centre for Field Robotics (ACFR) by the University of Sydney, Australian Research Council Centre for Excellence in Robotics Vision, and CRCMining.

British–Australian multinational Rio Tinto is the owner and operator of the world's largest fleet of autonomous haul trucks. The company works with ACFR on its Mine of the Future program and currently operates 71 autonomous trucks in the remote Pilbara region of Western Australia.

Innovation is also occurring onshore for unconventional gas development with central controlling of coal seam gas (CSG) projects in Brisbane. This is done at a much larger scale than the monitoring of conventional liquefied natural gas (LNG), given the level of CSG drilling.

## Research and development

Significant research is being undertaken jointly by governments, universities and industry.

- › The Western Australian Energy Research Alliance (WA:ERA) is an alliance between CSIRO, Curtin University and the University of Western Australia. WA:ERA focuses on offshore gas technologies, facilities and subsurface technologies, particularly linked to the upstream petroleum industry.
- › The University of Western Australia has developed an anchoring system for floating LNG and pipeline construction.
- › The Gas Industry Social & Environmental Research Alliance (GISERA) invested more than A\$14 million over five years to research the environmental, social and economic impacts of the natural gas industry. Its members are CSIRO, Australia Pacific LNG and QGC.

### Subsectors:

energy, resources, oil and gas, minerals

### Growth areas:

analytics, automation, IoT, robotics, sensors, predictive maintenance, visualisation and modelling

## DATA ANALYTICS

The oil and gas exploration industry is investing in digitisation and big data analysis to improve efficiency and reduce costs associated with the volumes of data required in seismic surveying for exploration and appraisal.

- › GE has established a digital training and monitoring centre in Perth, employing 350 people in digital technology and 3D visualisation.
- › Woodside has established FutureLab, a research network focusing on ocean engineering, developing an LNG 'plant of the future', and applying enterprise artificial intelligence and analytics.
- › Santos has developed (in partnership with IBM) a scalable, integrated, end-to-end predictive analytics system that provides real time operational monitoring across multiple assets, combined with decision theory for automatic notification, which can be scaled to thousands of assets.
- › QGC works with GE to provide a combination of advanced sensors, predictive analytics on real-time and historical data and expertise from diagnostic engineers to assure up to 99.9 per cent availability of equipment.

CAVE2™ facility at Monash University. Photography: Paul Jones, Coretext. Image courtesy of Monash University. Data and visualisation from the Electronic Visualisation Laboratory at the University of Illinois at Chicago (UIC) and the UIC Department of Psychiatry.







# Investment opportunities: digital health

The health-related digital technologies market for Australian consumers is vigorous. Many vendors provide analytics-as-a-service using vital signs data collected from various apps and devices, and offer guidance on wellness, health management, fitness and diet.

Australia is a pioneer in developing sensor-based health technologies, including sensors for home healthcare, such as those used in Swinburne University of Technology's Holly Project, which has attracted investment from Korean tech giant Samsung.

Australia's telehealth market is moving toward services-based business models, with video telemedicine services and the mobile health app sub-segments expected to have the fastest growth (CAGR at 12.9 per cent and 11.7 per cent respectively) from 2015 to 2020.<sup>42</sup>

## **Subsectors:**

aged care, telehealth, eHealth (information management and health informatics), mobile health, genomics, imaging

## **Growth areas:**

analytics, IoT, sensors, wearables, decision support, predictive maintenance

## **ALCIDION PARTNERS ON HEART DATA STUDY**

Adelaide health informatics company Alcidion has developed new heart-data technology in partnership with the National Echocardiography Database of Australia (NEDA).<sup>43</sup>

The technology extracts, normalises and amalgamates data from echocardiography studies performed around Australia into a single, centralised cloud-hosted database server. The NEDA study will be the largest study of heart function in the world.

In the past decade, Alcidion has invested A\$15 million into research to develop clinical decision support systems. In 2014, FUJIFILM Medical Systems, part of the FUJIFILM group of companies, partnered with Alcidion to develop an intelligent cardiovascular information system that delivers advanced decision support features to cardiovascular clinicians.

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

# Investment opportunities:

## Transport and logistics

Australia's mining, agriculture and transport industries require intelligent transport systems to overcome issues related to high-cost, labour intensiveness and geographical spread.

The transport and logistics sector is the backbone of Australian industry, contributing more than 10 per cent of GDP. This sector is technology-ready and actively collaborating to innovate operations and infrastructure across road, rail, port and air.

### Subsectors:

spatial mapping, asset monitoring, predictive maintenance

### Growth areas:

analytics, IoT, robotics, autonomous vehicles

### DATA61 TRANSPORT AND LOGISTICS LIVING LAB

The Transport and Logistics Living Lab seeks to increase the productivity, efficiency and safety of Australia's transport and logistics industry by fostering collaborative innovation.

The lab is coordinated by CSIRO's digital research agency Data61 (see page 8). It provides a platform for industry, research and government to investigate real world problems and demonstrate transport and logistics technology.

Led by industry members, this national lab has more than 50 participants including global companies and research organisations such as the Fraunhofer Society, a German research institution.

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

## Government

In 2014–15, Australian Government ICT spending was A\$5.6 billion. IDC Australia forecasts spending to exceed A\$6.2 billion by 2018.<sup>44</sup>

Australia was ranked 7th globally for eGovernment in 2015, behind Singapore, US, Denmark, UK, Korea and Japan. In the areas of e-participation and open government, Australia ranked in first place in Tokyo's Waseda University 2015 eGovernment rankings.<sup>45</sup>

The Australian Government encourages innovation in government procurement processes, such as using technology to improve services through the Digital Transformation Office ([dto.gov.au](http://dto.gov.au)). These processes are designed to make government services more accessible to startups and small and medium-sized businesses.

### Subsectors:

information management

### Growth areas:

cloud, platform technologies, analytics, visualisation

**The Australian Government encourages innovation in government procurement processes.**

## Education

Australian entrepreneurs are at the forefront of fast growing markets for education content and delivery, particularly the technology behind massive open online course (MOOC) platforms.

Australia's relative maturity and growth in the education technology (edutech) sector has been driven by market characteristics including Australia's geographically dispersed population, lack of language barriers, high-quality communications infrastructure, government support and a culture of learning. The country's edutech market is estimated to be worth A\$5.9 billion, with an annual growth rate of 14.4 per cent between 2009 and 2014.<sup>46</sup>

### Subsectors:

MOOC platforms, mobile learning

### Growth areas:

simulation, training, visualisation

### OPENLEARNING

OpenLearning is an Australian edutech company offering a social online learning platform to deliver MOOCs. Focusing on peer-based learning rather than content delivery, OpenLearning offers free public courses and has an enterprise model for businesses and private course providers that want to restrict participation.

Launched in 2012, OpenLearning's first clients included UNSW and Taylor's University, Malaysia. In June 2015, the Australian Government commissioned its first-ever MOOC from OpenLearning. The company was recently appointed the official MOOC of the Malaysian Ministry of Higher Education for Public Institutions.

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

## Tourism

Australia's well-developed tourism industry is receptive to investment in digital technologies, which is reflected in its adoption of innovative sales and marketing tools.

To ensure Australia's tourism industry stays globally competitive, Tourism Australia is collaborating with travel providers on data-sharing partnerships to improve the industry's analytics capabilities.<sup>47</sup>

### Subsectors:

marketing, events, e-commerce

### Growth areas:

cloud, platform technologies, analytics

### HOTELSCOMBINED.COM

Metasearch engine HotelsCombined.com was founded in Sydney in 2005. The site attracts more than 17 million visitors a month who use the service to compare hotel prices and make reservations. The site is available in over 220 countries and more than 40 languages.

In 2014, HotelsCombined.com was named the World's Leading Hotel Price Comparison Site for the second consecutive year at the World Travel Awards.

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



## Government support

The Australian Government makes a significant annual investment in science, research and innovation – A\$10.1 billion in 2015–16.<sup>48</sup> Initiatives include:

- › **Providing tax breaks for early-stage investors in innovative startups.** Investors will receive a 20 per cent non-refundable tax offset based on the amount of their investment, as well as a capital gains tax exemption.
- › **Enabling early-stage venture capital partnerships.** To encourage a broader range of investment activities, the Australian Government has increased the maximum fund size for new and existing early-stage venture capital limited partnerships from A\$100 million to A\$200 million.<sup>49</sup> Investors can also access a 10 per cent non-refundable tax offset on capital invested during the year.
- › **Fostering greater collaboration between universities and businesses.** The Australian Government has refocused a greater proportion of research-grant funding toward collaboration. To fast-track decisions on collaborative research grants it has opened up Australian Research Council Linkage Projects to continuous applications, and opened a new application round for the Cooperative Research Centre program.
- › **Investing in research infrastructure.** The Australian Government has committed A\$2.3 billion over ten years to support research infrastructure, including Australia's Synchrotron and the international Square Kilometre Array radio telescope project, as well as the National Collaborative Research Infrastructure Strategy.<sup>50</sup>
- › **Investing in the future of cyber security.** The global cyber security market is currently worth US\$71 billion and is growing at around 8 per cent a year.<sup>51</sup> The Australian Government is establishing a Cyber Security Growth Centre to create jobs and business opportunities, and boost the Government's cyber security capabilities.
- › **Investing in talent and skills.** The Australian Government encourages all Australians to embrace the digital age. It is funding a range of initiatives to help ensure future generations of students have the skills needed for the workforce of the future, and encouraging greater participation in STEM subjects.
- › **Streamlining access to public data and services.** The Australian Government is making all non-sensitive data from its public-facing agencies available via data.gov.au. The Digital Transformation Office is a standalone government agency leading the transformation of public services to improve user experience.

For more information visit [innovation.gov.au](http://innovation.gov.au).

## Australia Research Council grants

The Australian Research Council (ARC) nurtures the creative abilities and skills of Australia's most promising researchers through a national competitive grants program.

The program comprises two funding schemes – Discover and Linkage – through which the ARC funds complementary schemes to support researchers at different stages of their careers, build Australia's research capability, expand and enhance research networks and collaborations, and develop centres of research excellence.

Visit [arc.gov.au/grants](http://arc.gov.au/grants) to find out more.

## Cooperative Research Centres

The Australian Government's CRC program supports industry-driven research partnerships between publicly funded researchers, business and community.

In 2015-16 there were 33 active CRCs operating across four categories: agriculture, forestry and fishing; manufacturing; mining; and services. The CRC program has two streams, CRCs and CRC Projects (CRC-Ps). Eleven CRC-Ps with a combined investment value of A\$22.6 million commenced in July 2016.

Visit [crca.asn.au](http://crca.asn.au) to find out more.

## Global Innovation Linkages program

The Australian Government's Global Innovation Linkages program will provide A\$18 million over five years to help businesses collaborate to develop high-quality products, services or processes that respond to strategically important industry challenges for Australia.

Visit [business.gov.au](http://business.gov.au) to find out more.



## DATA TO DECISIONS CRC

Established with a A\$25 million Australian Government grant in 2014, Data to Decisions CRC (D2D CRC) brings researchers and industry together to improve the nation's capabilities around big data analytics, management, policy, research, security and storage.

Based in South Australia, D2D CRC's vision is to be a leading provider of big data capability, resulting in a safer and more secure nation and a sustainable big data workforce. Industry participants include BAE Systems, Boston Consulting Group, SAS and Unisys.

[d2dcrc.com.au](http://d2dcrc.com.au)

## Pathways for investment

Investors have a choice of models of engagement, including:

- › establishing an Australian subsidiary to supply local industries of global significance
- › investing in new digital technology infrastructure such as new data centres and contact centres
- › creating global or regional innovation centres of excellence by investing in collaborative partnerships with universities, IT centres of excellence or cooperative research centres
- › establishing joint ventures or strategic alliances with Australian companies to develop, upscale or commercialise niche Australian technologies to launch in global markets
- › investing in digital technology companies listed on the ASX.



# How Austrade can help

The Australian Trade and Investment Commission – Austrade – is the Australian Government agency that promotes trade, investment and education, and develops tourism policy and research.

Working in partnership with Australian state and territory governments, Austrade provides international investors with the information needed to establish or expand a business in Australia. Services for international investors include:

- › initial coordination of investment enquiries and assistance
- › information on the Australian business and regulatory environment
- › market intelligence and investment opportunities
- › identification of suitable investment locations and partners in Australia
- › advice on Australian government programs and approval processes.

Our services for international companies are free, comprehensive and confidential.

[austrade.gov.au/invest](http://austrade.gov.au/invest)

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





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