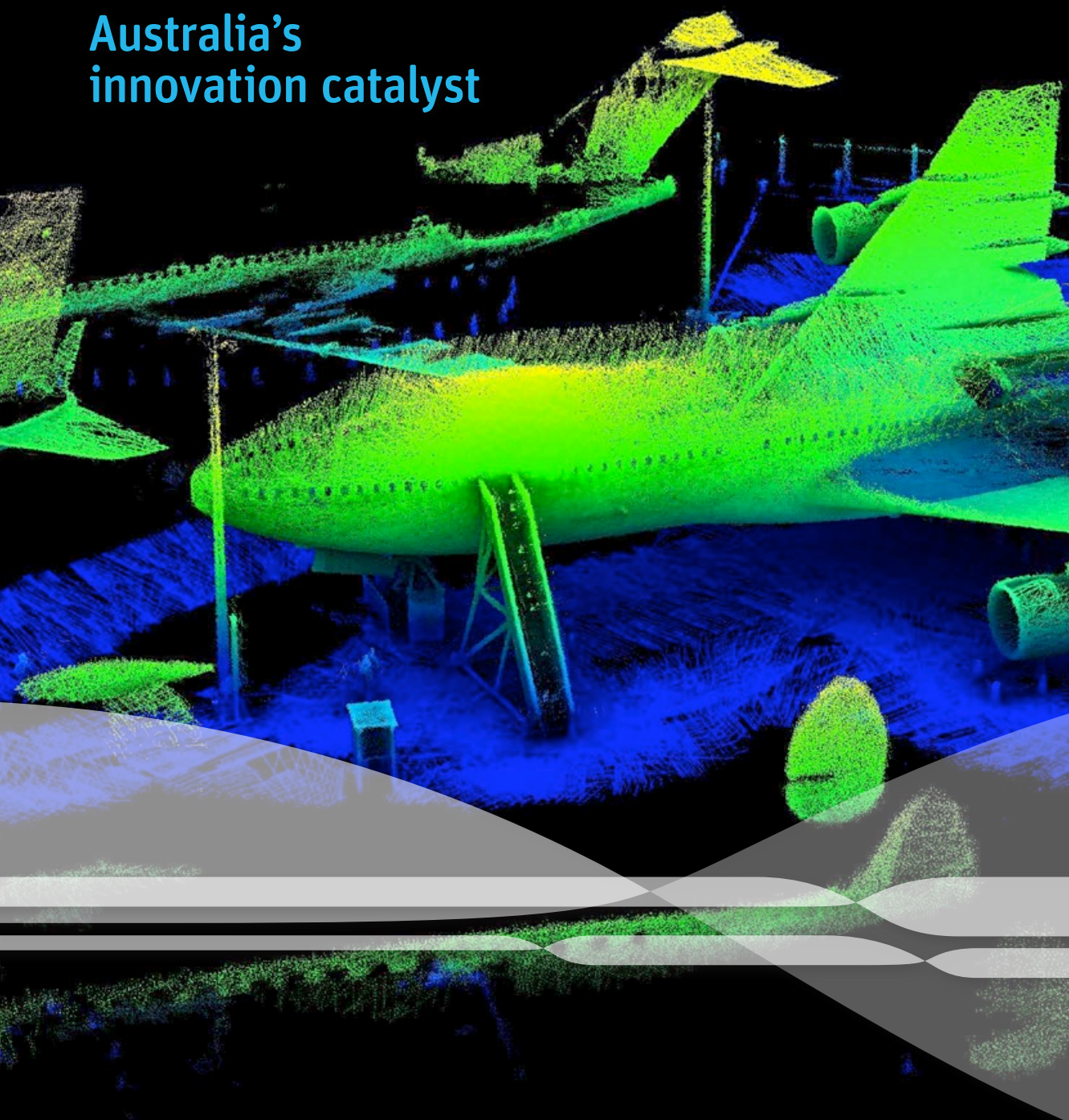
www.csiro.au

Annual Report 2014–15

Australia's innovation catalyst



At CSIRO we invent the future.

We do this by using science and technology to solve real issues. Our solutions make a difference to industry, people and the planet.

As Australia's national innovation agency, we have been pushing the edge of what's possible for almost a century. Today we have thousands of talented people working across Australia and internationally. Our people work closely with industry and communities to leave a lasting legacy. Collectively, our innovation and excellence places us in the top ten applied research agencies in the world.

We collaborate to innovate.

COVER: A 3D laser map of aeroplanes by our handheld 3D laser mapping system, Zebedee. Access to high-quality 3D maps of an environment can help improve decisions and productivity across a wide range of applications, but creating these 3D maps quickly, reliably and in any environment has been a major challenge for business and industry. To overcome this problem, we developed the world's first lightweight, handheld 3D laser mapping system, Zebedee, which is self-contained and does not rely on external positioning systems.

Commercially available as ZEB1 through joint venture GeoSLAM, our technology is now being used internationally by organisations in the manufacturing, mining, security, surveying and forestry sectors. In 2014, GeoSLAM was awarded $2 million for R&D through the Australian Growth Partnership, see page 55 for more details.

This report covers the financial year ended 30 June 2015.
It is also available on our website at www.csiro.au/annualreport2015.

Our vision

Our science is used to make a profound and positive impact for the future of Australia and humanity.

Our mission

We deliver innovative solutions for industry, society and the environment through great science.

Our values

Our values guide our decisions and interactions with our colleagues and with our external partners and stakeholders. Our values are symbolised through the CSIRO Values Compass:

- Embracing **scientific excellence** and working together ethically and with **integrity** in everything we do.
- Building **trust and respect** each day with our communities, partners and colleagues, knowing that with trust comes accountability.
- Igniting our **creative spirit**, exploring new horizons and creating an environment where innovation thrives.
- Consistently **delivering on our commitments**. 'Do what we say we will do'.
- Striving towards a **healthy, safe and sustainable** future.

Our purpose

Our purpose is defined through the functions we undertake for the benefit of Australia, which are set down in the *Science and Industry Research Act 1949*. These primarily include:

- to carry out scientific research for the following purposes:
  - assisting Australian industry
  - furthering the interests of the Australian community
  - contributing to the achievement of Australian national objectives or the performance of the national and international responsibilities of the Commonwealth
  - any other purpose determined by the Minister
- to encourage or facilitate the application or utilisation of the results of such research.

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24 August 2015

The Hon Ian Macfarlane MP
Minister for Industry and Science
Parliament House
CANBERRA ACT 2600

We have pleasure in submitting to you, for presentation to Parliament, the sixty-seventh Annual Report of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) for the year ending 30 June 2015. This report has been prepared in accordance with the requirements of the *Science and Industry Research Act 1949* and in accordance with section 46 of the *Public Governance and Accountability Act 2013* (PGPA Act) and with section 7AB of the *Public Governance, Performance and Accountability (Consequential and Transitional Provisions) Amendment (Annual Reports) Rule 2015*, which extends the application of the now-repealed *Commonwealth Authorities (Annual Reporting) Orders 2011* for the 2014–15 Annual Report.

The report was endorsed for presentation to you at the meeting of the CSIRO Board members on 24 August 2015.

The report includes an appendix comprising a report from the Chief Executive of CSIRO, as trustee of the Science and Industry Endowment Fund (the Fund), established under the *Science and Industry Endowment Act 1926*, on the operations of the Fund together with a report by the Auditor-General on the accounts of the Fund.

During the annual reporting period CSIRO conducted extensive engagement with our customers, partners and staff to elicit input into the new CSIRO Strategy 2020, which took effect from 1 July 2015. Our Strategy positions CSIRO for longer term differentiation and sustainability, with a particular focus on playing a role in significantly lifting Australia's innovation performance while delivering impact against areas of national challenge.

We commend the Organisation's achievements to you.

Dr Eileen Doyle
Deputy Chairman of the CSIRO Board

Dr Larry Marshall
Chief Executive of the CSIRO

Contents

RV *Investigator* on its delivery voyage to Australia in August 2014. *Investigator* is a new state of the art blue-water research vessel, supporting Australia's atmospheric, oceanographic, biological and geoscience research, from the tropical north to the Antarctic ice-edge.

Part 1 | Overview

Performing high-quality science that delivers results with relevance and impact across areas of importance for Australia, is what drives us each and every day.

Our governing and senior leaders share their views on the past year.

- Chairman's foreword | 2
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From 3D printed titanium heel bones to client satisfaction and staff safety, we are achieving great things.

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With over 50 locations our impact stretches across Australia and around the world.

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Our business units and executive leaders as at 30 June 2015.

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Foreword

By the Chairman

As Australia's national science agency we've been solving issues for the nation for almost a century. Our ability to achieve results and deliver solutions is shown by the quality of our research and our strengths lie in building multidisciplinary expert teams to tackle complex challenges facing Australia and the world.

Dr Megan Clark completed her outstanding service to CSIRO in the last year and we are delighted to welcome Dr Larry Marshall as CSIRO's new Chief Executive. Larry brings with him a particularly strong scientific and venture capital pedigree, along with an unwavering sense of enthusiasm for the development of a culture of innovation, technology and inclusion. Larry is focussed on CSIRO being connected to the global science, technology and innovation frontier and attracting new customers and markets for Australian innovation and national benefit.

A large part of CSIRO's success is from our ability to work with external partners holding complementary skills enabling research collaborations that achieve remarkable science. Working with other Australian research partners in the last year, we have developed purpose-built facilities to both engage with industry having an innovation focus, and foster integrative and collaborative work by sharing joint access to facilities.

Both the Canberra-based National Agriculture and Environmental Sciences Precinct (NAESP) and the Clayton-based Biomedical Materials Translational Facility (BMTF) were launched in the last year. Involving collaboration between Monash University and CSIRO, and funded by the Science Industry Endowment Fund, BMTF will develop as a biomedical manufacturing centre for Australia. This is a major partnership, which will boost Australia's global competitiveness in this field.

The Canberra-based NAESP, a collaboration between CSIRO and ANU, will allow us to conduct outstanding research and innovation essential to food security and environmental stewardship in the face of climate change, population growth and land degradation. It will link with partners in the ACT and will continue to build on its already strong links with Australian and global life sciences companies.

CSIRO is looking to dramatically improve Australia's marine knowledge and in the last year launched the new state-of-the-art research vessel, the RV *Investigator*. This 'best of breed' research vessel will enable researchers to head into the Indian, Pacific and Southern Oceans to undertake research including sea floor mapping, observing marine life at 1500–3000 meters and collecting data to improve our weather forecasts.

We recognize that dynamic global competition is changing the landscape for Australian business and strongly believe there is an important role for CSIRO to play. We aim to bridge the gap between business and the research sector, through the CSIRO Small and Medium-sized Enterprises (SME) Engagement Centre. We have established the opportunity for SME's to access research placements to help overcome technical challenges and implement new innovative solutions. We recently created ASPIRE, a 'proof of concept' project that has been developed to assist manufacturing companies to reduce their operating costs in regards to waste disposal and landfill costs.

CSIRO continues to work directly with farmers and related industries to help us understand how science can make the greatest difference and deliver practicable solutions. Supported by the Bill and Melinda Gates Foundation we have brought together a team of world leading scientists to develop tools to generate self-reproducing crops for Sub-Saharan Africa, the seeds of which can be saved and grown by smallholder farmers providing a more secure food supply.

We continue to make inroads to strengthen performance in gender equity and diversity. For example, CSIRO Astronomy and Space Science received a bronze place in the Astronomical Society of Australia Pledies Awards which recognise organisations that take active steps to advance the careers of women. We appreciate, however, that there is much more to do.

People are the heart of CSIRO's ability to deliver great science and innovation to our customers. CSIRO continues to aspire to Zero Harm and, as we operate in a range of environments, we must continue to be ever vigilant in protecting the wellbeing of our people, partners and the community. The health, safety and environmental sustainability policy was approved by the Board in early 2014. The policy has been updated to embrace the wellbeing strategy, and it has a greater focus on how we interact with our affiliates, partners and the broader community. Some of our customers are large industrial companies with exceptional health, safety and environment knowledge, who can teach us best practice, and other customers may benefit from our help by example and cooperation.

We often hear that the decades ahead will see the innovation imperative take hold in the national economies of the world with rising importance of science, technology and innovation in an interconnected world of accelerating and disruptive change. At CSIRO, we shape the future by using science to solve real issues, making a difference to industry, people and the planet. CSIRO is well placed to tackle the innovation imperative that lies ahead and as we closed out this year, much work had already been done to develop the strategic plan for the next five years. The CSIRO Strategy 2020: Australia's Innovation Catalyst is an ambitious but achievable plan – and an organisation with the extraordinary talent that CSIRO has will certainly be able to achieve it.

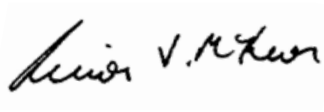
The organisation is in very capable hands. I extend my thanks to the other CSIRO Board members for their keen interest in CSIRO's mission and their dedication to good decision making. I particularly acknowledge Mrs Mary Boydell, Professor Peter Hoj and Professor Tom Spurling AM, whose terms finished during 2014–15.

I am delighted that the Government has announced that CSIRO will be chaired by Mr David Thodey, the recently retired CEO of Telstra, who will join the Board in November, 2015. In the meantime, CSIRO is very well served with Dr Eileen Doyle, who has been a CSIRO Director since 2006, standing in as Chairman.

As I write my last foreword, we are in the midst of a significant global stock market sell down. Commentators are endeavouring to predict what this will mean for our future economic wellbeing. Markets, particularly global ones, go up and down and can leave one with a feeling of being a 'cork in the ocean'.

With innovation, it doesn't have to be that way. This nation has a proud history of discovery and CSIRO has frequently been at the forefront of solving some of our most taxing problems. It has been an enormous honour to serve as CSIRO's Chairman, especially as I have had the opportunity to observe closely our terrific workforce which is the basis for the wonderful achievements of this organisation.

I leave CSIRO more convinced than ever of its importance to Australia and hopeful that it will continue to have the resources necessary for it to continue with its important work.



Simon McKeon AO
Chairman of the CSIRO Board

Chief Executive's report

My first year as Chief Executive has been an extraordinary experience. In my short time with CSIRO, I have been privileged to be introduced to a broad portfolio of world-leading science, technology and innovation with the potential to deliver long-term, sustaining value to our customers in government and industry, and long-term benefit to the nation.

I would like to acknowledge the leadership of Megan Clark, who completed her tenure as CSIRO's Chief Executive at the end of 2014, leaving us all a remarkable legacy.

This is an exciting time for CSIRO, and our ambitious Strategy 2020 will help us position ourselves as an innovation catalyst for Australia, seeing us focus very clearly on a mission to create value for customers through innovation to deliver positive economic, environmental and social benefit for Australia.

We will achieve this by putting our customers and the value they seek first, collaborating more deeply and integrating the capabilities of others with our own, to deliver the best outcome. We will work more globally, to enhance the market vision and global access for customers, and we will seek to increase our capacity for breakthrough innovation to help reinvent existing industries, create new industries for Australia and deliver social and environmental value.

I am especially proud that the strategy is largely driven by the great thinking of CSIRO's people, our most valuable resource. For the first time ever, we crowd-sourced the ideas of our staff, industry partners and the community, to deliver a new vision and goal for our organisation.

Success for CSIRO is not our success alone. It is making a serious contribution to boosting Australia's innovation performance, which on most indices is poor compared to other advanced economies. We don't succeed unless others succeed, and we can't succeed alone.

OUR VISION – AUSTRALIA'S INNOVATION CATALYST

Innovation is in our DNA. In the 1950s, we saved Australia's greatest industry, by enabling wool to be woven, washable without shrinking, and pleated into suits. We recently re-purposed that weaving technology to enable carbon-fibre circuits in clothing, and to create a unique 3D material for Victorian SME Textor Technologies that is now the most innovative product for Kimberley Clarke, a global multinational. Industries can and must reinvent themselves, and CSIRO must be every vigilant of disruptive innovations affecting Australia.

An example is our 3D titanium printing capabilities, which are opening new doors for the treatment of medical conditions across the world. In the last year, CSIRO, together with the St Vincent's Hospital and biotech company Anatomics, produced a titanium-printed heel bone for a world-first surgery on a Melbourne man. The heel was successfully implanted into the 71-year old, who had been diagnosed with cancer of the heel bone and was facing amputation of the leg below the knee. This collaboration saved the patient's leg from amputation. Innovative products like this are helping to improve the quality of people's lives.

In another innovative solution to a national challenge of reducing energy consumption, CSIRO created a building energy management system for heating, ventilation and air conditioning – OptiCOOL. The technology has been widely adopted, controlling approximately 15 million square feet of floor space in Australia and the US. The impacts include reduced energy consumption in commercial buildings up to 30 per cent, greater electricity grid stability, reduced greenhouse gas emissions and employment opportunities through licensee BuildingIQ.

In the last year we launched the Marine National Facility – the RV *Investigator*. Funded by the Australian Government and operated by CSIRO, the Marine National Facility operates Australia's only blue-water research vessel dedicated to marine research throughout Australia's vast ocean territories.

The *Investigator* is exploring the southern ocean and aiding new technological research, which should leverage Australian marine science to be at the forefront of the world. The Investigator recently discovered extinct volcanoes just off the coast of Sydney.

GLOBAL OUTLOOK, NATIONAL BENEFIT THROUGH COLLABORATIONS

Our customers are seeking the best capability to solve their problems, and that capability will not always be within CSIRO. While we are a high-performing and differentiated applied R&D organisation, CSIRO today represents less than five per cent of the research capability in Australia. We are aiming to more effectively source and integrate research capability from outside CSIRO, offer our customers unique value and ensure that we are a provider of choice. This helps us deliver the best solutions for our customers and make the connections that support a more collaborative and efficient Australian innovation system.

In an example of a successful collaboration, CSIRO is working with Chinese partners to deliver exceptional science outcomes with real prospects of transforming the productivity and environmental performance of global iron smelting. CSIRO is partnering with Beijing MCC Equipment Research and Design to commercialise our dry slag granulation technology.

Helping to forge a future in green steelmaking, this Australia-China research collaboration has led to the development of the new smart technology able to harvest furnace waste and convert it into a new product to make cement while reducing water use and greenhouse gas emissions.

VIBRANT CULTURE

We continue to invest in and enable a staff culture that is vibrant and innovative. We hire the best and brightest people to provide answers to national challenges through research and development. Where we are co-located with universities or have active student engagement, the culture is more vibrant and innovative. Students bring age, multicultural and gender diversity, fresh perspectives, and an attitude to try things differently and take risks. We embrace this model and will expand it.

We currently co-supervise more than 750 postgraduate students with our university partners and take on hundreds of interns across our business. We are also engaged in school programs and are seeking to grow these numbers significantly to help build the science, technology, engineering and mathematics (STEM) and innovation workforce. CSIRO is partnering with the BHP Billiton Foundation on a $28.8 million, five-year project to deliver education programs, excellence awards, mentoring, summer schools and tailored university degrees aimed at closing the gap in Aboriginal and Torres Strait Islander achievement and employment in STEM.

The measure of CSIRO's success comes from our people, and we strive to create a trustworthy and respectful environment where coming to work is seen as a benefit to the Australian community.

THE YEAR AHEAD

We will position CSIRO to become Australia's innovation catalyst, implementing a number of changes that will see us focus on value creation and the delivery of innovative solutions to help our customers invent or reinvent themselves.

One of the major initiatives is CSIRO 'ON'. Launched in June 2015, ON provides a path for the best ideas in CSIRO to be identified and accelerated. It will build our entrepreneurial skills, connection and culture and provide new funding models for high-potential ventures.

I believe we are more relevant to our customers today than when we first opened the doors. Our pioneering spirit is strong, and I am genuinely excited to be a part of the organisation's next chapter as a more entrepreneurial, innovative and customer focused CSIRO that provides tangible benefit to Australia.

Dr Larry Marshall
Chief Executive of the CSIRO

Highlights of 2014–15

We're Australia's leading multidisciplinary research organisation, with more than 5000 talented people working out of 55 centres in Australia and internationally furthering our mission to deliver innovative solutions for industry, society and the environment.

IMPACT

3D PRINTED TITANIUM HEEL BONE successfully implanted in Australian patient' (pg 48)

Agreement signed between **CSIRO AND BEIJING MCC EQUIPMENT R&D CORPORATION** to scale up and demonstrate dry slag granulation technology in China. (pg 51)

ATLANTIS, rated one of the best ecosystem models in the world, rolled out to Europe, US and Guam. (pg 53)

GEOSLAM START-UP has taken 3D laser mapping to the international market. (pg 55)

PENTHROX, the green whistle pain relief, received initial regulatory approval for sale in Europe. (pg 49)

INFRASTRUCTURE

RV *INVESTIGATOR*, THE MARINE NATIONAL FACILITY RESEARCH VESSEL, LAUNCHED. (pg 69)

3.78 BILLION DOWNLOADS AND >55 MILLION RECORDS REACHED BY ATLAS OF LIVING AUSTRALIA. (pg 77)

>1000 MARINE SPECIMENS AND 400 SPECIES DNA BARCODED BY THE AUSTRALIAN NATIONAL FISH COLLECTION. (pg 75)

CANBERRA DEEP SPACE COMMUNICATION COMPLEX TRACKED >40 SPACECRAFT MISSIONS THIS YEAR. (pg 66)

PAWSEY CENTRE SUPERCOMPUTERS COMMENCED OPERATIONS, SERVING >80 ORGANISATIONS. (pg 70)

ENGAGEMENT & CONNECTIONS

- Our customers rate us highly, 8.2 out of 10, stressing the calibre of our staff and the quality of our science. (pg 17)
- We worked with approximately 3000 customers including 500 major Australian companies, more than 1200 Australian SMEs. (pg 25)
- This year we had 1799 Scientists and Mathematicians in Schools (SMiS) partnerships in 1263 schools, including 30% of partnerships in rural and regional schools. (pg 56)
- We supported 200 SMEs with information, connections and facilitation of research projects, with 52 Researcher in Business projects conducted. (pg 54)
- In 2014 Australian and international universities were partners in about 75% of CSIRO's research publications. (pg 33)
- 30–40% of our 578 patent families are the result of collaborative activity – 64% industry partners.

EXCELLENCE

- Our research publications are 48% more cited than the global average. (pg 32)
- CSIRO is the most central institution in the Australian publication network in the seven research fields in which we publish most of our work. (pg 33)
- We are in the top 1% in 15 research fields globally. (pg 33)

SUSTAINABILITY

- 10,521 m^3 waste diverted from landfill, equating to 994 tonnes of carbon emissions saved. (pg 91)
- Reduction in air travel of 22 million air kilometres compared with 2013–14, a 19.5% per cent decrease. (pg 92)

STAFF & CULTURE

- 4983 development days delivered through our learning and development curriculum. (pg 94)
- 63 Indigenous employees, a three-fold increase from 20 over the strategy period 2011–15. (pg 94)
- 17% reduction in musculoskeletal staff injuries requiring time off work. (pg 89)

These are just some of our achievements from 2014–15. Many more are provided throughout this report.

Our locations and global achievements

Since 1926, we have sought to solve problems that matter to Australia and the world and generate positive impact for today and tomorrow. In 2014–15 we continued this legacy. Here are just some examples of our international impacts.

NORTH AMERICA

We licensed our Remote-I technology to Silicon Valley spin-off TeleMedC, which plans to take the technology to the US and world market as part of its 'EyeScan' diagnostic solution.

650 17

CONNECTED

OUR CONNECTIONS WITH INTERNATIONAL UNIVERSITIES AND RESEARCH INSTITUTES LINK US TO THE 97 PER CENT OF RESEARCH THAT HAPPENS OUTSIDE AUSTRALIA.

WE ARE ALSO WORKING IN THE MIDDLE EAST, SOUTH KOREA, AND THE PACIFIC, IN AREAS SUCH AS AGRICULTURE, ASTRONOMY, CLIMATE VARIABILITY, ENERGY, FISHERIES, FOOD, MINING, OCEANOGRAPHY, AND WATER.

JOINT PUBLICATIONS

MEMORANDUM OF UNDERSTANDING

LATIN AMERICA

The Chilean National Service of Fisheries and Aquaculture (SERNAPESCA) received funding from the Chilean Ministry of Economy to support CSIRO for the Aqua-Atlantis project to improve the sustainability of the aquaculture industry in Chile.

108 5

AFRICA

We are helping tackle the problem of the African cassava whitefly in close partnership with East African scientists.

93 3

EUROPE

We built high-performance heliostats at the frontier of solar technology in Cyprus with a low cost design allowing them to be installed affordably. CSIRO lab in Montpellier, France.

767 16

CHINA

We forged a future in green steel making by creating smart technology that reduces water and energy use and greenhouse gas emissions while sustaining metal production.

376 25

JAPAN

A South Australian automotive industry company is using our technology to build heliostats for Japan.

95 8

SOUTH ASIA

We completed a capacity building project in India, focused on eco-toxicological tools for management of environmental pollution.

66 5

SOUTH-EAST ASIA

We have signed a two-year, $1 million collaboration agreement with a Singapore partner to develop metal powders for 3D printing.

108 5

INDONESIA

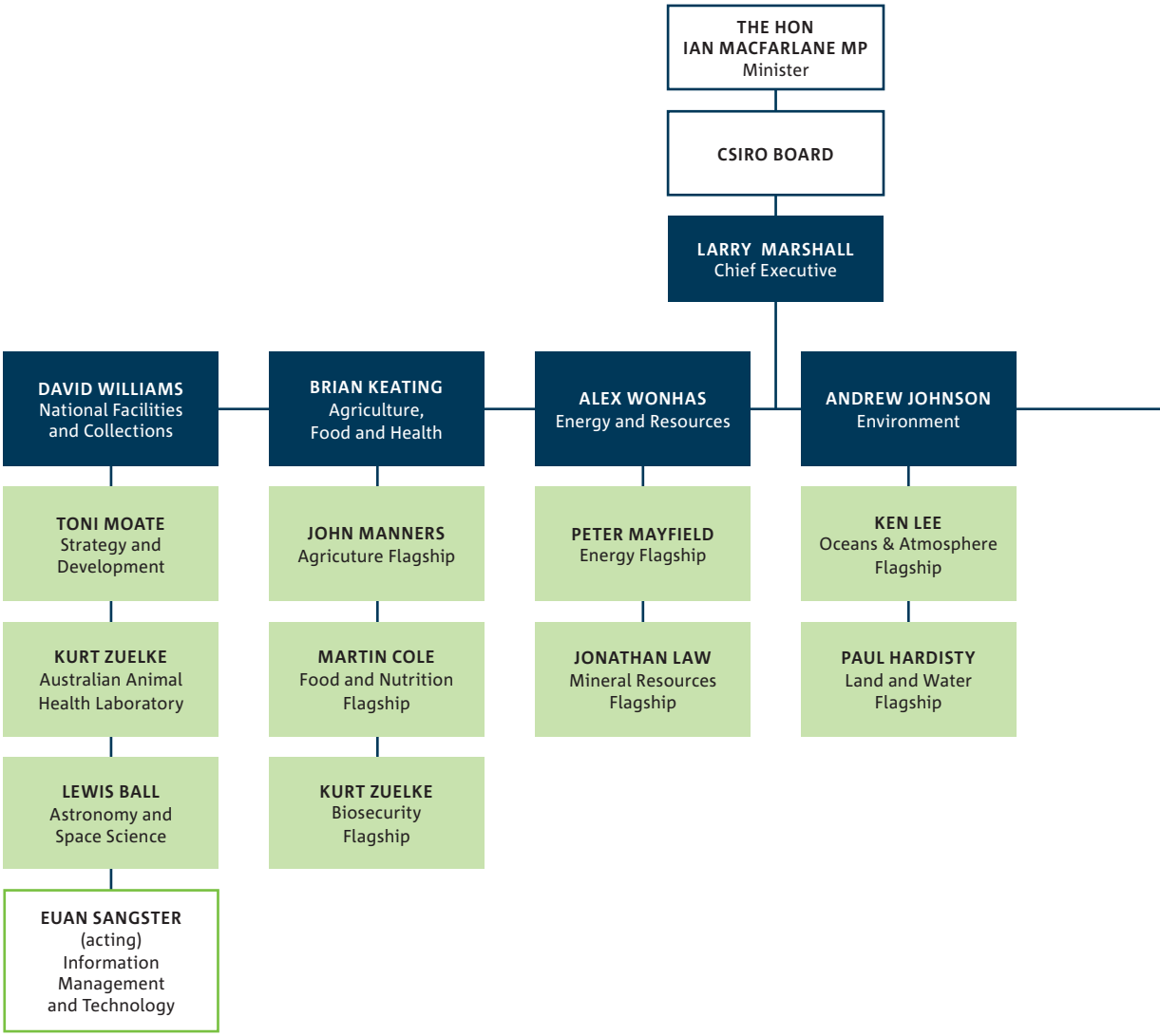
We are helping to enhance the capacity and reporting systems of Indonesia's National Carbon Accounting System to meet international greenhouse gas reporting requirements under the UNFCCC.

22 3

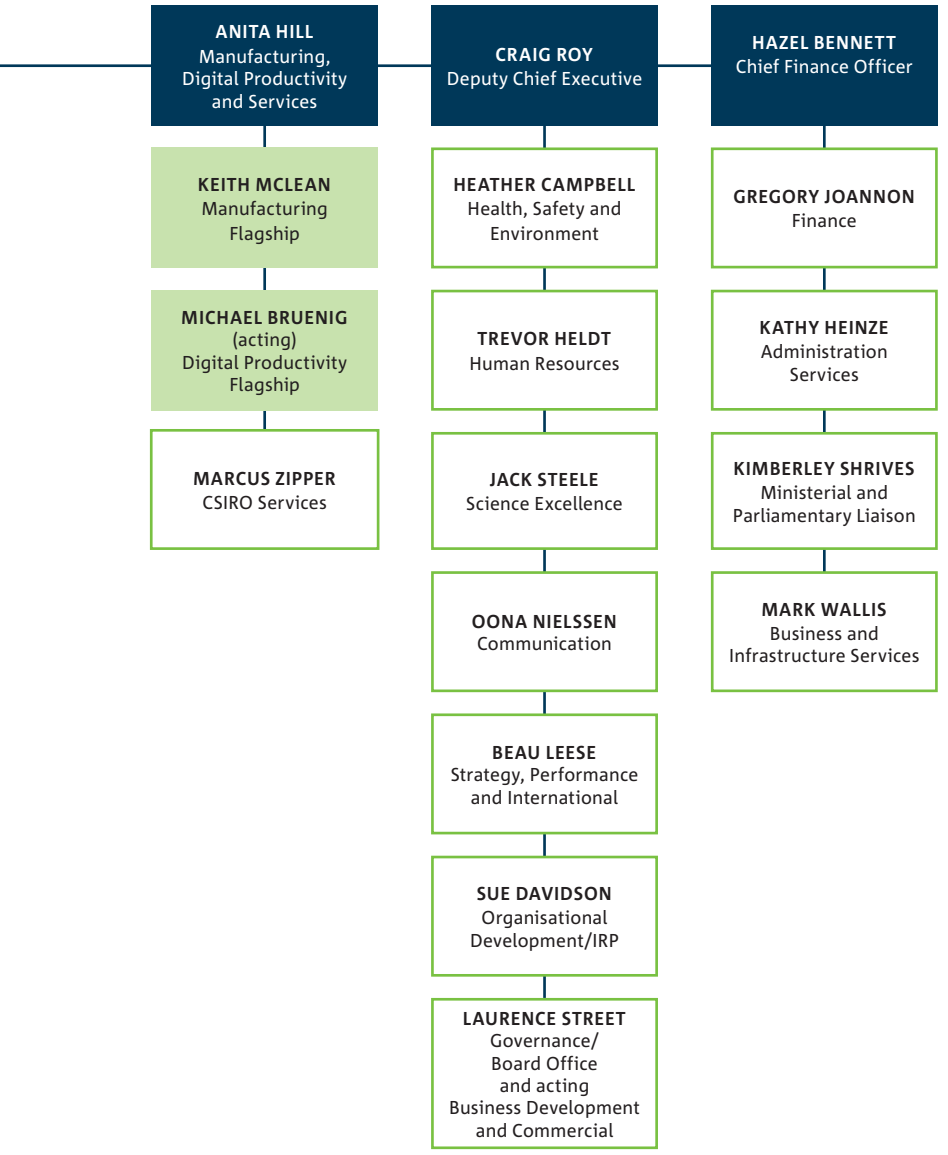
A full list of CSIRO locations is available on page 178.

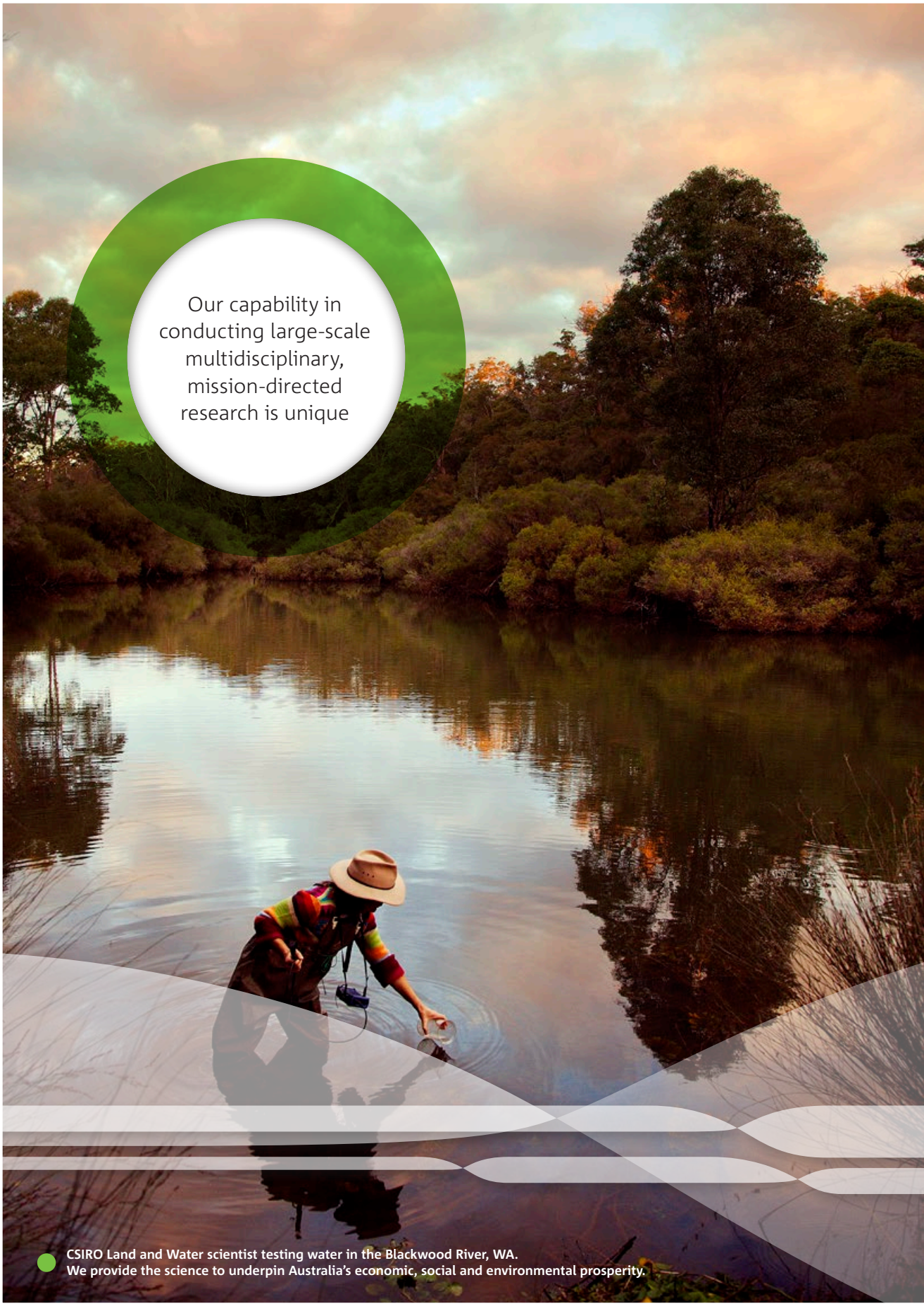
Our organisational structure

AS AT 30 JUNE 2015



- ACCOUNTABILITY AND GOVERNANCE
- EXECUTIVE TEAM MEMBER
- FLAGSHIP DIRECTOR
- ENTERPRISE SERVICES LEADER





CSIRO Land and Water scientist testing water in the Blackwood River, WA.
We provide the science to underpin Australia's economic, social and environmental prosperity.

Part 2 | Our performance

As a trusted advisor on the big issues facing the nation, CSIRO and its people continue to play a key role in Australia's productivity and competitiveness.

A high-level summary of how we monitor our performance.

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Our performance against the planned activities within our four-year Strategy.

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Our collaborations with customers, partners and stakeholders around the world are critical to our success.

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Our performance against the deliverables and key performance indicators as agreed to with Government.

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  - Science and Industry Endowment Fund | 78

Measuring our performance

CSIRO continues to play an important role in Australia's National Innovation System. Consistent with our responsibilities outlined in the *Science and Industry Research Act 1949,* we aim to deliver innovative solutions for industry, society and the environment, and to see our science used to make a positive impact for the future of Australia and humanity.

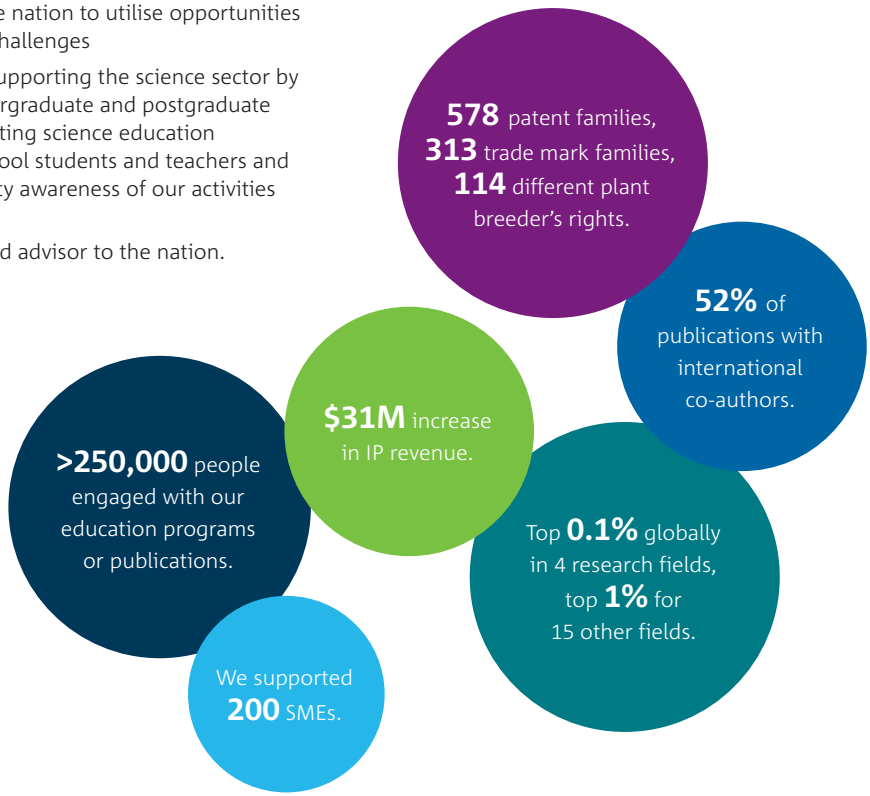
Our capability and expertise in conducting large-scale, multidisciplinary, mission-directed research is unique. We are a leader in addressing major challenges that matter to Australia's future, including the complex interactions of human activity with the natural and built environments.

Fundamental to this outcome is our focus on:

- connecting and collaborating across the innovation system to help Australia gain access to global knowledge
- managing research capabilities and facilities that are critical for the nation to utilise opportunities and respond to challenges
- promoting and supporting the science sector by supervising undergraduate and postgraduate students, conducting science education programs for school students and teachers and raising community awareness of our activities and science
- acting as a trusted advisor to the nation.

The activities and achievements outlined in this section of our annual report provide evidence of our performance against our Operational Plan 2014–15[1] and the Portfolio Budget Statements 2014–15[2]. In addition to this report to Parliament, we also monitor our performance throughout the year by providing:

- regular reports to the CSIRO Executive Team and Board to assist with their decision-making and governance responsibilities
- detailed planning and review processes operating at a range of levels, including Flagships, functional areas and individuals.



1 CSIRO's Operational Plan is available at: www.csiro.au/operational-plan
2 CSIRO's Portfolio Budget Statement is available at: www.industry.gov.au

Financial performance

In 2014–15, CSIRO delivered a deficit from ongoing operations of $14.5 million. Total revenue of $1,230.8 million included appropriation from government of $745.3 million and $485.5 million in revenue generated from other sources.

TABLE 2.1: CSIRO'S FINANCIAL PERFORMANCE BY SOURCE OF REVENUE, $M

REVENUE SOURCE	2010–11	2011–12	2012–13	2013–14	2014–15
Co-investment, consulting and services					
Australian private sector	65	74.2	70.1	78.5	69.4
Australian Governments	202.7	201.8	190.3	179.3	181.1
Rural Industry R&D corporations	37.7	35	38.4	50.2	38.1
Cooperative Research Centres	32.3	30	16.9	14.7	9.5
Overseas entities and international	74.5	77.5	84.3	84.7	81.4
Work in progress/deferred revenue	5.9	-7.6	25.1	-13	-6.1
Total co-investment, consulting and services	**418.1**	**410.9**	**425.1**	**394.4**	**373.4**
IP – royalty and licence revenues	29.2	278.5	37.5	29.1	60.8
Total research and services revenue	**447.3**	**689.4**	**462.6**	**423.5**	**434.2**
Other external revenue	47.9	61.3	44.1	43.2	44.6
Gain/(loss) on sale of assets	4.9	0.4	0	-	-
Other fair value gains and reversals	0.1	-	5.5	-	6.7
Total external revenue	**500.2**	**751.1**	**512.2**	**466.7**	**485.5**
Revenue from government	720.4	724.9	733.8	778.2	745.3
Total revenue	**1,220.6**	**1,476.0**	**1,246.0**	**1,244.9**	**1,230.8**
Less expenses	1,231.1	1,275.5	1,267.5	1,270.6	1,245.3
Operating result	**-10.5**	**200.5**	**-21.5**	**-25.7**	**-14.5**

Note, the 2014–15 total expenses of $1,245.3m includes CSIRO's share of the net operating deficit ($0.3m) of joint venture accounted for using the equity method.

Strategy progress

Our CSIRO 2011–15 Strategy is underpinned by five strategic pillars:

- National Research Flagships
- Science Excellence and Preparedness
- Deep Collaboration and Connection
- Innovation Organisation
- Trusted Advisor.

Our Operational Plan 2014–15 and Portfolio Budget Statements 2014–15 respond to our Strategy, providing an overview of the priorities, programs, change initiatives and other key activities to be undertaken, along with the resources to implement these during the final year of our Strategy.

Operational plan

Our Operational Plan 2014–15 identified nine Key Executive Actions (KEAs) to progress our CSIRO Strategy. These actions are designed to focus our Board and Executive Team's attention on the Organisation's most important priorities for the year.

An overview of the results achieved for these actions is provided below.

Strategic Objective 1: National Research Flagships

Focus and increase the Organisation's resources invested in delivering profound impact in response to national challenges and opportunities through the National Research Flagships program.

Impact science line of business

Finalise and communicate the formation of the nine new Flagships as CSIRO's key vehicle to deliver profound national impact. Complete the transition to focus our resources invested through the National Research Flagship Program. Embed the Impact 2020 planning, monitoring and evaluation framework and accountabilities to a consistent standard across all Flagships.

The consolidation of our project and capability management teams has been completed through our structural reform, merging Divisions and Flagships into nine Flagships from 1 July 2014. All but one Flagship has finalised its strategic plan presented to the Science, Strategy, Investment and Impact Committee (SICOM) in October 2014. The finalisation of the Digital Productivity Strategic Plan was delayed pending confirmation of the relationship and structural arrangements with NICTA. Draft impact statements were completed as part of the Flagship planning process and continue to be refined. When finalised, they will form a key part of the Supporting the Research Operating Model (SROM) system architecture that links our impact objectives with research activity.

Strategic Objective 2: Science Excellence and Preparedness

Invest in people and infrastructure to maintain and develop national scientific breadth and depth in support of delivering profound impact and scientific preparedness.

Science platforms

Flagships will complete and commence implementation of approved science direction and capability plans covering workforce and talent, global science standing, infrastructure, collaborations (internal and external) and future science platforms aligned with their Flagship goals and impact objectives.

All but one Flagship has finalised its strategic plan, which includes approved science direction and capability plans. The appointment of Science Directors as part of Flagship leadership teams from 1 July 2014 provides business unit leadership on science and capability development. Work undertaken as part of the CSIRO Strategy 2020 places emphasis on investment in future science platforms aligned to impact objectives. This has been further operationalised during the year, through the establishment of a Science Council to support integrated science planning through SICOM.

Strategic Objective 3: Deep Collaboration and Connection

Build deep connections with and among the best partners in Australia and the world to complement our science capability and accelerate impact delivery.

National Research Facilities and Collections

Finalise the formation of the National Facilities and Collections line of business, and commence implementation of a strategy to optimise infrastructure utilisation and condition that will support a long term sustainable funding model for these assets.

The National Facilities and Collections Strategic Plan was endorsed during the year by SICOM, including funding models for each of the business units. Key potential user groups and other stakeholders have been identified, and an engagement strategy for approaching the scientific and broader community is being developed. Long term funding options will continue to be progressed as part of the sustainable positioning of CSIRO's National Facilities and Collections. Our response to government on Marine Research Vessel (MRV) cost recovery regime applied to supplementary days was accepted by the government as part of the Budget process. Discussions continue on future co-funding for Australian Animal and Health Laboratories (AAHL), including cost recovery models.

Finalise the formation of the CSIRO Commercial Services line of business including the development and commencement of a strategy that transitions the line to budget neutrality by 2016–17.

The CSIRO Services line of business (LoB) structure is in place and operational. During the year SICOM considered a draft strategic plan, which was endorsed in principle. Additional assessment of future business model options will be considered next financial year by the Chief Finance Officer and CSIRO Executive Team. The strategic plan and business models will be finalised early next financial year.

Precincts

Deliver CSIRO Precincts in line with individual precinct plans with commitment from key collaborators and partners, with a particular focus during the year on progressing the Canberra and Clayton Precincts and re-positioning our efforts in the Parkville Precinct.

Redevelopment of the Black Mountain and Clayton sites is underway, with the Canberra Precinct officially launched by the Hon Ian Macfarlane MP, Minister for Industry and Science, on 5 December 2014. As announced by Minister Macfarlane in September 2014, the Clayton Precinct received SIEF funds to leverage a Biomedical Materials Translational Facility as part of a biomed consortium. The Australian Advanced Manufacturing Council recently located their headquarters at Clayton providing greater opportunities for research and industry collaboration. The Perth Precinct has established an Advanced Resource Characterisation Facility with several joint appointments in place between research partners, CSIRO, University of Western Australia (UWA) and Curtin University. A decision was reached during the year to relocate staff based at Parkville to CSIRO's existing site at Clayton with Monash University.
See page 21 for more details.

Business development and key partnerships

Build industry research alliances, active licenses and the proportion of external funding from industry sources:

a. Increase the total value of long term strategic partnership agreements with industry by 10 per cent.

During 2014–15, the total value of partnership engagements increased by 34 per cent, from $135 million to $181 million. This is due primarily to an increase in the value of the Boeing relationship and two new industry partnerships. Discussions on potential new alliances continue, with various opportunities being progressed on a project basis.

b. Increase the number of active licences by 15 per cent, and increase the proportion of licenses to Australian small-medium enterprises.

As at 30 June 2015, the number of patent and active licences was 277, a 3.8 per cent decrease over the same time last year. This decrease is due to the expiration of a significant number of short term licences, including adopter licenses and evaluations relating to digital technologies. During the last three years, 147 of these licenses were revenue generating. While CSIRO has typically replenished licenses at a similar rate as natural attrition, the CSIRO Strategy 2020 will aim to significantly increase its licensing activity over the next five years. For details of our Intellectual Property (IP) portfolio see page 30.

c. Maintain our customers' current 'willingness to recommend' result of 8.4 out of 10.

For the third consecutive year we received high satisfaction ratings from customers, recording an average of 8.2 out of 10 in 2014–15. While this was slightly below the 8.4 target, the result is still positive when compared with similar peers and institutions. The top three reasons for such high results are the quality of our science, the high calibre of our staff, and finding CSIRO an organisation great to deal with. This result is based on a total of 137 responses, approximately 50 fewer than last year.

Strategic Objective 4: Innovation Organisation

Boost our capacity to operate as one organisation to respond to the changing nature of science; deliver profound impact and build capability for the future.

Integrated Reform Program

Finalise successful implementation of CSIRO's Integrated Reform Program objectives to realise staff wellbeing, productivity and efficiency benefits, with a focus in the financial year on:

a. Delivery against agreed program objectives charter and project plan, with progress towards desired benefits being realised.

During 2014–15 significant progress was made in delivering key Integrated Reform Program work-stream elements, including the implementation of 'Lines of Business Model', 'Supporting Science Excellence & Investment Prioritisation' and 'Impact Focus'. The reform has been a significant, once-in-a-decade change program, with activities being delivered and adapted based on staff feedback and other environmental factors. The delivery of the work-stream elements, 'Business Process' and the 'Support Function Reform', has not been as expected. This was due to competing priorities focussing on the delivery of reform elements including development of the CSIRO Strategy 2020 and CSIRO's innovation catalyst program called 'ON'.

b. Continue to manage and support staff and leadership transitions through the reform process, and maintain staff engagement as measured through staff surveys.

A staff survey was undertaken in August-September 2014, with results indicating a drop in engagement during the period. This was expected given the level of organisational restructure occurring at the time. A follow-up survey is proposed for early 2016, to assess for a longer term trend. An internal audit in April 2015 on 'Role Clarity and Core Controls' provided a favourable assessment of the adequacy and operational efficiency of new leadership and line management roles. Staff engagement in the development of the CSIRO Strategy 2020 during the year provided a number of opportunities for staff to interact with leaders and others, including a crowd-sourcing activity in which over 40 per cent of staff participated.

c. Implementation of staff wellbeing initiatives including Pearce Review Phase 1 and 2 recommendations and deployment of the Fatality Prevention Strategy initiatives.

Implementation of the Pearce Review Phase 1 and 2 recommendations is complete, and education and training activities are ongoing. Diversity & Inclusion (D&I) and Workplace Expectations eLearning modules were released as part of the D&I and Wellbeing Plan. Fatality prevention strategy milestones have been completed, including activities relating to all-Terrain Vehicles, and together with a significant component of Forklifts and electrical work. A re-evaluation of the fatality risk project has been completed to ensure current priority risks align with the organisational risk profile.

d. Finalise, implement and embed process, system and incentive improvements through the Supporting the Research Operating Model (SROM) project to facilitate the seamless collaboration across organisational boundaries.

High level processes for the SROM architecture have been finalised and endorsed by the reference group and steering committee. The design for the project and activity management processes is ongoing. The first release of the supporting system is expected in October 2015. Detailed planning for staff communications, process change management and IT system requirement gathering has commenced, and a base set of user guides and support materials has been developed. Amendments to the revenue recognition methodology will be implemented from 1 July 2015.

STAFF ENGAGEMENT IN THE DEVELOPMENT OF THE CSIRO STRATEGY 2020 DURING THE YEAR PROVIDED A NUMBER OF OPPORTUNITIES FOR STAFF TO INTERACT WITH LEADERS AND OTHERS.

Productivity, efficiency and sustainable funding

Deliver the 2014–15 budget with particular emphasis on the full and timely completion of the redundancy and savings program. Achieve an agreed position with key stakeholders on property rationalisation to reduce the fixed cost base of the organisation and optimise funding to science. Develop long term cash flow and capital plans as input to the development of, and final alignment with, the 2015–25 CSIRO Strategy and 2015–16 four year budget.

Unaudited results are within 1 per cent of the total expenditure budget and within $2.6 million of the approved loss position of $12.7 million. The financial offer for the Enterprise Bargaining Agreement (EBA) has been informally approved by the Department of Finance with other parts of the EBA awaiting approval before full clearance is provided. The Property Strategy continues to be developed. Cash forecasting accuracy has improved, with planning now extending to a four year horizon.

Strategic Objective 5: Trusted Advisor

Play a leading role in the trusted delivery of scientific evidence, advice and interpretation to the Australian government, public and industry.

CSIRO Strategy 2015–25

Develop and progress a robust 2015–25 CSIRO Strategic Plan to position the organisation for longer term differentiation and sustainability, in particular leading a process to:

a. Engage Government, industry and research stakeholders to ensure endorsement and resourcing of CSIRO's Strategy and associated growth options.

The new Chief Executive's strategy perspectives were shared with the Executive Team and Board and integrated into a revised strategy development approach for an iterative, open source and participative process. More than 7000 staff, customers, thought leaders and other stakeholders, including the public, were engaged for ideas and input to strategy questions.

1. Staff involvement was via a successful crowd-sourcing activity in which over 40 per cent of staff participated, providing more than 715 ideas and 7200 comments and votes.
2. More than 200 customer, advisory committee and thought-leader conversations were held, including senior stakeholder events and a general public survey.

STAFF INVOLVEMENT IN THE NEW STRATEGY PROVIDED MORE THAN 715 IDEAS AND 7200 COMMENTS AND VOTES.

b. Further articulate our future impact, market, science direction, capability and property directions.

Following input, analysis and decision, the Executive Team agreed to strategy actions, themes and initiatives to articulate key strategic shifts out to 2020, with a focus on CSIRO as an innovation catalyst. These directions have been articulated in the CSIRO Strategy 2020[3] and will be reflected in internal planning processes over the coming year.

c. Identify areas of global priority and CSIRO's approach to manage and service international operations.

During the year we prioritised CSIRO's international focus for the next five years as part of the new CSIRO Strategy 2020. As part of that process, the organisation agreed to specific priority countries and options for physical presence and partnering. Our priority regions recognise the increasing economic strength of economies in Asia and South America. Their investments in research present both industry and science collaboration opportunities for CSIRO, which will in turn provide national benefit. Our historical ties to Europe and North America remain strong, while we will accelerate our overall rates of international engagement and operations to capture the higher potential impact value return to Australia. For more details on stakeholder engagement see page 25.

3 CSIRO Strategy 2020, www.csiro.au/Strategy

Enterprise strategy measures

At CSIRO, we adopt a number of mechanisms to monitor overall progress against our strategy, including reporting against ten Enterprise Strategy Measures (ESMs). These measures are designed to provide evidence of our performance across four dimensions critical to the success of our CSIRO Strategy 2011–15:

A summary of actions taken and progress achieved against our ESMs is provided below.

Impact

Develop measures in 2011–12 for benchmarking our performance for delivery of triple-bottom-line impact through evaluating realised benefits. Be recognised as one of the top three global applied science organisations by 2014–15 for impact delivery as measured against our 20 global peers.

In terms of our scientific knowledge and impact, we are performing as well as, or better than, most of our global peers (top three). The level of CSIRO publications in the top 1 per cent of most cited is nearly three times higher than the average[4]. Analysis of Normalised Citation Impact indicates we maintained our rank of second for a third year in a row.

Similarly, in our delivery of scientific solutions that contribute to significant economic, environmental and social impact for Australia, our scale and reach compares favourably with our peers. An analysis of patent filings registered in the World Intellectual Property Database indicates that we have dropped in ranking among our global peers as a result of increased filings from Asian institutes. However, we are still Australia's largest patent holder (1854 granted patents) with 30 to 40 per cent of our patent families the result of collaborative activity with external parties.

Evidence of our impact is demonstrated in the achievements in Program 1, pages 28–61.

Develop future impact pipelines for at least 80 per cent of the Flagship Portfolio by June 2012. Evaluate potential triple-bottom-line value for at least 50 per cent of the Flagship future pipeline by June 2013 and 80 per cent by June 2014. Deliver Flagships' goals at a rate meeting or exceeding initial time-to-goal expectations.

This year 100 per cent of the Flagship portfolio developed impact pipelines and plans. This activity is transitioning successfully to a business-as-usual status across the organisation, as we embed it as part of our Planning and Performance Framework and research operating model architecture.

From 1 July 2014, the organisation transitioned from 11 to nine Flagships. Over the financial period new Flagship goals and supporting strategies were developed and approved by SICOM. This process included establishing new impact objectives, aimed at clearly identifying the pathways through which our science outputs, linked with well-defined outcomes, will lead to impacts aligned with Flagship goals. By retaining our triple-bottom-line approach to impact, the organisation has been able to further build staff capacity in planning, monitoring and evaluation, strongly increasing our ability to track and report our performance.

4 CSIRO's Science Health and Excellence Report is available at: www.csiro.au/Science-Excellence-for-Impact

Baseline customers' willingness to recommend in 2011–12 and improve our performance year-on-year over the Strategy.

Over the strategy period, we received high satisfaction ratings from customers, with an average of 8.3 out of 10 of the three years we conducted the survey. The top three reasons for the high rating are: the quality of our science, high calibre of staff, and seeing CSIRO as an organisation *'great to deal with'*. The areas consistently identified for improvement over the term of the strategy include: our contracts, legal and admin processes, pricing structure and project management and delivery. The survey results provide valuable insight on our performance and inform improvements to our business and project management processes and services, including cost, that are already underway as part of the SROM architecture development.

Increase community awareness of impact derived from CSIRO activities from the established baseline of 50 per cent in 2010–11 to 75 per cent by 2014–15.

In 2015, CSIRO commissioned a community awareness and attitudes study, which reported that 39 per cent of the sample could name at least one contribution they believe CSIRO has made to their lives. This result was a slight increase from the 2012–13 period (38 per cent), but a slight decrease from 2011–12. Our aim is to draw on the additional findings from the survey to inform us about how to come closer to the 75 per cent target.

An overwhelming majority (89 per cent) of Australians are aware of CSIRO, which is also a slight downward trend compared with previous years. Awareness is higher among older Australians; 99 per cent of Australians aged 55 and over are aware of CSIRO, compared with 76 per cent aged 34 and under. Yet, consistent with previous studies, a majority (63 per cent) of Australians still have a positive perception of CSIRO, 28 per cent viewing the organisation very positively and 35 per cent positively.

For further details please see page 35.

Science

Science quality is maintained or improved in Environment and Ecology, Agricultural Sciences, Plant and Animal Sciences and Geosciences as measured through benchmarking against global peers (science productivity, citations per paper, collaboration). CSIRO maintains breadth in at least 14 fields in the top one per cent globally based on ISI/Thomson Reuters total citation data.

CSIRO is ranked in the top 0.1 per cent of global institutions in Plant and Animal Sciences, Agricultural Sciences, Environment and Ecology and Geosciences, based on total citations. In addition, we rank in the top one per cent globally in a further eleven research fields. This number increased from 14 last year to 15 this year.

Overall, our citation impact has consistently improved over the past decade, with CSIRO articles cited performing 48 per cent better than the global average for the period 2010–14, a one per cent rise on the period 2009–13.

Further, when comparing all articles of the same type and in the same subject for the period 2009–13 (based on percentile performance), 2.9 per cent of CSIRO publications were in the top one per cent of articles globally, 10.5 per cent in the top five per cent and 18.4 per cent in the top 10 per cent. This is an improvement across all three levels since 2009–13. These results demonstrate that our science excellence and outputs are highly competitive against global peers.

For more information on our publication output and citation impact see pages 32–33.

Progress towards establishing precincts of global standing in the Plant and Agricultural Sciences, Resource Sciences, Environmental Sciences, Materials and Manufacturing Sciences and Human Life Sciences meets Precinct Development Plans by 2014–15.

The precincts are now established, with core relationships and governance in place with key partners, and broadening stakeholder engagement. The Canberra Precinct (Plant and Agricultural Sciences and Environmental Sciences) was officially launched by the Hon Ian Macfarlane MP, Minister for Industry and Science, on 5 December 2014. The Canberra Precinct received funds of $18 million for an ANU and CSIRO Centre for Genomics, Metabolomics and Bioinformatics collaborative facility and to assist in development of a new life sciences building.

The Perth Precinct (Resource Sciences) has now established an Advanced Resource Characterisation Facility for which it received $12.4 million in 2014. The Centre includes new NanoSIMS, Maia Mapper and Geoscience Atom Probe instruments. An inaugural workshop was held on 18 June. The Clayton Precinct (Materials and Manufacturing Sciences) received SIEF funds of $10 million, announced by Minister Macfarlane in September 2014, to leverage a Biomedical Materials Translational Facility, part of a biomed consortium worth approximately $46 million, which brings together CSIRO, Monash University and 20 industry players. The Australian Advanced Manufacturing Council (AAMC) recently located its headquarters in the CSIRO Ian Wark Laboratory at Clayton, providing excellent opportunities for linking researchers and industry. The Clayton Manufacturing team was awarded the Committee for Melbourne 2015 Melbourne Achiever Award at the 30th anniversary dinner in April 2015, for a significant and sustained contribution to Melbourne. The University of Melbourne and CSIRO steering committee for the Human Life Sciences Precint at Parkville was reconstituted following the CSIRO restructure 1 July 2014. The steering committee continues to meet quarterly, and the relationship has led to two joint appointments in the material science area.

People

Number of fatalities or major injuries of CSIRO people. Lost Time Injury Frequency Rates and Medical Treatment Frequency Rate improves year-on-year and is in the top quartile of like organisations.

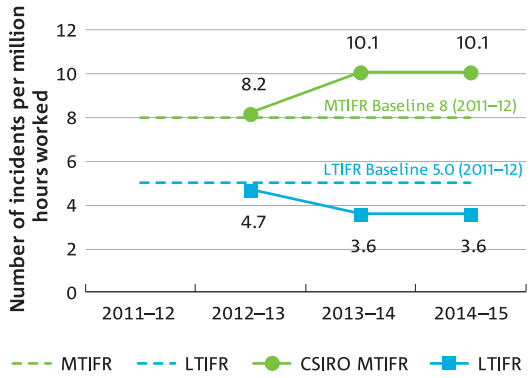
In the last 12 months, four fewer staff experienced a lost time injury than in 2013–14. A concurrent reduction in staff numbers rendered our LTIFR the same as for the 2013–14 period (see Figure 2.1).

The MTIFR is equivalent to 2013–14, while early intervention programs make up a large part of the injury profile. Initiatives encouraging staff to report body-stressing injuries early, before they develop into more disabling injuries, have continued, resulting in a significant drop in the rate of these injuries (17 per cent), particularly those attributed to repetitive movement. Maintaining a steady rate of recordable injuries over a year of significant change demonstrates the effectiveness of the programs.

The number of incidents reported to Comcare also decreased by 15 per cent in 2013–14.

For more information on our health and safety programs see pages 89–93.

FIGURE 2.1: CSIRO LOST TIME AND MEDICAL TREATMENT FREQUENCY RATES (CORRECTED FOR LAG REPORTS)

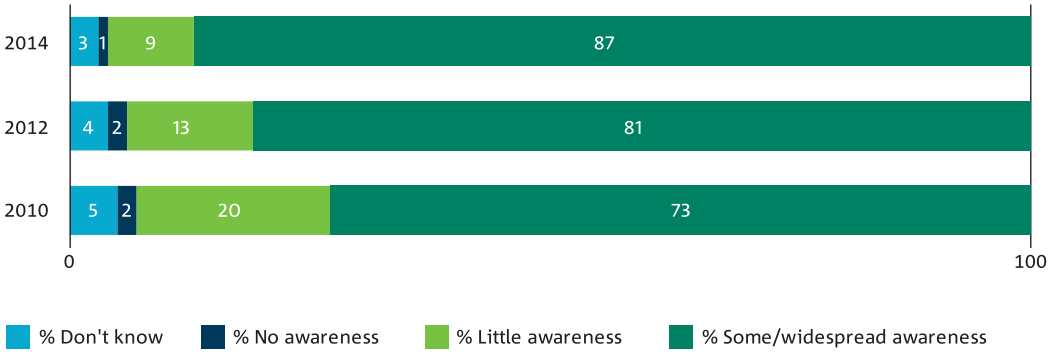


Awareness of CSIRO's Values increases year-on-year from the established baseline of 73 per cent in 2010–11 to 95 per cent in 2011–12. A baseline for the use of Values in guiding behaviours and decision-making is established by June 2012 and improves year-on-year over the strategy period.

Values awareness increased from 81 percent in 2012 to 87 percent in 2014 (see Figure 2.2). While this awareness level is below the target of 95 percent, it is important to note that the result was achieved during a period of intense organisational reform. All other attitudinal survey results measured during this period, with the exception of values awareness, decreased.

FIGURE 2.2: CSIRO STAFF AWARENESS OF VALUES

In your opinion, what level of awareness exists about CSIRO's Values Compass?



Resources

CSIRO's financial, operating and capital management performance meets approved annual budget.

During the year, CSIRO's operating, capital and cash positions were constantly monitored an achieved the budgeted financial outcomes. CSIRO delivered a deficit operating result of $14.5 million for the year, which was within $2.6 million of the approved loss position of $12 million. CSIRO did not fully spend its planned capital budget due to unforeseen delays in the following major projects – delivery of the future research vessel, Highett to Clayton re-location, and externally funded projects. The Property Strategy is a rolling strategy, which continues to be developed. Cash forecasting accuracy has improved, with planning now extending to a four year horizon.

Direct investment of CSIRO challenges and opportunities through the National Research Flagships increases to 65 per cent by 2014–15.

Direct investment of CSIRO resources towards major national challenges and opportunities through the National Research Flagships, Science and Services program increased to 88.5 per cent in 2014–15, exceeding the target of 65 per cent.

The EcoSciences Precinct building in Brisbane.

Listening to our clients

We work with customers of all sizes, applying our scientific expertise to help them grow and succeed. Here is just a glimpse of what our customers think about working with us.

- *There was good communication and honest desire to understand our needs and objectives and develop projects and timelines to deliver within our budget. Enjoyed the interaction with the scientists on the projects.*

  DOW AGROSCIENCES LLC

- *We have been pleased to receive and learn from CSIRO's practice of professional and effective work management. Our own operations improved as the result of collaborating with CSIRO teams in multiple projects.*

  VIET UC SEAFOOD JOINT STOCK COMPANY

- *The people we have dealt with share the same goals and aspirations as ourselves. They have been nothing short of sensational to work with. Our domestication program would not be where it is today and indeed nor would the Australian prawn farming industry.*

  GOLD COAST MARINE AQUACULTURE PTY LTD

- *We recently licensed state of the art technology from CSIRO which would be the primary reason to do business with CSIRO. Furthermore, I can rate the manner in which the CSIRO team handled the negotiations as one of the most efficient and most pleasant negotiations I have ever been involved in. The CSIRO team provides an example of how Tech Transfer should be done.*

  FUTURAGENE INC

- *The professionalism, expertise knowledge and experience of your staff is exceptional..... We have confidence that any work and interaction with CSIRO will provide internationally acceptable solutions.*

  TERNES AGRICULTURAL CONSULTING PTY

- *Nice scientists with good expertise and personality and to be easy to collaborate in research. Also CSIRO is a good place for young scientists to be trained.*

  SHANDONG ACADEMY OF SCIENCES

- *We have had a great relationship with CSIRO over the past three years, with a feral pig project. The advice, expertise and patience they have given is priceless.*

  BALKANU CAPE YORK DEVELOPMENT CORPORATION PTY LTD

- *I feel that you try to understand our business and to come up with solutions that work for us.*

  ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

- *CSIRO have proven to be an invaluable business partner. They have been flexible, dynamic and responsive and provided very high quality and timely outcomes/outputs.*

  DEPARTMENT OF HEALTH AND AGEING

Stakeholder engagement

Collaboration with customers and partners is essential to delivering sustainable impact for the nation. We continue to build and maintain strong relationships with our customers, partners and other stakeholders crucial to our success.

INDUSTRY COLLABORATION

CSIRO is committed to collaborating and partnering with organisations across Australia and around the world in a variety of ways, including strategic alliances, projects and joint ventures. We work with approximately 3000 customers, including 500 major Australian companies, more than 1200 Australian SMEs, and a large number of overseas corporations. Major strategic existing partnerships include Boeing, the Chinese Academy of Sciences and BHP Billiton, while new partnerships include Enirgi and the World Bank.

A key focus during the year was the development of partnerships in the areas of conservation, sustainability and the environment. Through the Minerals Flagship we entered into an international collaboration with China Metallurgical Group Corporation to commercialise our dry slag granulation (DSG) technology, which will transform the productivity and environmental performance of steelmaking globally. We also reached agreement with Enirgi to license the Magsonic technology, which reduces carbon dioxide emissions in magnesium metal production by up to 70 per cent. Our Oceans and Atmosphere Flagship signed a contract with BHP Billiton for $5 million of research over five years to increase the understanding of the Ningaloo Marine Park World Heritage area so as to ensure its conservation and sustainable use.

The Agriculture Flagship obtained funding from the Bill and Melinda Gates Foundation for a significant five-year project to work with a diverse group of international organisations, including three universities, two independent research organisations and a multi-national company, to support agricultural production in the world's 50 least developed countries. The $22 million Capturing Heterosis project aims to create self-propagating hybrid sorghum and cowpea crops with increased yield. The partners are the University of California Davis and the University of Georgia in the United States, the University of Zurich, the IPK in Germany, Langebio in Irapuato, Mexico, and DuPont-Pioneer.

COOPERATIVE RESEARCH CENTRES

The Cooperative Research Centre (CRC) program supports industry-led collaborations between researchers, industry and the community.

We engage in CRCs to build critical mass in research to tackle clearly articulated major challenges for end-users. Throughout the life of the program, over 200 CRCs have been funded by the Australian Government with 36 operating in the 2014–15 period. CSIRO has participated in 142 CRCs and as of 30 June 2015 is participating in 13.

There was one windup Greenhouse Technologies in December 2014, in which CSIRO was an Essential Participant. The CRC for Greenhouse Gas Technologies is no longer associated with the CRC program. However, it is continuing as a self-sustaining entity and is engaged in collaborative research. On 30 June 2015 CSIRO ceased participation in the Australian Seafood CRC when the funding term expired.

On 26 May 2015, The Hon Ian Macfarlane MP, Minister for Industry and Science, announced more than $74 million in funding for two CRCs – the CRC for Optimising Resource Extraction (CRC ORE) and the Innovative Manufacturing CRC (IMCRC). It is anticipated that CSIRO will be a participant in both the IMCRC and the CRC ORE.

CSIRO's total cash and in-kind contribution to CRCs in 2014–15 was $12.5 million.

CSIRO HAS PARTICIPATED IN 142 CRCS AND AS OF 30 JUNE 2015 IS PARTICIPATING IN 13.

GOVERNMENT ENGAGEMENT

Throughout 2014–15, we had regular meetings with ministers, parliamentarians and senior staff from relevant government departments, to listen to their needs, share our research activities, and provide scientific information and advice to inform policy development and program implementation and evaluation. This included contributing to the development of the Australian Government White Papers on Northern Australia and Agriculture.

CSIRO made six submissions to federal parliamentary inquiries, and our staff attended four hearings to provide further evidence. We also held three 'Science for Breakfast' briefings at Parliament House for parliamentarians and their staff. These briefings covered getting more from less, new industries from agriculture and unlocking the potential of northern Australia.

During the year the CSIRO Chief Executive became a member of the newly-formed National Science Technology and Research Committee, and also attended Commonwealth Science Committee meetings.

UNIVERSITY COLLABORATION

CSIRO partners with universities to ensure the best available research is utilised in delivering impact in areas of national priority. In 2014 Australian and overseas universities were partners in around 75 per cent of CSIRO's research publication, and in partnership with universities, CSIRO supervised 761 higher degree research students. In 2014–15 CSIRO undertook a range of activities with universities including:

- Together with 13 companies, four industry bodies and 16 Australian universities, CSIRO was announced as a partner in a new CRC for Innovative Manufacturing.
- Working with researchers from the University of Adelaide, Monash University and the Australian Synchrotron, CSIRO researchers developed a capsule, inspired by the porous structure of seashells, that protects pharmaceuticals from extreme temperatures.
- In collaboration with the University of Queensland and Telstra, CSIRO released a white paper that explores opportunities for Australian manufacturers in the emerging middle class of Asia.
- The National Geosequestration Laboratory (NGL), a collaboration between CSIRO, the University of Western Australia and Curtin University, commissioned three mobile laboratories that will be used for research in the field. NGL was established to conduct and deploy critical research and development to enable commercial-scale carbon storage options for Australia.

INTERNATIONAL COLLABORATION

Our connections with international universities and research institutes link us in to the 97 per cent of research that happens outside Australia and give access to essential data and expertise. By partnering with SMEs such as Textor, and major global companies such as Boeing and Bayer, we provide opportunities for Australian industry to join global value chains. Our science supports Australian foreign policy and trade agendas, including poverty alleviation and improving market access for Australian exporters and trading partners, particularly in Asia.

We continue to grow our international activities and their impact. For more information about our collaborations, alliances and partnerships with our global peers see our Operational Plan implementation on pages 16–19.

INDIGENOUS ENGAGEMENT STRATEGY

Our Office of Indigenous Engagement continued to implement the CSIRO Indigenous Engagement Strategy. As at 30 June 2015, we have 63 (1.2 per cent) Indigenous employees in CSIRO, an increase from 22 (0.3 per cent) on 30 June 2011. Of these, there are 16 cadets, 16 trainees, two research scientists, three experimental scientists and nine research technicians, with the remaining 17 working in the support functions of administrative services, technical services and communication and information.

We engage Indigenous Australians across a broad range of areas, such as marine and environmental science, human resources, property services, astronomy and space science, information management and technology, forestry, mining, horticulture and aquaculture – to name but a few. In this way, Indigenous Australians are engaged and contributing to research impacting the productivity and sustainability of Australian industry. Similarly, CSIRO also has Indigenous representation on high-level advisory committees such as the Minerals Resources Advisory Council and the newly-formed Indigenous Strategic Advisory Council.

IN PARTNERSHIP WITH THE BHP BILLITON FOUNDATION, WE ARE SUPPORTING STEM PARTICIPATION THROUGH A $28.8 MILLION, FIVE-YEAR PROJECT.

More than 500 staff across research, support and leadership areas have now participated in the 'Seeing through both eyes' program, an interactive course aimed at increasing cultural understanding and Indigenous awareness. This year sessions were held in Narrabri, Sydney, Perth, Geraldton, Melbourne, Adelaide, Brisbane and Canberra. The program has been effective in opening up more cadetships, traineeships and employment positions, by encouraging participants to think about how they might contribute to achieving Indigenous employment targets in their respective business units.

Research engagement has continued to develop, with exciting new partnerships particularly in the National Environmental Science program hubs. CSIRO staff involved in collaborations received awards including the 2014 Banksia Sustainability Award for an Indigenous biocultural knowledge project, while a Tiwi Islands fire ant eradication project won the Biodiversity category of the 2015 United Nations of Australia World Environment Day Awards.

In partnership with the BHP Billiton Foundation, CSIRO is implementing a five-year, $28.8 million education project aimed at increasing the participation and achievement of Aboriginal and Torres Strait Islander students in science, technology, engineering and mathematics (STEM). Recognising the fundamental importance of culture and identity in student achievement, a strong cultural aspect, as well as a rigorous academic focus, is guiding the development, implementation and evaluation of the project.

Performance of Portfolio Budget Programs

CSIRO received approximately 61 per cent of its operating revenue in appropriation funding from the Commonwealth Budget. Our commitment to the Parliament and people of Australia, set out in the Portfolio Budget Statements (PBS) 2014–15, is to contribute to the following outcome[5]: *Innovative science and technology solutions to national challenges and opportunities to benefit industry, the environment and the community, through scientific research and capability development, services and advice.*

This is achieved through three Programs:

- National Research Flagships, Science and Services
- National Research Infrastructure: National Facilities and Collections
- Science and Industry Endowment Fund.

The following sections provide a report against the deliverables and key performance indicators specified for each Program in the PBS. Table 2.2 outlines a summary of our consolidated financial performance by PBS Program.

TABLE 2.2: CSIRO (CONSOLIDATED) FINANCIAL SUMMARY BY PBS PROGRAM 2014–15, $M

	ACTUAL	PBS BUDGET	VARIANCE
Government revenue	745.3	745.3	-
External revenue	475.7	469.5	6.2
Total revenue	**1,221.0**	**1,214.8**	**6.2**
Program 1 (National Research Flagships, Science and Services)	1,068.5	1,095.3	-26.8
Program 2 (National Research Infrastructure: National Facilities and Collections)	169.6	163.1	6.5
Program 3 (Science and Industry Endowment Fund)	24.1	24.5	-0.4
Total expenses	**1262.2**	**1282.9**	**-20.7**

5 The relevant section of the Portfolio Budget Statements can be viewed at: www.industry.gov.au. The outcome is the formal legal statement of the purpose for which funds are appropriated to CSIRO.

Program 1

National Research Flagships, Science and Services

CSIRO commits the majority of its resources to addressing major national challenges and opportunities through our National Research Flagships Program, through large-scale, multidisciplinary research partnerships with Australian universities, publicly-funded research institutions, the private sector and selected international organisations.


Agriculture


Biosecurity


Digital Productivity and Services


Energy


Food and Nutrition


Land and Water


Manufacturing


Mineral Resources


Oceans and Atmosphere

CSIRO also provides technical and advisory services to industry and government. CSIRO Services runs student education programs, provides technical and engineering services, SME support and foresight advisory services.

CSIRO education and outreach programs consist of several key elements, including:

- Discovery Centre – showcases CSIRO science and technology achievements through an interactive journey into the world of research and innovation.
- Education Programs – explore a range of engaging science programs based on real CSIRO science for schools and students.
- CSIRO Publishing – an internationally recognised publishing program covering a wide range of scientific disciplines.

OBJECTIVES AND DELIVERABLES

CSIRO's Research and Services activities deliver economic, social and environmental impact to the nation through the provision of advice, information and solutions. A key objective of our CSIRO Strategy 2011–15 was to grow our National Research Flagships as a key mechanism for achieving outcomes that have the potential to deliver major, long-term benefits to Australia. Through the provision of technical and advisory services to industry and government, we also support Australian small and medium enterprises (SMEs) in improving their business performance.

Our science outreach programs aim to promote the importance of CSIRO science and its application to students, parents, teachers and the Australian community. We support undergraduate, postgraduate and postdoctoral researchers, to boost the calibre of researchers working in the Australian community and strengthen Australia's future innovation capacity. We also operate CSIRO Publishing, an independent science and technology publisher, which has a global reputation for quality products and services covering a wide range of scientific disciplines, including agriculture, chemistry, plant and animal sciences and environmental management.

PROGRAM PERFORMANCE

This year our National Research Flagships, Science and Services continued to perform well. An assessment of the Program's six key performance indicators (KPIs) identified in the Portfolio Budget Statements showed we met expectations and targets. Table 2.3 provides an overview of the evidence for each KPI, with a more detailed analysis following.

TABLE 2.3: PERFORMANCE INDICATORS FOR PROGRAM 1 – NATIONAL RESEARCH FLAGSHIPS, SCIENCE AND SERVICES

KEY PERFORMANCE INDICATOR	TARGET (AND PERFORMANCE ASSESSMENT)	PERFORMANCE
Evidence of economic, social and environmental impacts through demonstrated uptake and adoption of research outputs	Grow economic, social, and environmental benefits	An external review of CSIRO's impact and value during the year indicated an expected return on investment of at least 5:1. Adoption and uptake as demonstrated by IP assets shows that 61 per cent of CSIRO's patent portfolio is either subject to a research right, arose as a result of collaborative activity, was used as background IP in a collaboration, or is subject of a commercial licence.
Number of refereed publications	Maintain or increase	Flagships produced a total of 3552 publications in 2014. The recent restructure limits the ability to compare results with 2013. Prior to 2014, CSIRO staff were connected with Divisions and sometimes Flagships, while for 2014 all staff are connected with Flagships. Although the number of publications therefore appears to have almost doubled, this is an artefact of the reorganisation. In addition, 312 publications were produced by National Facilities & Collections and 20 by CSIRO Services.
Customer satisfaction	Maintain	This is the third year of our client satisfaction survey. Results show an average 'willingness to recommend' score of 8.2 out of 10.
Awareness of science by CSIRO stakeholders	Maintain or increase	89 per cent of Australians are aware of CSIRO, a slight downward trend compared to previous years. Overall, CSIRO is viewed as an important organisation that can assist Australia in advancing the nation's ability to have significant global impact through innovative science and technology.
Science excellence in CSIRO research capabilities and the impact of their research outputs	Maintain or improve	Our citation impact has been improving over the last decade, with CSIRO articles cited performing 48 per cent better than the global average for 2010–14, a slight rise from 47 per cent for 2009–13. In 2010–14, 2.9 per cent of CSIRO publications were in the top one per cent of articles globally, 10.5 per cent in the top five per cent and 18.4 per cent in the top ten per cent, an increase from 2009–13.
Utilisation and success of science outreach programs	Maintain or increase	Utilisation and success of science outreach programs has been maintained. In 2014 we began developing new programs, including our bootcamps for senior secondary students and our BHP Billiton Science, Technology, Engineering and Maths Indigenous program.

Blue shading: indicates positive progress for the year and that the target has been achieved.
Green shading: indicates some challenges have occurred during the year, but they are being managed.

Evidence of economic, social and environmental impacts through demonstrated uptake and adoption of research outputs[6]

CSIRO commissioned ACIL Allen to undertake an independent review of the economic, social and environmental impact and value of CSIRO. The review assessed the value and impacts of CSIRO research through assessment of six case studies, examined areas of activity not covered by the case studies, and also recognised a number of other elements of CSIRO's portfolio – such as the value of its 'standing capabilities'. The review was undertaken between August and December 2014, and concluded that the whole of CSIRO portfolio is delivering an expected return that supports an expected benefit-cost ratio of at least 5:1[7], with some case studies supporting an expected benefit as high as 12:1.

Intellectual property management and licensing

Intellectual property is a key tool for capturing the benefits of our research for Australia, protecting the results of our activity and ensuring our technologies are not inappropriately copied by competitors. Our Intellectual Property Management framework is provided by the Statement of Intellectual Property Principles for Australian Government Agencies. Strong IP portfolios also provide key positioning in various marketplaces, underpinning our strategy and providing external reputation benefits with customers and potential collaborators and competitors.

As of June 2015, CSIRO had 578 patent families, 313 trade mark families, and 114 different Plant Breeders' Rights. We have seen a decrease in the number of new inventions filed and a decrease in the total number of patent families in the IP portfolio, while other measures, such as the number of Patent Cooperation Treaty (PCT) patents and the number of granted cases, increased. The overall number of live cases appears steady over the last few years. An apparent decrease in the number of new inventions continues a trend that has been evident for several years.

Some of these downward trends demonstrate an increased focus on a more strategic approach to the management of our patent portfolio, utilising the patent process only for cases where it is likely to achieve the intended impact. Some of the decline may relate to a reduction in filing inventions that used to arise from strategic funding of fundamental science. Most patent filings are now coming from Flagship-directed research only. Overall however our portfolio remains healthy, with a rise in the number of granted cases reflecting an increase in quality patent filings.

Of the IP assets listed in Table 2.4, 61 per cent of CSIRO's patent portfolio is either subject to some research right, arose as a result of collaborative activity, was used as background IP in a collaboration/evaluation or is subject of a commercial licence. Of the 105 unique Plant Breeder's Varieties, 35 per cent are licensed. About half the licences that generate revenue relate to licensing of Registered IP rights (Patents, Trade marks and Plant Breeder's Rights). A significant component of licensing revenue was generated by cotton seed and WLAN royalties. Other IP revenue was derived from our work with contact lenses, coal and mining automation (LASC). The majority of the remaining revenue was generated from copyright and patent licences. Most of the licences generating revenue were to Australian companies, with one third international entities.

Registered Rights are also used as collateral in collaborations or technology evaluations, and these types of third party engagements themselves generate new IP that can lead to other licensing opportunities or other collaborations. Currently CSIRO has more than 30 active research collaborations that have patents listed as background IP. Of the current patent families, 195 (30 per cent) were the result of collaborative activity with 97 distinct external parties. The majority of partners (64 per cent, including 40 per cent international) can be characterised as industry partners, 24 per cent SME and large Australian firms. The other partners are Australian research institutes (15 per cent), government bodies (16 per cent) and overseas research institutes (5 per cent).

6 Due to the Integrated Reform Program, the schedule for Flagship Reviews was revised. No reviews were held in 2014–15, but they will recommence in 2015–16.

7 For the detailed assessment and results please see www.csiro.au/2014-impact-assessment

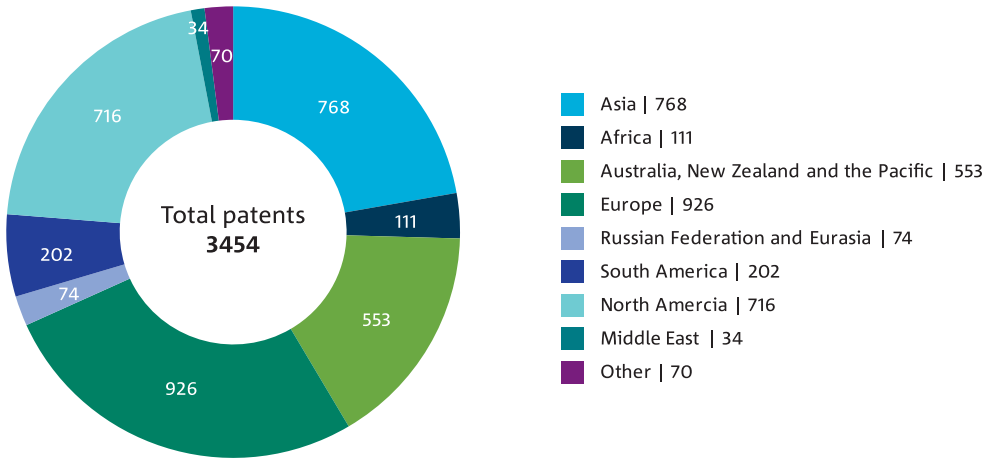
The total number of live patent cases in Asia has been growing steadily over recent years. CSIRO has a large proportion of live patent cases in Asia, with at least 20 per cent in Japan, China, India, South Korea, Hong Kong, Malaysia, Indonesia, Singapore, Vietnam, Taiwan, Thailand and the Philippines (see Figure 2.3).

There has also been an increase in the number of filings in South America and Africa, but these regions represent a relatively small portion of our patent portfolio, slightly more than seven per cent. Overall, our spread of patent cases mirrors the geographic regions where we focus our research and its reach.

TABLE 2.4: CSIRO INTELLECTUAL PROPERTY PORTFOLIO

IP CATEGORY	SUB CATEGORY	2010–11	2011–12	2012–13	2013–14	2014–15
Patents	Current PCT applications	101	98	83	56	78
	Granted	1,631	1,649	1,647	1,755	1,854
	Live cases	3,370	3,582	3,454	3,506	3,454
Inventions	Patent families	709	728	718	644	578
	New provisional and direct filings	92	95	87	66	63
Trade marks	Australian	259	275	281	257	250
	Foreign	109	81	88	91	63
Plant breeder's rights	Australian	122	83	87	91	89
	Foreign	21	39	24	26	25
Registered designs	Australian	2	3	3	2	2
	Foreign	10	8	8	6	6

FIGURE 2.3: CSIRO'S LIVE PATENT CASES BY GEOGRAPHIC REGION



Equity portfolio

CSIRO licenses technology to existing companies where it is deemed the most likely route of maximising IP value. However, it also directly creates new high technology SMEs through spinning out IP, when that is considered to be the best pathway to commercialisation.

The total value of CSIRO's equity portfolio at 30 June 2015 was $12.6 million. This is a decrease compared with the value at 30 June 2014 of $14.6 million. The major contributing factors of the revaluation and impairment of the portfolio were the sale of Advantage Wheats Pty Ltd, which resulted in a $1.4 million decrease, and additional investment of $2.1 million into the portfolio, resulting in the final value of $12.6 million.

During the 2014–15 reporting period two companies were deregistered and one new company added to the portfolio. Currently CSIRO has interest in 31 companies with a total market value of $495 million.

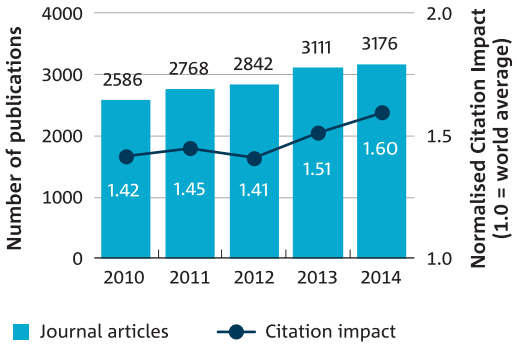
Maintain or increase the number of refereed publications

The total number of publications produced by Flagships in 2014 was 3552[8], based on the home Flagship of the authors. The restructuring of CSIRO has rendered comparison of this figure with 2013 output impossible; prior to 2014 CSIRO staff were connected with Divisions, and sometimes with Flagships, while in 2014 all staff are connected with Flagships. The number of publications shown as connected with Flagships therefore appears to have almost doubled, but in reality this is an artefact of the reorganisation. In addition, National Facilities and Collections produced 312 publications, and CSIRO Services 20.

The number of refereed CSIRO journal articles has been trending upwards over the last five years (see Figure 2.4), with a two per cent increase between 2013 and 2014.

Research publication performance is often measured in the science community by counting citations: the references from one article to another in its bibliography. When one piece of work cites another, this is taken as recognition of value and academic impact. The more citations an article has received, the more impact it has had on its field.

FIGURE 2.4: CSIRO PUBLICATION OUTPUT AND CITATION IMPACT[9]



Science excellence in CSIRO research capabilities and the impact of their research outputs

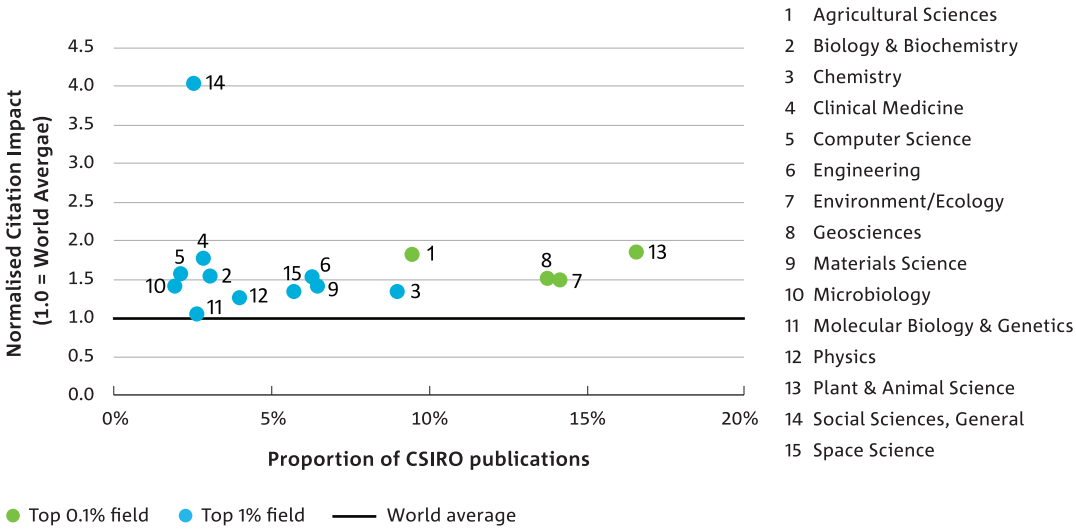
CSIRO produces 51 per cent of our publications in the four fields for which the organisation is most strongly ranked globally by total citation count (see Figure 2.5). The remaining fields in which we rank in the top one per cent globally are also shown.

Citations can also be expressed relative to the world average performance, accounting for the age and subject of publications. A result of 1.0 is equal to the global average, 1.2 is 20 per cent more cited and 0.75, 25 per cent less cited. Overall, our citation impact has been improving over the last decade, with CSIRO articles cited performing 48 per cent better than the global average for the period 2010–14, a slight rise from 47 per cent for the period 2009–13.

Another robust and established metric is ranking articles by citation count based on percentile performance, compared with all other articles of the same type and in the same subject area. In 2010–14, 2.9 per cent of CSIRO publications were in the top one per cent of articles globally, 10.5 per cent in the top five per cent and 18.4 per cent in the top ten per cent. All three of these levels improved on the period 2009–13. These results demonstrate that our share of the very best research output is substantially above average and continues to improve.

8 Flagship publications include journals, books, book chapters, technical reports and conference papers as per the organisational publication repository.
9 Journal articles as per Web of Science.

FIGURE 2.5: CSIRO PUBLICATION OUTPUT AND CITATION IMPACT BY RESEARCH FIELD, 2005–14

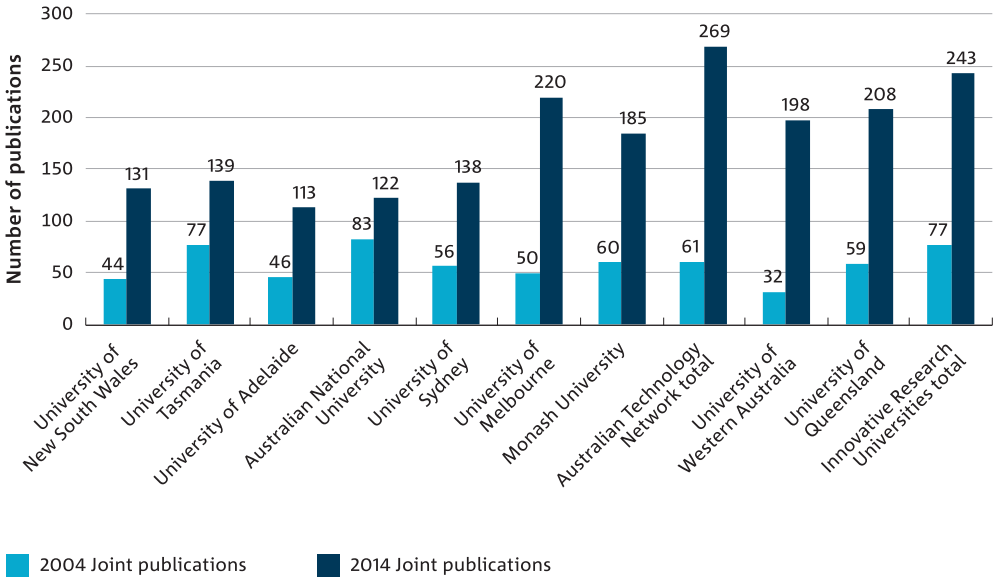


Joint research publications with Australian universities

Our number of collaborative publications has more than doubled since 2004. In 2014, 86 per cent of our publications were collaborations with authors from other institutions. Of these, 62 per cent were produced with authors from other Australian institutions. Figure 2.6 shows our collaboration with Australian universities has also increased substantially since 2004 (as measured by joint publications). We continue to collaborate with the Group of Eight universities, universities in the Australian Technology Network of Universities and those in the Innovative Research Universities.

Network analysis can also show our place in Australia's research ecosystem by analysing the relationships among research producers, as measured through their collaborative publications. Applying a common network metric, Eigenvector Centrality, which shows a weighted closeness of the organisation to all other institutions, CSIRO is demonstrated to be the most important ('central') institution in the country in the seven fields in which it publishes most work: Agricultural Sciences, Chemistry, Engineering, Environment and Ecology, Geosciences, Materials Science, and Plant and Animal Science.

FIGURE 2.6: CSIRO JOINT RESEARCH PUBLICATIONS WITH KEY AUSTRALIAN UNIVERSITIES



Joint research publications with other countries

We have significantly increased the rate of collaboration with organisations overseas, as measured by joint publications. In 2014, 52 per cent of our scientific publications were co-authored with an international author. The top ten countries we co-published with are, in descending order, the USA, China, England, Germany, France, Canada, the Netherlands, New Zealand, Italy and Japan. Joint publications with institutes in China increased nearly seven-fold between 2004 and 2014. Over the same period joint publications with USA institutions more than doubled.

Maintain customer satisfaction

Our 'Listening to Clients' online survey asks our customers to rate their 'willingness to recommend' CSIRO on a scale of 0–10, and provide reasons for their score. For the third consecutive year, we received high satisfaction ratings from customers, recording an average 8.2 out of 10 this year. Customers rated us best for science quality, the calibre of our staff and described us as *'great to deal with'.* The survey results provide valuable insight into our performance and inform improvements to our customer engagement initiatives, business processes and services, such as timeliness, communication and cost.

Awareness of science by CSIRO stakeholders

A majority (89 per cent) of Australians are aware of CSIRO, a slight downward trend compared with previous years. Awareness is higher among older Australians, with 99 per cent of Australians aged 55 and over aware of CSIRO, compared with 76 per cent of Australians aged 34 and under. The downward trend reflects the decline in STEM awareness and interest among younger Australians, the entry of this cohort into adulthood, and participation in our survey demographics.

Consistent with previous studies, a majority (63 per cent) of Australians still have a positive perception of CSIRO with 28 per cent viewing the organisation very positively and 35 per cent positively. Understanding of what CSIRO does has increased substantially with 60 per cent of Australians saying they understood CSIRO, compared with 37 per cent in the last survey, with 21 per cent saying they understood CSIRO extremely well (up from 13 per cent). Overall, CSIRO is viewed as an important organisation that can assist Australia in advancing the nation's ability to have significant global impact through innovative science and technology.

63% OF AUSTRALIANS HAVE A POSITIVE PERCEPTION OF CSIRO. CSIRO IS VIEWED AS AN IMPORTANT ORGANISATION THAT CAN ASSIST AUSTRALIA IN ADVANCING THE NATION'S ABILITY TO HAVE SIGNIFICANT GLOBAL IMPACT THROUGH INNOVATIVE SCIENCE AND TECHNOLOGY.

To raise awareness of CSIRO with all our customers, we will launch CSIROseven, a marketing and media campaign promoting our people and our impact on Australia's innovation system, later in 2015.

In our 'Listening to clients' survey we received high satisfaction ratings from customers. Image: Shutterstock

Agriculture Flagship

GOAL: DELIVER TRANSFORMATIONAL POSITIVE IMPACT ON THE PRODUCTIVITY, PROFITABILITY AND AGRO-ECOSYSTEM HEALTH FOR AUSTRALIA'S AGRI-FOOD- AND AGRI-FIBRE INDUSTRIES AND TO PARTNER GLOBALLY TOWARDS FOOD SECURITY IN A RESOURCE AND CLIMATE CHALLENGED WORLD.

THE CHALLENGES

The growing global population requires a 70 per cent increase in food supply in the coming 30 years to sustain the human race and avert global instability driven by food shortages. This needs to be achieved in the face of diminishing natural resources, strong regional urbanisation, increasingly protein-rich diets, a changing climate and environmental constraints on arable land expansion while supporting an export market valued at more than $41 billion.

OUR RESPONSE

This year CSIRO brought all agriculture research together into one Flagship, making it one of the world's largest agricultural research institutions, connecting research across agricultural sectors and diverse research disciplines. We initiated our digital agriculture strategy, to create and deploy digital technologies across the agricultural value chain.

Our Flagship also released molecular markers for four important rust-resistance genes to the wheat breeding industry. These enable breeding companies to develop new varieties that are resistant to existing and emerging forms of this major disease of wheat.

We produced the first wheat yield gap map for Australia to contribute to the world wheat yield gap atlas on an interactive internet platform. The district maps are now available for growers and researchers to interrogate and start exploring their local yield gaps and the ways in which they may be reduced.

We successfully completed field trials for the long chain omega-3 (DHA) canola that prompted Nuseed and GRDC to extend our collaboration to develop additional long chain omega-3 canola oils. Commercialisation of these oils will mean CSIRO technology dominates the global plant-produced long chain omega-3 oils market.

OUR PATHWAYS TO IMPACT

We released the Northern Australia Food & Fibre Supply Chains Study. Using a new integrated modelling approach, the report examined new opportunities and highlighted a range of critical infrastructure and supply chain investments needed to realise northern Australia's potential. This report is already influencing investments and the policy debate around northern Australia.

We contributed to the development, registration and release of Australia's first oral analgesic for use in cattle, Buccalgesic®, manufactured by Troy Laboratories Australia. Released in April 2015, the first batch sold out within a week, and high demand continues for this practical and effective means for managing pain in cattle.

The Water Use Efficiency Initiative won the Department of Agriculture Landcare Eureka Prize for Sustainable Agriculture. The Initiative has resulted in diverse practice changes on farms in southern Australia that have improved the water use efficiency of crop production. Australian grain farmers are boosting yield by more than 50 per cent without using extra water.

WE CONTRIBUTED TO THE DEVELOPMENT, REGISTRATION AND RELEASE OF AUSTRALIA'S FIRST ORAL ANALGESIC FOR USE IN CATTLE, BUCCALGESIC®, MANUFACTURED BY TROY LABORATORIES AUSTRALIA.

Australia's living skin bared in stunning three dimensions

Australia's soils and landscapes constitute one of the country's most valuable assets, critical to food production, our health and the profitability and sustainability of sectors such as agriculture, mining and infrastructure.

The Soil and Landscape Grid of Australia, launched in November 2014, is the result of a partnership between CSIRO, the University of Sydney, several government agencies and the Terrestrial Ecosystem Research Network (TERN). It is the first continental expression of the Global Soil Map concept and revolutionises soil information globally.

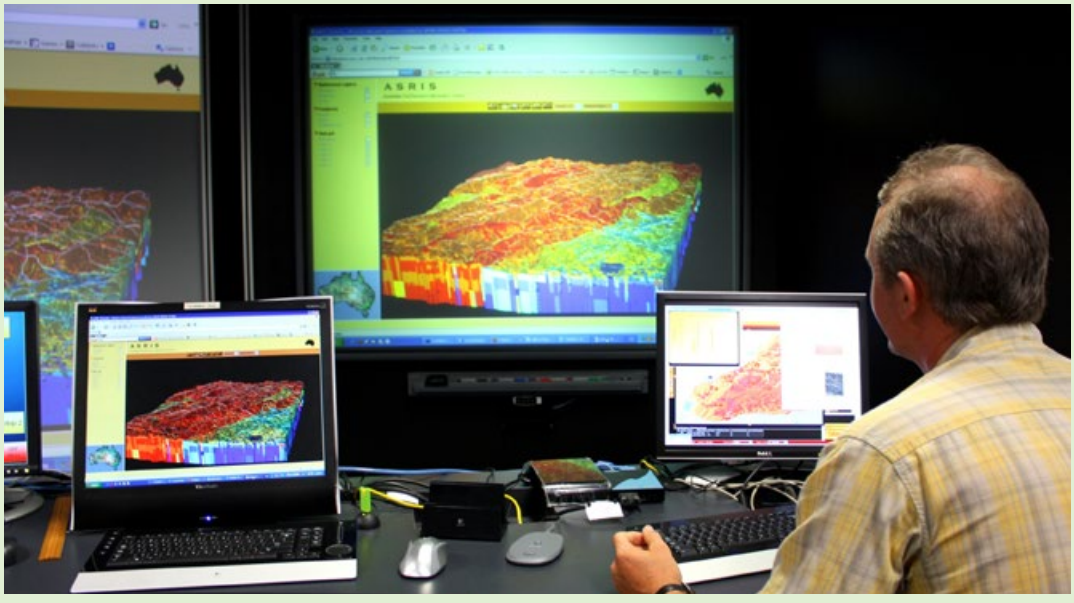
The grid exposes Australia's vast and complex land surface in new ways thanks to the most comprehensive nation-wide digital maps of our soils and landscapes yet produced. The entire country is represented as a digital grid with two billion pixels, about 90 by 90 metres, down to a depth of two metres below the surface.

The grid draws information from the partner agency databases, weaving together historical and current data from sampling, laboratory sensing, modelling and remote sensing. It also includes estimates of reliability and is designed to integrate future data, even from technology that has not yet been invented.

The grid is completely free and accessible to anyone. Urban and regional planners, land managers, farming groups, scientists and engineers have adopted it for a range of uses, from exploring new land uses and making the most of water to finding habitats for endangered native species. In the first six months, the grid website had over 4200 map views each week from 100 countries. Users include most Australian universities and science organisations, international institutions, and about twenty private industry companies, many of them acting for a range of clients.

The grid was a critical component of a report commissioned by the Australian Government to inform the development of its Northern Australia White Paper.

The Wentworth Group of Concerned Scientists has used the grid in collaboration with the Natural Resource Management community in developing a national model for environmental accounting, 'Accounting for Nature'. The model allows measurement of the condition of environmental assets and places the information into an accounting framework, enabling communities and governments to take practical action to maintain healthy and productive land, freshwater and marine resources.



The Soil and Landscape Grid of Australia provides relevant, comprehensive, nation-wide data in an easily-accessible format.

Biosecurity Flagship

GOAL: THROUGH NATIONAL AND INTERNATIONAL PARTNERSHIPS, WORK TO SUPPORT AUSTRALIA'S SOCIAL, ENVIRONMENTAL AND ECONOMIC WELLBEING BY REDUCING THE RISK OF PESTS AND DISEASES EMERGING OR ENTERING AUSTRALIA, THEREBY PROTECTING OUR $60 BILLION AGRICULTURAL INDUSTRY, PRICELESS ENVIRONMENT AND SOCIETY.

THE CHALLENGES

Australia's enviable biosecurity status is increasingly threatened by growing global trade and the international movement of plants, animals and people. A changing climate can also impact on the magnitude and/or range of threats from exotic pests and diseases. These affect our agricultural industries and access to export markets. While the risks we face are only likely to increase, expertise and resources in biosecurity research are declining.

OUR RESPONSE

Wind-borne biosecurity pests, such as wheat rusts, pest insects and agents of plant, animal and human diseases, remain poorly understood and managed. CSIRO and the Bureau of Meteorology have partnered to develop the Tool for Assessing Pest and Pathogen Aerial Spread (TAPPAS), a user-friendly web-based interface that allows users to easily visualise and assess wind-borne threats. It can be used to conduct tailored analyses, such as helping the Northern Australian Quarantine Service prioritise their surveillance efforts. TAPPAS is available to existing partners throughout 2015, with a global release expected in 2016.

Carp are one of the most invasive and damaging pests of our freshwater ecosystems costing the Australian economy an estimated $500 million per year[10]. Our research, supported by the Invasive Animals Cooperative Research Centre, has shown that the use of Cyprinid herpesvirus 3 (CyHV-3) as a biocontrol agent has the potential to significantly reduce the number of carp in our rivers. In 2014–15 the entire genetic sequence of the virus was determined, and further work completed on persistent (latent) infections of carp with CyHV-3. The latter may prove to be very important in understanding the spread and activity of the virus.

We are helping Australia, and the world, prepare for the next human pandemic. For more than 50 years, eggs have been used to grow influenza vaccine virus to help protect people world-wide from the deadly flu virus. However, this is not an efficient system.

We are taking advantage of our expertise in immunology and genome engineering technology, to modulate genes in the egg to favour the growth of virus. Within the last year we have conducted the proof-of-concept work in a chicken cell line and are now beginning to engineer the modifications into the chicken. This technology has the potential to significantly increase the number of vaccine doses produced per egg.

OUR PATHWAYS TO IMPACT

A human disease pandemic, European honey bee colonies wiped out and an invasion of a devastating wheat disease are just three potential biosecurity threats facing Australia, as outlined in our report *Australia's Biosecurity Future: Preparing for future biological challenges*.

Developed in collaboration with government and industry for the benefit of diverse stakeholders, the report is a vital forecasting document that identifies the major trends and risks Australia may need to respond to over the next 20–30 years, and what we need to do to protect our environment, industries and people. The Minister for Agriculture, the Hon Barnaby Joyce, endorsed the Biosecurity Futures report in a public statement.

The announcement of human trials of an antibody treatment for the deadly Hendra virus, to be conducted by the Queensland Health Department, is yet another significant development in our Hendra research story, which began in 1994. Our scientists were instrumental in the preliminary *in vitro* and *in vivo* (animal studies) work undertaken at the highest level of biosafety at the Australian Animal Health Laboratory (AAHL). Our involvement in the development of the human monoclonal antibody, known as m102.4, was part of a truly global effort. The trials are the next step in defeating this deadly virus and, together with the CSIRO-developed horse vaccine, adds to the arsenal of tools in the fight against Hendra virus.

10 Gehrke PC, St Pierre S, Mateev V, Clarke M (2010). Ecosystem responses to Carp population reduction in the Murray-Darling Basin. Project MD923 Final Report to the Murray-Darling Basin Authority

Farmers reap the rewards of a decade of research

Globally, the silverleaf whitefly (*Bemisia tabaci*) causes crop losses in excess of US$2 billion per year and is recognised as one of the most damaging invasive pests due to its ability to spread disease.

Before silverleaf whitefly appeared in Australia in 1995, the agriculture industry had never experienced a pest of its nature with the ability to cause extensive damage to crops, move easily between a wide variety of crops, and rapidly develop resistance to insecticides.

GLOBALLY, THE SILVERLEAF WHITEFLY (*BEMISIA TABACI*) CAUSES CROP LOSSES IN EXCESS OF US$2 BILLION PER YEAR.

Twenty years of research resulting in a direct benefit to farmers were highlighted this year with the CSIRO 2014 Chairman's Medal awarded to the Silverleaf Whitefly Integrated Pest Management Team. They were recognised for their delivery of a long-term, sustainable pest control solution against silverleaf whitefly, for the benefit of Australia's horticultural, nursery, cotton and grain legume industries.

The foundation of their work was the identification and release of a highly effective biological control agent, *Eretmocerus hayati* (*E. hayati*), with further ecological research providing the knowledge to develop long-term management solutions.

When growers follow the recommended management solutions, which include actions such as avoiding insecticides which harm *E. hayati*, planting a crop that is less susceptible to silverleaf whitefly prior to the peak whitefly season and keeping broad leaf weeds to a minimum, silverleaf whitefly numbers can be reduced almost 100 fold.

As a result of our extensive expertise, our scientists are now helping tackle the problem of the African cassava whitefly. This new work is part of an international project funded by the Bill & Melinda Gates Foundation through the Natural Resources Institute, University of Greenwich. Launched in Uganda in early 2015, it will run until 2019.

The silverleaf whitefly is recognised as one of the all-time worst global pests because it spreads devastating viruses to crops.

Digital Productivity and Services Flagship

GOAL: DELIVER INNOVATION IN SCIENCE AND TECHNOLOGY FOR THE DEVELOPMENT OF AUSTRALIA'S DIGITAL FUTURE. WE WILL DELIVER ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACT AND HELP TRANSFORM THE AUSTRALIAN ECONOMY, THROUGH THE CREATION OF INTELLECTUAL PROPERTY, NEW SPIN-OUTS AND PARTNERSHIPS WITH GOVERNMENT AND INDUSTRY.

THE CHALLENGES

By 2055, the number of Australians aged 65 and over is projected to more than double. Chronic disease incidence continues to rise, and health is already the second largest area of Australian government expenditure. We are more 'connected' than ever before: 83 per cent of all households had internet access in 2012–13, 11 million Australians made an e-commerce transaction in 2014, and we also have great expectations for experiences. Digital technologies and big data are fundamentally reshaping economies, markets and industries in Australia and internationally.

OUR RESPONSE

Through the Flagship we are making healthcare accessible, by enhancing existing services and delivering outcomes remotely to reduce costs, assisting older Australians and people with chronic illnesses to achieve or maintain greater independence, and optimising existing health infrastructure and systems.

By enhancing accessibility, usability and outreach of government services, building accessible service solutions for citizens online, informing decision-making, and empowering governments to manage and reduce cost, we are helping to deliver better digital services.

We are also partnering with industry to develop solutions for a better economy, by embracing digital technologies to realise competitive advantages, capturing value from disruptive technologies, and using platform technologies to underpin future success.

WE RELEASED SPARK, A NEW BUSHFIRE MODELLING FRAMEWORK THAT CAN PREDICT THE SEVERITY AND SPREAD OF DESTRUCTIVE BUSHFIRES.

OUR PATHWAYS TO IMPACT

This year, in conjunction with health authorities in Western Australia, the Flagship completed trials of a low-cost system that uses broadband satellite technology to screen people living in very remote and rural areas who are at risk of eye disease. One of the underlying technologies, Remote-I, was licensed to TeleMedC, which plans to take the technology to the US and the world as part of its 'EyeScan' diagnostic solution.

VizbiPlus, our biomedical data visualisation collaboration with the Walter and Eliza Hall Institute of Medical Research and the Garvan Institute, produced two new animations on Alzheimer's disease and type-2 diabetes, to inspire and educate the public about cutting-edge biomedical research into these diseases. This led to strong engagement with the public and research community via a well-attended event at CSIRO's Discovery Centre and on social media, positioning CSIRO as a leader in data visualisation.

We released Spark, a new bushfire modelling framework that can predict the severity and spread of destructive bushfires. Spark has become one of the most downloaded items from our the CSIRO Data Access Portal, and the release generated requests from the fire fighting and land management, education, insurance and web mapping sectors. We will soon enter an early adopter phase with a number of state emergency services.

We continued commercialisation of our Zebedee hand-held laser scanner with UK joint venture GeoSLAM (more on page 55); worked with the Manufacturing Flagship and commercialisation partners to deliver our tele-assistance technology Guardian Mentor Remote to the mining, oil and gas, and aerospace industries (more on page 48); and developed, with the Energy Flagship and Australian company HabiDapt, a technology for householders to keep real-time track of their electricity usage and remotely switch on and off appliances (more on page 42).

Smartphone app a lifesaver for heart attack patients

Cardiovascular disease kills one person every 12 minutes in Australia. While more people survive heart attacks than ever before, they are living with a chronic condition that needs to be actively managed. More than $5.5 billion is spent every year on managing heart disease.

Patients who successfully complete a cardiac rehabilitation program following a heart attack are less likely to have another cardiac event, be readmitted to hospital or die from their condition. These six-week programs are designed to help patients return to an active, satisfying life.

Despite these benefits, participation in rehabilitation is poor due to factors such as time constraints, accessibility, lack of referral and patient motivation.

We developed the Care Assessment Platform (CAP) program to deliver cardiac rehabilitation via smartphones for patients and a web-portal for clinicians.

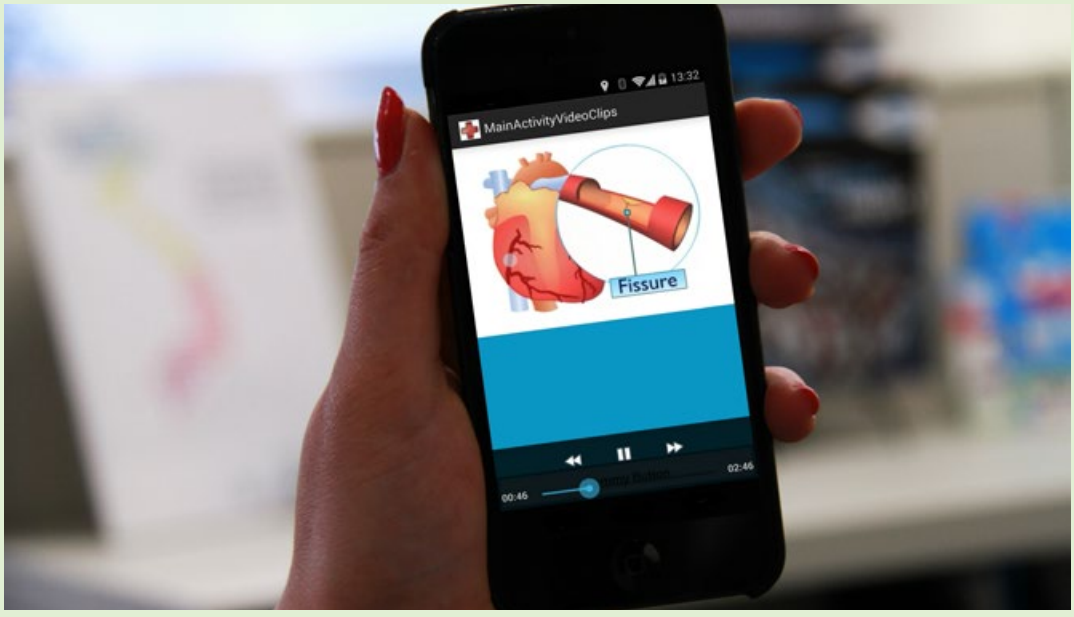
Rather than patients regularly travelling to outpatient clinics, CAP brings the rehabilitation program to the patient. Blood pressure, weight, physical activity and other information is recorded through the smartphone each day and uploaded to the web portal for the clinician to view. Weekly phone calls from a health mentor support patients in their risk modification and provide counselling. Daily SMS messages educate and motivate patients.

This year, in partnership with Queensland Health through the Australian eHealth Research Centre, we reported the results of a randomised controlled trial of the program to compare CAP with the traditional program.

Our trial found that cardiac patients who used CAP were almost 30 percent more likely to take part in their rehabilitation program than those who had to travel to an outpatient clinic. Furthermore, participants using CAP were 40 percent more likely to adhere to the program, and almost 70 percent more likely to complete it.

CAP does not replace the standard rehabilitation program but offers a more flexible option for eligible patients and greatly minimises reliance on health centre visits.

The trial results were published in the journal *Heart* and reported in *Nature Reviews Cardiology*. The next-generation version of the platform will soon be offered in several Queensland hospitals.



Clinical trial results have shown that patients who used our Care Assessment Platform smartphone app were almost 30 per cent more likely to take part in cardiac rehabilitation. Image: iStock

Energy Flagship

GOAL: DELIVER BY 2030 TECHNOLOGY OPTIONS AND SCIENCE THAT WILL ENHANCE AUSTRALIA'S ECONOMIC COMPETITIVENESS AND REGIONAL ENERGY SECURITY WHILE ENABLING THE TRANSITION TO A LOWER-EMISSIONS ENERGY FUTURE.

THE CHALLENGES

Energy plays a pivotal role in the economic and environmental wellbeing of all countries. Australia has the benefit of abundant energy resources and many options for meeting all its own energy needs, as well as being a globally significant energy exporter to other countries. We can help to provide a pathway for Australia to achieve both an enduring legacy from its energy resources and the social cohesion to tackle the environmental consequences of the options chosen.

OUR RESPONSE

The Energy Flagship brings together teams from across CSIRO, collaborators and partners from industry and academia to tackle large problems affecting the current and future energy system for Australia and the world.

We contribute to wealth creation by aiding the sustainable development of resources in the oil, gas, unconventional gas and coal domains. We are also leading the development of renewable resources, such as solar thermal energy with heat storage, which are not yet economic but offer the potential for future low emission energy supply and export.

Australia's energy system is also benefitting from our focus on improving the productivity of our energy system, particularly around the efficiency of energy use in buildings and the integration of renewables into the energy mix.

OUR PATHWAYS TO IMPACT

We have exported our longwall automation technology to China, improving the productivity of the coal mining industry and the safety of its workers. The project is the latest example of our growing impact in China, and builds on our reputation as a world-leading organisation actively working to solve issues in a rapidly changing energy future.

Our fugitive emissions research has helped government, industry and the community understand the greenhouse gas footprint of coal seam gas. The research builds on our work with the Gas Industry Social and Environmental Research Alliance in which we are helping Australia understand the impacts of coal seam gas development.

We have developed a home energy management tool which is helping to address peak demand. Known as Eddy, the tool allows people to remotely control major appliances that drive peak demand, such as air conditioners, pool cleaners and hot water systems.

Users can also take part in demand management programs offered by their energy company, reducing demand on the grid. The technology has been commercialised by Australian company HabiDapt.

WE HAVE EXPORTED OUR LONGWALL AUTOMATION TECHNOLOGY TO CHINA, IMPROVING THE PRODUCTIVITY OF THE COAL MINING INDUSTRY AND THE SAFETY OF ITS WORKERS.

From Cyprus to Japan: bringing our solar technology to the world

We have successfully exported our solar thermal technology to Cyprus by designing and installing a field of our unique solar heliostats on the south coast of the island nation.

The southernmost member of the European Union, Cyprus is blessed with abundant sunshine, but most of the island nation's electricity is generated expensively, using oil. This makes solar an attractive option for power generation. It can also be used to power energy-intensive desalination plants to tackle the country's perennial water shortages.

In late 2014 our solar team travelled to Cyprus and constructed a solar thermal field consisting of 50 heliostats, which produces 150kW of peak thermal energy, intense enough to bring a two-litre kettle to the boil in less than five seconds. The experimental facility will be initially used for demonstration purposes by the Cyprus Institute, the country's premier research institute, to conduct their research, with expansion planned for the future and with a view to longer-term commercial use of the technology in Mediterranean islands and the Middle East.

Building on our success in Cyprus, our heliostat technology has been commercialised by a new South Australian company, Heliostat SA, which is aiming to manage the looming downturn of the automotive industry by using pressed metal equipment to produce Australian designed heliostats.

As a result, our technology has been deployed in Japan at a concentrated solar power demonstration facility run by Mitsubishi Hitachi Power Systems.

Solar installations in Japan have grown dramatically in the past few years as the country attempts to diversify its energy mix in the wake of the 2011 Fukushima nuclear disaster.

Our solar thermal field spreads out over half an acre in Cyprus, overlooking the Mediterranean Sea.

Food and Nutrition Flagship

GOAL: MAXIMISE AUSTRALIA'S FOOD, AGRIBUSINESS AND HEALTH RELATED VALUE CHAIN OPPORTUNITIES BY CREATING INNOVATIVE PRODUCTS, PROCESSES AND SERVICES FOR DOMESTIC AND PREMIUM EXPORT MARKETS.

THE CHALLENGES

The Australian agribusiness and health sectors are challenged by increasing global demand for sustainably produced foods that fulfil consumer desires for convenient, safe and healthier products. Food and lifestyle related diseases, rising demand for food oil and renewable alternatives to fossil-based resources were also a focus for our research this year.

OUR RESPONSE

In a world-first trial, our researchers have produced safflower seed oil with super-high levels of oleic acid. The stability of oleic acid makes it especially suitable for high temperature industrial applications such as lubricants and transformer fluids, and it can also be processed for use in bioplastics and surface coatings. This is an exciting step in the development of biologically-sourced alternatives to traditional fossil-based, non-renewable resources.

The Food and Nutrition Flagship responded to two high-profile public health risks this year: thirty-one cases of Hepatitis A from frozen imported berries and a fatality from the consumption of unpasteurised milk. With expertise in food safety and stability, we were able to provide important food safety advice to government departments, industry and the Australian community, as part of our trusted advisor role.

With our commercial partners, the Flagship has introduced higher protein weight loss programs with different support models to cater to the individual needs of consumers, allowing users to personalise meal plans to suit their tastes and preferences, and receive personal support from health professionals such as pharmacists.

WE HELPED COMMUNITY CHEF BOOST THE NUTRITIONAL DENSITY OF MEALS FOR THE AGED, GOODMAN FIELDER IMPROVE THE TASTE AND HEALTHINESS OF SAUCES, KAGOME AUSTRALIA SELECT TECHNOLOGIES FOR TOMATO PROCESSING, AND MUCH MORE.

OUR PATHWAYS TO IMPACT

Working with French company, Clextral, and the SME Inovo, our scientists have developed a world-first spray drying technology for making powdered foods such as instant coffee and powdered milk. The extrusion porosification technology process uses significantly less energy than conventional spray drying, preserves more flavour and is creating new and improved food products.

Through our partnership with Food Innovation Australia Ltd, we worked with a range of food manufacturers to overcome technical challenges and improve their businesses. We helped Community Chef boost the nutritional density of meals for the aged, Goodman Fielder improve the taste and healthiness of sauces, Kagome Australia select technologies for tomato processing, and much more.

Launched in August 2014, the Impromy health and weight loss program is now delivered through 290 pharmacies nationally, with more than 15,400 members. The online version of the CSIRO Total Wellbeing Diet entered the market at the beginning of 2015 and approximately 8,000 Australians have already signed up to the program.

Healthier meals for the community's most vulnerable

Community Chef is a social enterprise and Australia's largest provider of prepared meals for people nutritionally at risk, often the elderly, people with a disability, hospital patients and aged care residents. The company collaborated with CSIRO and Food Innovation Australia through the SME Solution Centre, to support the long-term food security and nutritional wellbeing of those most vulnerable in the community.

Feedback from their clients was that current meal sizes were too large and they were not eating all the food provided, and therefore not getting adequate daily nutrition. Some clients reported choosing to skip meals so as not to waste food.

The company needed a means of modifying their recipes to increase the nutritional density and reduce the portion size of meals, while still conforming to or exceeding the Commonwealth and Victorian Government Home and Community Care (HACC) guidelines.

CSIRO dieticians, trained in nutritional profiling of foods and food components, assessed and remodelled some of the company's most popular menu items. The researchers investigated total energy, protein and a range of macro and micronutrients of concern for the aged population at risk of malnutrition, such as fibre, zinc, iron and calcium. The Flagship also matched the meals to the HACC guidelines and the Nutrient Reference Values specific to the aging populations, as set by the National Health and Medical Research Council.

Flagship dieticians then developed recommendations for the energy and protein required for nutritionally-dense, reduced-portion meal components such as soups, desserts and sides to assist the company with future recipe development.

The nutritional density of many dishes was increased by fortifying recipes through the use of whole foods and whole food additives such as skim milk powder. This enabled Community Chef to reduce the portion sizes slightly, while maintaining or improving the protein density of the meal, leading to less food wastage.

CSIRO recommendations set a benchmark for defining the appropriate energy and protein content of various meals, enabling the company to mix and match meal components and still meet the nutritional requirements of the meal. More than 15,000 people have so far received these modified meals.

We helped Community Chef support the long term food security and nutritional wellbeing of those most vulnerable in the community. Image: Shutterstock

Land and Water Flagship

GOAL: DELIVER SCIENCE THAT DIRECTLY CONTRIBUTES TO THE SUSTAINABLE DEVELOPMENT AND STEWARDSHIP OF LAND, WATER, ECOSYSTEMS AND COMMUNITIES, VALUED AT OVER $12 BILLION PER ANNUM IN TRIPLE BOTTOM LINE BENEFITS BY 2025.

THE CHALLENGES

Australia's land, water, ecosystems and communities face multiple competing pressures from agricultural and urban development, a rapidly expanding resources sector and the impacts of extreme events and global change. Achieving food, energy, and water security as well as sustained human health, social and cultural value from the environment will require the efficient use and appropriate sharing of land and water resources.

Governments, industries and communities need to develop solutions for balancing the demands on natural resources with sustainable environmental and ecological management, and building social, economic and environmental resilience and adaptation to impacts and hazards.

OUR RESPONSE

Our Land and Water Flagship provides information and technologies that enable government, industry and communities to protect, restore and manage natural and built environments.

With the Australasian Fire and Emergency Service Authorities Council, we produced *A Guide to Rate of Fire Spread Models for Australian Vegetation*, which consolidates and analyses all published Australian models to inform the most appropriate fire management strategies.

We have made significant progress toward the delivery of the Australian Government's Bioregional Assessments Project on the potential impacts of coals seam gas and large coal mine developments on water resources and water-dependent assets.

We continued our efforts to support decision making in northern Australia, including our work with the Queensland Government to assess potential risks to fisheries and ecological values in the southern Gulf of Carpentaria under a range of development scenarios, as previously outlined in the CSIRO Flinders and Gilbert Resource Assessment.

We brought together Australia's leading freshwater ecologists to quantify how water resource developments and changes to river flow affect aquatic species and ecosystems in the Murray-Darling Basin, providing Basin managers with invaluable information to inform environmental flow regimes.

OUR PATHWAYS TO IMPACT

As well as delivering impact in Australia, we are building partnerships to deliver international impact. These include the CSIRO Chile International Centre of Excellence in Mining and Mineral Processing, India-Australia Water Science and Technology Partnership, South Asia Sustainable Development Investment Portfolio and Department of Foreign Affairs and Trade (DFAT)-CSIRO Research for Development Alliance.

Our interdisciplinary work supporting water resource management and water security, previously applied in the Murray-Darling Basin, is being implemented in several of the world's largest river basins, in Bangladesh, Nepal and India.

We are working with DFAT, the National Mission for Clean Ganga and India's water and pollution agencies to examine how to improve the quality of water entering the Ganga (Ganges).

We also deliver impact internationally through our soil research. We led an international soil data interoperability experiment, through the Open Geospatial Consortium's Agriculture Domain Working Group and the International Union of Soil Sciences, to revolutionise the way soil data is made available.

AS WELL AS DELIVERING IMPACT IN AUSTRALIA, WE ARE BUILDING PARTNERSHIPS TO DELIVER INTERNATIONAL IMPACT.

Modelling Australia's water balance

For the first time Australia has the capacity to systematically and accurately report on the nation's water balance. The Australian Water Resources Assessment modelling system (AWRA), developed by CSIRO and the Bureau of Meteorology, through the Water Information Research and Development Alliance, provides water balance estimates at a national to regional scale.

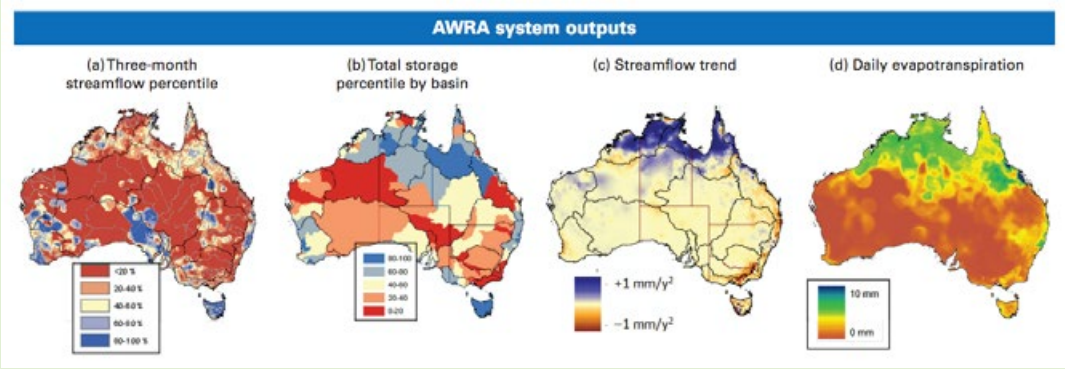
AWRA enables the Bureau to meet its mandated responsibility to explain the nature and availability of Australia's water resources, and directly informs the development of the Bureau's annual National Water Accounts and the Australian Water Resources Assessments.

The AWRA products help Australians understand the state of their past and present water resources, and provide an invaluable and accessible knowledge base to support future decisions, such as planning and investments in water infrastructure in the urban, agricultural or environmental sectors.

The AWRA model is a globally unique example of a coupled landscape, groundwater and regulated river system model implemented at a regional and continental scale. Its outputs provide valuable information on Australia's water resources for water management practitioners, policy makers and researchers.

AWRA has been developed with state-of-the-art hydrological science and computing technology. It can quantify water flow and storage terms, and their respective uncertainties, using a combination of on-ground and remotely sensed observations and model outputs to produce nationally consistent and robust estimates of water flows and stores at a 5km spatial resolution and daily time step.

AWRA models underpin critical research projects across the nation, such as the Australian Government's Bioregional Assessments Project, which aims to quantify the impacts of coal seam gas and large coal mining developments on water and water dependent assets. The models are also used to identify potential dam sites to support agriculture across Northern Australia, and by the Victorian Climate Initiative, which provides projections of water availability across Victoria and seasonal climatic updates for the state.



Typical outputs from the AWRA modelling system across a range of periods and timescales.

Manufacturing Flagship

GOAL: BY 2030 WE WILL DEVELOP THE SCIENTIFIC AND ENGINEERING INNOVATIONS TO TRANSITION AUSTRALIAN MANUFACTURING INTO A GLOBALLY CONNECTED, ECONOMICALLY VIABLE, HIGH-TECHNOLOGY SECTOR; CREATING THE JOBS OF THE FUTURE, EXPORT GROWTH, AND INVESTMENT IN THE NATION'S MANUFACTURING INDUSTRY, AND INCREASING THE VALUE OF THE SECTOR BY >$10 BILLION.

THE CHALLENGES

The challenges facing Australian manufacturers have never been greater, brought on by increasing competition from developing economies, a volatile Australian dollar, and lower productivity growth than our competitors. Australia's manufacturing industry is also transitioning from heavy industrial manufacturing to higher value-add production and knowledge-intensive manufacturing activities. The industry will need to adapt, diversify and compete against the best in the world to be successful.

OUR RESPONSE

The Manufacturing Flagship has responded to these challenges by strengthening our engagement activities, partnering with around 400 manufacturing companies this year. We are embracing i- and e-manufacturing to take advantage of emerging digital and agile manufacturing methods and developing technologies that enhance productivity, open new markets and product lines and build long term sustainability.

We continue to make great inroads in the area of biomedical innovation with Australian companies producing implants for our own doctors and patients. We have demonstrated that truly personalised 3D printed biomedical implants can be made in Australia for Australians.

Partnering with Victorian-based biotech company Anatomics, we designed and built a heel implant made of titanium using our state-of-the-art Arcam 3D printer. In a world-first surgical procedure at Melbourne's St Vincent's Hospital, the artificial heel bone was successfully implanted into cancer patient Len Chandler, saving his leg from amputation.

WE HAVE DEMONSTRATED THAT TRULY PERSONALISED 3D PRINTED BIOMEDICAL IMPLANTS CAN BE MADE IN AUSTRALIA FOR AUSTRALIANS.

OUR PATHWAYS TO IMPACT

Emerging technologies, such as additive manufacturing or 3D printing, offer huge advantages over traditional manufacturing methods. Additive manufacturing reduces waste material, brings down labour costs, speeds up development and allows for product customisation and the ability to make complex metal parts.

Our aim is to make additive manufacturing more accessible for Australian industry. We have established our Lab 22 Innovation Centre, a $6 million advanced manufacturing facility to encourage the adoption of metal additive manufacturing in Australia. Through this new centre, industry participants can access our cutting edge 3D printers in a supportive and collaborative environment and work alongside our leading researchers.

We are also helping create intelligent industrial environments, in which autonomous machines, ICT systems and humans work side-by-side. Under a licensing agreement signed in June, Australian aerospace company TAE will commercialise CSIRO's Guardian Mentor Remote (GMR) wearable technology system, making it available to the global aerospace industry.

Environmental sustainability is also vital to our industry. We developed a new scalable process to manufacture sponge-like crystals that purify water or store renewable energy. Thanks to this new process, the crystals, which are made of extremely porous metal organic frameworks, can be produced in minutes rather than days and for a fraction of the cost.

Euro vision turns to reality for Australia's iconic 'green whistle'

Medical Developments International (MDI) is an Australian company that manufactures the emergency pain-killer Penthrox, commonly known as the 'green whistle'.

Used by hospitals, ambulances, defence forces, sporting leagues, life savers and other emergency services, Penthrox has significant advantages over other analgesics such as nitrous oxide and morphine. It is rapid, self-administered, non-addictive, non-narcotic, safe to use and provides strong pain relief.

Penthrox has been used in Australia for more than 30 years, but to meet the demand of international markets, MDI had to develop a smarter, more efficient manufacturing process for the drug methoxyflurane, the pain relieving ingredient in Penthrox.

Building on a long history of collaboration, in 2012 CSIRO invested $750,000 in MDI's technology development through its Australian Growth Partnership (AGP) program, which awards innovative Australian small and medium businesses access to world-class research and facilities to significantly grow their business.

Through this grant, CSIRO and MDI developed a new low-cost manufacturing process that will allow MDI to increase their production of methoxyflurane tenfold in order to meet large demand. In May 2015, Penthrox received initial regulatory approval for sale in Europe and the UK.

MDI CEO John Sharman said: '*Our partnership with CSIRO has been integral to up-scaling our production capacity ahead of this opportunity.*' He believes that regulatory approval to sell the product in England, France, Ireland and Belgium is a company-making achievement that has opened the door to supplying it globally. It also means patients around the world will benefit from this unique Australian invention.

Penthrox has been approved for sale in Europe, meeting a significant market need for a non-narcotic emergency analgesic.

Mineral Resources Flagship

GOAL: DELIVERING SCIENCE AND TECHNOLOGY OPTIONS FOR THE DISCOVERY AND EFFICIENT DEVELOPMENT OF AUSTRALIA'S MINERAL RESOURCE ENDOWMENT THAT LEAD TO $1 TRILLION *IN-SITU* VALUE BY 2030 AND ENABLE FLOW-ON BENEFITS TO THE WIDER NATIONAL ECONOMY.

THE CHALLENGES

The Australian resources sector has been challenged by declining mining returns and ore grades. Australia's position as a global leader in mining and associated technologies and services is also under threat as a globalised industry seeks investment opportunities world-wide.

OUR RESPONSE

The Mineral Resources Flagship has focused on research and innovation that maintains and improves the mineral resources industry's prospects and competitiveness during difficult market conditions. We are developing new technologies like sensor systems and automation that are creating efficiencies and lowering costs through reduced energy usage and labour costs.

Our national and international collaborations have paved the way for a more competitive Australian industry and a more productive and environmentally responsible global industry. An agreement with a Chinese partner to scale-up a novel and environmentally friendly iron blast furnace technology, and the additional gold production possible in Nevada, USA, through the use of a cyanide-free leaching process, are just two examples of this international reach and influence.

WE ARE DEVELOPING NEW TECHNOLOGIES LIKE SENSOR SYSTEMS AND AUTOMATION THAT ARE CREATING EFFICIENCIES AND LOWERING COSTS THROUGH REDUCED ENERGY USAGE AND LABOUR COSTS.

OUR PATHWAYS TO IMPACT

Together with partner Barrick Gold we helped to develop and patent a cyanide-free thiosulphate leaching process that led to the first production of gold from previously uneconomic stockpiles at the Goldstrike plant in Nevada in late 2014. Our new process is not only friendlier to the environment but also allows Barrick to process an average 350 to 450 thousand ounces of additional gold each year. The cyanide-free thiosulphate process at the Goldstrike plant is worth between US$400 million to US$550 million per year in additional gold processing.

Our high tonnage magnetic resonance ore sorting technology has demonstrated its potential as a transformational technology, able to cut energy use and boost the productivity and efficiency of mining operations. CSIRO is working with an industry partner towards global commercialisation and application.

The vision for a cleaner, greener and more productive steel industry moved a step closer with our recent signing of an agreement with a company in China to scale-up CSIRO's dry slag granulation technology (DSG) that recycles waste slag and heat energy from iron smelting.

During the year we produced international *Attitudes to Mining* reports for Australia, Chile and China. These reveal important information and insights into community perceptions and level of support for mining, which underpins the industry's social licence to operate and its long-term prospects.

Forging a future in green steel

A collaboration with a Chinese engineering company in the past year was a major step towards the introduction of iron blast furnace technology able to transform the productivity and environmental performance of global steelmaking.

Finding better ways to re-use the waste products and heat generated in the iron smelting process has been an ongoing challenge for the global industry. Each year, hundreds of millions of tonnes of slag are produced as by-product from metal smelting.

Some modern steelworks use water to granulate molten slags into a glassy product that can be used for cement, but this approach consumes large amounts of water and does not recover the large amounts of heat energy available in the molten slag.

In response to this challenge, CSIRO and partners including Arrium and BlueScope, set about a decade of collaborative R&D to develop a DSG technology. After initial design and proof of concept, the team constructed and operated DSG pilot plants at small, intermediate and large scales.

The DSG technology fits onto blast furnaces. It includes a spinning disc and granulation chamber that separates molten slag into droplets under centrifugal forces, using air instead of water to quench and solidify the droplets, and extracts a granulated slag product, as well as hot air.

The agreement signed by CSIRO and the Beijing MCC Equipment Research and Design Corporation sets the path to scale-up the technology and demonstrate it at industrial level in China, where 60 per cent of the world's 300 million tonnes of iron blast furnace slag is produced each year.

CSIRO's DSG process successfully produces a glassy cement feed product, but does so while saving large amounts of water, recovering valuable heat energy and lowering the associated greenhouse gas emissions.

Air recovered at 500–600°C can be used onsite for drying, preheating or steam generation.

If the technology is successfully demonstrated in China and adopted globally, the benefits would be savings in the order of 60 billion litres of water, 800 petajoules of heat energy and 60 million tonnes of greenhouse gas emissions.

This is equivalent to 14 per cent of Australia's energy use, 10 per cent of the nation's greenhouse gas emissions, and enough water to meet a quarter of Melbourne's residential needs.

Finding more sustainable ways to produce steel will help to underpin the long term future of Australia's main exports, iron ore and coking coal.

CSIRO's dry slag granulation testing facility at Clayton, Victoria.

Oceans and Atmosphere Flagship

GOAL: BUILD KNOWLEDGE TO ENHANCE AUSTRALIA'S PROSPERITY AND WELLBEING, THROUGH RESEARCH THAT UNDERPINS SUSTAINABLE, ECONOMIC, SOCIAL AND ENVIRONMENTAL USE OF AUSTRALIA'S MARINE ESTATE, AND MANAGEMENT OF THE ATMOSPHERIC ENVIRONMENT. TOGETHER WITH OUR PRIVATE AND PUBLIC SECTOR PARTNERS, WE WILL INCREASE THE VALUE OF AUSTRALIA'S MARINE INDUSTRIES FROM $47 BILLION TO $100 BILLION BY 2025, AND HALVE AUSTRALIAN GOVERNMENT EXPENDITURE ON ENVIRONMENTAL RESPONSE OPERATIONS, NATURAL DISASTER RELIEF AND HABITAT RECOVERY OPERATIONS BY 2050.

THE CHALLENGES

Our oceans and atmosphere are vital for the environmental and social wellbeing of the planet. Ocean-based industries contribute over $47 billion each year to the Australian economy alone. The ocean drives the climate system, provides food and transport, minerals, oil and gas resources, sustains biodiversity and regional economies, and offers recreational and lifestyle opportunities. A productive and resilient Australia depends on the balanced use of our ocean resources and science-based management of our atmospheric environment.

OUR RESPONSE

Our Oceans and Atmosphere Flagship provides the large-scale multidisciplinary science to inform the use of Australia's marine environment. Our world-class marine science is helping the oil and gas industry better understand and protect the environments in which it operates. We work on large-scale research programs across Australia to ensure a balanced approach to sustainable resource use and ecosystem health. We are uniquely positioned to support industry and protect the marine ecosystem, with world-leading fisheries scientists who have proven experience in tackling research at the national and international level.

Through our national collaboration with the Australian Bureau of Meteorology and the university sector, we continue to conduct research to better understand Australia's climate, what it will be like in the future and how best to prepare for the expected changes. We share our knowledge in order to support government, industries and community decision-makers to understand, plan for and respond to a changing climate.

The Flagship also provides the information that monitors the health of the atmosphere, from information on greenhouse gases and aerosols that alter the Earth's heat balance, to hazardous air pollutants that affect human and ecosystem health.

OUR PATHWAYS TO IMPACT

Over 8.4 million tonnes of plastic enters the ocean each year, with impacts documented on over 700 marine species to date. Our Marine Debris project, a $3 million study funded by Shell Australia, was the first continental-scale study of plastic pollution. Information from the project is leading to new perspectives on the problem, and potential solutions on a global scale.

Our multidisciplinary $20 million, four-year, Great Australian Bight collaboration with BP, the South Australian Research and Development Institute, University of Adelaide and Flinders University is the largest whole-of-ecosystem study ever undertaken in Australia. The research projects are examining the oceanography, ecology and geochemistry of the area. They will significantly increase knowledge of this unique marine environment and provide science to decision makers to support sustainable development in the region.

This year we also collaborated with Hobart-based Specialised Industrial Products to develop an innovative bungee-like mooring technology to safely hold marine monitoring equipment and replace heavy and damaging chains.

In 2014–15 the Flagship also collaborated with the Bureau of Meteorology to deliver the most comprehensive climate change projections ever produced for Australia, targeted to the natural resources management sector. These projections are based on the latest global climate models, including several long-term climate simulations from Australia's own ACCESS model, rated one of the top five global models. The extensive climate modelling delivered an unprecedented level of information to assist Australia's natural resource management sector to plan for, and adapt to, a changed and more variable future climate. Our international collaborations are also flourishing.

A new Atlantis: world-leading decision support for marine ecosystem management

Australia's fishing zone is the world's third-largest, and the commercial fishing and aquaculture industries, worth $2.4 billion, employ over 11,000 people.

Our waters are home to some 5000 species of fish. This is an impressive natural endowment, which needs to be sustainably maintained and managed for the good of the ecosystem, the marine and human food chains, and the economy.

To support the sustainable management of Australian fisheries we have developed Atlantis, a whole-of-ecosystem modelling tool that lets resource managers and coastal planners test drive their decisions for balancing resource use and conservation before committing to them in the real world.

The model encompasses oceanography, chemistry and biology, and simulates ecological processes such as consumption, migration, predation and mortality, along with human activities such as fishing, run-off from catchments, coastal industries and development, as well as coastal social pursuits.

A 2007 United Nations report rated Atlantis as the best ecosystem model in the world for considering alternative potential futures for fisheries and marine ecosystems. It can be recalibrated with new data sets to take into account a changing climate, warmer seas and more acidic oceans.

Regional versions of the model are now being used in management strategy evaluation for more than 30 ecosystems around the world, including Pacific islands, Antarctica, Africa, North America and Europe.

In 2014–15 Atlantis reached new heights. It has been rolled out to new Australian locations, such as Queensland's Gladstone Healthy Harbour Partnership, to explore sustainable futures for the port. In Europe and the USA Atlantis is also now being used for integrated ecosystem assessments and fisheries management, while in Guam, Atlantis has been used to explore the effects of land use, climate change and recreational fishing on the local reef.

The Oceans and Atmosphere Flagship also used Atlantis to provide the Australian Fisheries Marine Authority with advice on management questions related to the Southern and Eastern Scalefish and Shark Fishery and the Small Pelagic Fishery. This resulted in an increased understanding of the ecosystem implications of planned management decisions for these fisheries, including harvest strategies.

A marine coral ecosystem. Image: Shutterstock

CSIRO Services

SME ENGAGEMENT CENTRE

Global competition is changing the landscape for Australian industry. In order to compete, SMEs need to innovate and apply new technology to adapt their business and meet the needs of changing markets. Australia's research sector has world-class expertise and facilities, but the nation ranks poorly in translating research to industry innovation. Our SME Engagement Centre was established to bridge the gap between Australian industry and the research sector, and help companies adopt new ideas and technologies for a competitive advantage.

This year approximately 200 SMEs were supported with information, connections and facilitation of research projects that will allow them to develop a competitive advantage. In addition, 52 projects were facilitated between a researcher and SME, to work in collaboration on a technical solution to a company challenge or opportunity. Thirty-three companies (63 per cent) used a CSIRO researcher, with 19 companies (37 per cent) using a researcher from another Australian research organisation. These projects allow for both explicit and tacit knowledge transfer, which helps improve collaboration between SMEs and research organisations. SME Engagement Director Michael Egan won the 2015 Australasian Industrial Research Group Medal for his career achievement in bridging the gap between SMEs and research organisations.

Northern Project Contracting

Queensland's Northern Project Contracting (NPC) is a service provider to the mining and civil construction industry in remote Australia. Their services include providing labour and equipment contract services such as drilling, earth moving, crushing and road building.

As an Indigenous-owned and operated organisation, and a large employer of local Indigenous people, NPC enables communities to take part in wealth-generating activities on their traditional lands to earn long-term economic and social benefits. Seeking to better articulate and create a framework for their value proposition, the company turned to social research with CSIRO.

The research found that NPC's business model helps facilitate important contact between their clients and the local communities they operate in. This results in better trust and relationships, which companies in the mining and construction industries recognise as integral to the future of their operations. NPC is using the framework created from the research to take their value proposition to other regions and industries. It has given them the tools and insight to develop a competitive edge that will help grow their business both nationally and internationally.

NPC is building better trust and relationships in rural communities. Image: iStock

AUSTRALIAN GROWTH PARTNERSHIPS PROGRAM

To support the growth of our IP Portfolio, we place significant focus on strategic engagements and collaboration with industry partners. In 2007, we established the Australian Growth Partnerships (AGP) program to increase engagement with Australian SMEs. The AGP program provides funds to high-potential, technology-receptive SMEs so they can access CSIRO research and development capability and IP. It is designed to be mutually beneficial, assisting SMEs to overcome existing technical issues, while contributing to our own National Research Flagships Program.

As at 30 June 2015, seven SMEs were engaged in the AGP program, including one new participant. This year $150,000 was invested in Sydney-based minerals company Direct Nickel. There were no company exits from the program during 2014–15.

Taking 3D laser mapping to the world

After developing Zebedee, the world's first lightweight, handheld 3D laser mapping system, CSIRO partnered with UK-based distributor 3D Laser Mapping on a joint venture to commercialise it.

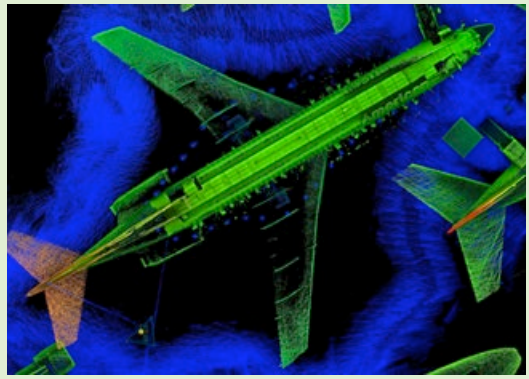
Together, we established GeoSLAM, a UK start-up that now offers the system commercially, as ZEB1, to the international market. In its second year, GeoSLAM is already profitable and is generating more than 500 3D models each week through a pay-as-you-go model.

ZEB1 is being used around the world by organisations in the manufacturing, mining, security, surveying and forestry sectors for efficiency and productivity gains. It enables a user to generate a 3D map simply by walking through a desired location, quickly, reliably and cost-effectively, without relying on external positioning systems.

In 2014, GeoSLAM was awarded $2 million through our AGP program for the next generation development of the system's underlying Simultaneous Localisation and Mapping (SLAM) technology.

The aim is to enhance the technology and add features that will broaden its applications and further secure GeoSLAM's global competitive advantage.

The research and development is now underway, and if successful, GeoSLAM will increase sales of ZEB1 by more than tenfold.



A 3D point cloud map generated from the Zebedee 3D mapping system.

SCIENCE OUTREACH: EDUCATION AND PUBLISHING

At CSIRO, we are in a strong position to help create a knowledgeable society by increasing scientific literacy and communicating the outcomes, impacts and benefits of our research, so the community can engage with major issues related to science. Communicating scientific research helps raise the profile of science and CSIRO within the community.

Our science outreach programs, including the Discovery Centre and Education programs, aim to promote the importance of CSIRO science and its application to students, parents, teachers and the Australian community. We support undergraduate, postgraduate and postdoctoral researchers, so as to boost the calibre of researchers working in the Australian community and strengthen Australia's future innovation capacity. We also operate CSIRO Publishing, an independent science and technology publisher. It has a global reputation for quality products and services covering a wide range of scientific disciplines, including agriculture, chemistry, plant and animal sciences and environmental management.

EDUCATION

Utilisation and success of science outreach programs

We conduct various science education programs for school students, teachers and the public. These programs inform students, families and teachers of the valuable contribution scientific research makes to the community.

CSIRO Education has education specialists and facilities in each capital city, and also in Townsville. In 2014–15, 154,825 participants took part in hands-on science education programs for primary and secondary students (see Table 2.5). This is less than previous years, because in 2014 CSIRO changed the focus of our programs and the way they operate.

The education and outreach team also delivered the Scientists and Mathematicians in Schools (SMiS), Sustainable Futures (formerly CarbonKids), BHP Billiton Science and Engineering Awards, CREativity in Science and Technology (CREST) programs and Double Helix events.

During 2014–15, CSIRO Education changed the way it delivers programs, including ceasing state-based programs and developing new national programs.

In September 2014 CSIRO and BHP Billiton launched a new five-year program to support science, technology, engineering and maths for Indigenous students. Our first summer school, in Adelaide in December 2014, had 28 students attending. In January 2015 we launched our bootcamps targeting senior secondary students (see page 59).

SMiS links scientists and mathematicians with primary and secondary teachers and students. At the end of June 2015 there were 1799 SMiS partnerships in 1263 schools, including 30 per cent of partnerships in rural and regional schools and 44 partnerships in schools with more than 25 per cent Indigenous students. The program has been highly successful in engaging students in science, mathematics and ICT. It provides ongoing professional development and confidence for teachers and is a community base for scientists and mathematicians and their research.

The Sustainable Futures program worked with 4643 students and 1422 teachers Australia-wide, to help them understand the science behind climate change and reduce their own carbon footprints.

CREST helped 10,805 school students plan and carry out research projects. Over 60 per cent received awards for their work. Many went on to participate in BHP Billiton's Science and Engineering Awards, which recognise outstanding scientific research and technology projects by school students and the commitment and expertise of their teachers. In 2014–15, 8146 students entered these awards (7034 in science and 1112 in engineering).

Education and outreach programs at the Canberra Deep Space Communication Complex (CDSCC) attracted 9022 school students and teachers during 2014, 10 per cent down on 2013. This was due to the reduction in education staff from two to one, and the consequent decision to maintain the intake of students for guided programs at around 9000, to keep the remaining role manageable. Surveys of teachers indicate schools remain very positive about our programs, with repeat bookings up until 2018. The CDSCC marked its 50th year of operations and its role is being highlighted in national media coverage of prominent NASA and European Space Agency missions.

The long-term effectiveness and impact of education and outreach programs, including Scientists and Mathematicians in Schools, Sustainable Futures and BHP Billiton Science and Engineering Awards, will be measured in coming years.

TABLE 2.5: SCIENCE OUTREACH: EDUCATION PROGRAMS

PROGRAM	2010–11	2011–12	2012–13	2013–14	2014–15
CSIRO Science Education Centres (visitors)	389,287	374,797	363,099	366,305	154,825
Double Helix Magazine (subscribers)	15,821	13,851	15,958	15,209	11,226
Science by Email (subscribers)	38,156	41,204	42,422	42,011	43,010
Maths by Email[11] (subscribers)	9,255	14,967	17,292	20,381	22,771
Creativity in Science and Technology (CREST) (participants)	9,668	8,385	7,767	11,048	10,805
BHP Billiton Science Awards (participants)	3,658	3,770	4,065	7,125	8,146

THE DISCOVERY CENTRE AND MAJOR VISITOR CENTRES

Utilisation and success of science outreach programs

We host the CSIRO Discovery Centre in Canberra, and major visitor centres at the Parkes and Narrabri observatories in NSW and the CDSCC. These centres are purpose-built to showcase our research in an entertaining way that demystifies and educates people of all ages about research and innovation.

CSIRO Discovery Centre continues to attract large crowds, with its biggest audience being local and interstate school groups. We hosted 30,296 students during 2014–15. Discovery is a growing attraction, complementing Canberra's other science-themed institutions (see Table 2.6). During 2014–15 the building where Discovery is located was being renovated and public visitors were not charged entry for self-guided tours. Because of this, we have not counted the number of these visitors this year.

The Parkes radio telescope welcomed 68,427 visitors in 2014, a 19.2 per cent decrease on 2013. This was due to a significant drop in senior travellers. Visitor surveys noted higher fuel prices and reduced disposable income for self-funded retirees. Education and outreach programs remained relatively steady, with 36 schools compared with 41 the previous year, approximately 1183 students and 1893 visitors from seniors groups, clubs or specialised interest groups. The PULSE@Parkes program had about 270 students using the Parkes radio telescope last year, in sessions held in NSW, Victoria, remote Queensland, Japan and Canada. The Parkes radio telescope visitors centre conducts monthly exit surveys. In 2014, approximately ninety percent of visitors rated their experience 'good' or 'excellent'.

With the support of the BHP Billiton Foundation, we are implementing an important education program aimed at increasing participation and achievement of Aboriginal and Torres Strait Islander students in science, technology, engineering and mathematics (STEM).

11 Launched in 2010.

Public outreach activities at the Australia Telescope Compact Array at Narrabri included a self-guided visitor centre experience with approximately 10,971 visitors in 2014, down 1500 from 2013. Regular visitors to the observatory included seniors coach tours and local school groups.

Total visitor numbers to the CDSCC were 61,051, down 9.6 percent on the previous year. Staff reductions in CDSCC Outreach meant services were reduced and visitor numbers impacted.

Postgraduate and postdoctoral researchers

Our postgraduate scholarship program provides opportunities in science and engineering for outstanding graduates who enrol at Australian tertiary institutions as full-time postgraduate students, for research leading to the award of a PhD. Doctoral students at CSIRO are co-supervised by a university, allowing students to maintain and develop their university connections while being exposed to research in a working environment (see Table 2.7). The number of students fluctuates, with uneven intakes each year. A reduction in student numbers is often seen when a cohort moves through the program.

TABLE 2.6: SCIENCE OUTREACH: VISITOR CENTRES

DISCOVERY CENTRE AND VISITOR CENTRE	2010–11	2011–12	2012–13	2013–14	2014–15
CSIRO Discovery Centre (visitors)	100,920	108,060	113,000	120,000	33,189
Parkes radio telescope (visitors)	95,104	96,609	92,876	84,698	68,427
Canberra Deep Space Communication Complex (visitors)	70,044	77,350	68,710	67,554	61,051
Australia Telescope Compact Array, Narrabri (visitors)	-	-	10,500	12,500	10,971

TABLE 2.7: SCIENCE OUTREACH: CSIRO'S POSTGRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

	2011	2012	2013	2014	2015
Sponsored postgraduates[12]					
PhD	333	291	294	254	224
Masters	24	20	16	19	16
Honours	19	17	22	23	10
Total	**376**	**328**	**332**	**296**	**250**
Supervised postgraduates[13]					
PhD	655	639	642	601	621
Masters	59	77	68	90	70
Honours	77	64	82	61	70
Total	**791**	**780**	**792**	**752**	**761**
Postdoctoral Fellows	**333**	**326**	**324**	**325**	**303**

12 A student may be either sponsored, supervised or both. The total number of individual students sponsored and/or supervised was 771, including more than 23 supervised in collaboration with Cooperative Research Centres and 59 through the Flagship Collaboration Fund. See the glossary on page 182 for definition of sponsorship and supervision.

13 Includes 39 students fully sponsored and 211 students partially sponsored by CSIRO.

Science Bootcamps for the brain

In addition to programs that target teachers and students in schools, CSIRO Education & Outreach reaches out into the community in a variety of ways, including at large public events, small to medium-scale workshops and activities, CSIRO site visits, performances and exhibitions.

The challenge is to identify suitable settings and develop offerings that will attract and engage target audiences, ideally in ways that encourage further connection with CSIRO research. A series of Science Bootcamps, targeted at secondary school aged students, was initiated in January 2015. These two-day immersive programs introduce participants to authentic scientific research in working laboratories, and provide a direct interface with CSIRO researchers.

Bootcamps have been run in Clayton (VIC), North Ryde (NSW), Lindfield (NSW), Black Mountain (ACT) and Pullenvale (QLD) and been attended by over 100 students to date. Each Bootcamp features a combination of laboratory tours, presentations by scientists and hands-on workshops. Workshop activities have included designing, 3D printing and testing wind turbines, building an electrophoresis tank and exploring a range of nanotechnology devices.

Scientists' presentations have covered a wide range of topics, including flexible electronics, fire testing, environmental monitoring technologies, superconductivity and 3D titanium printing.

The program is proving popular with students and parents. On a feedback form, one student wrote '*I love science and CSIRO, the two together is just awesome!*' A parent from Sydney thought the Bootcamp worthwhile because '*It provides a great opportunity to see scientists working in the lab and what a real science job involves doing.*' Participating scientists have also received the program well. Dr Stefan Hrabar from the Digital Productivity Flagship said, '*It's always great to see the enthusiasm that students have for robotics!*' Researcher Renata Lippi, from the Manufacturing Flagship, said '*It was a pleasure for us and a very interesting experience trying to explain our research for such a young audience.*'

Students visit the Monash University's CAVE2 immersive visualisation facility.

CSIRO PUBLISHING

International reach and impact of published journals

CSIRO Publishing operates as an independent science publisher within CSIRO on behalf of authors and customers in Australia and overseas. Our publishing program covers a wide range of scientific disciplines, including agriculture, the plant and animal sciences, and the environment, as well as publications for children. We are Australia's only endemic scholarly science publisher with a significant digital capability.

We provide a viable local publishing option for CSIRO itself, and for learned and professional societies to publish scholarly content that champions Australian research. We also publish books for the Australian market that multinational publishers would not take, ensuring dissemination of great Australian research to a wider market. CSIRO Publishing also represents a body of expertise in scholarly and digital publishing that CSIRO and Australians tap into for advice and guidance on issues like Open Access, digital publishing, peer review and other scholarly publishing matters. We operate within CSIRO on a commercial basis.

CSIRO Publishing's products are targeted at researchers, professionals, the general public and children. The business sells content in digital and hard copy formats, with format determined by market preferences. We also advise CSIRO on matters relating to the business of publishing, including digital delivery, peer review, sales, marketing, open access and copyright. We publish the Science and Solutions for Australia series of books, including e-books, for CSIRO Flagships.

CSIRO Publishing provides writer training services to researchers in CSIRO and other parts of the innovation system. Our staff make a significant and positive impact on the understanding of science and enhances CSIRO's reputation. Staff have skills in commissioning, writing, editing and production (print and online), marketing and sales of scholarly content.

During 2014–15, we published 26 journals. Fourteen were published in partnership with the Australian Academy of Science, a successful relationship dating back to 1948. Eleven journals were produced under agreements with Australian and international societies or institutions. One journal was acquired during the year and is now owned by CSIRO. Additionally, special issues of journals were published in connection with societies and international conferences. The journals are available free to developing countries through the United Nations program Research4Life. This program fosters scientific understanding and education in developing nations. Online use of the journals resulted in 2,471,566 articles being downloaded.

ECOS, the online magazine about science for sustainability, transferred from CSIRO Publishing to CSIRO Communications in January 2015. Up to January the magazine saw a significant increase of 40 per cent in downloads (see Table 2.8).

A selection of the journals we published during 2014–15 in partnership with the Australian Academy of Science.

TABLE 2.8: CSIRO PUBLISHING DOWNLOADS

	2011–12	2012–13	2013–14	2014–15
CSIRO Publishing journal (downloads)	2,653,848	2,641,160	2,819,798	2,471,566
ECOS story (downloads)	296,448	454,385	639,271	797,726[14]

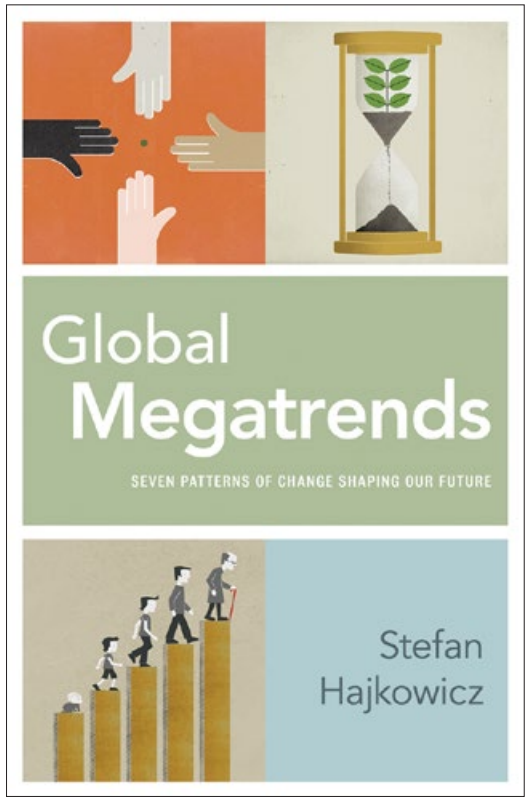
CSIRO PUBLISHING PROVIDES A VIABLE LOCAL PUBLISHING OPTION FOR CSIRO AND FOR LEARNED AND PROFESSIONAL SOCIETIES TO PUBLISH SCHOLARLY CONTENT THAT CHAMPIONS AUSTRALIAN RESEARCH.

New book titles

During 2014–15, CSIRO Publishing released 27 book titles in print and digital formats. The digital books comprised approximately 12 per cent of sales. A highlight among the titles was *Global Megatrends* by CSIRO's Stefan Hajkowicz. This work identifies seven patterns of global change and tells a story about how the world will change over the next 20 years.

Net profit

CSIRO Publishing delivered a net profit of $328,670 for 2014–15. Total revenue for the period was $10,282,219.



Published in 2015, *Global Megatrends* is based on CSIRO research.

14 Includes *ECOS* January 2015 downloads, when *ECOS* transferred from CSIRO Publishing.

Program 2

National Research Infrastructure: National Facilities and Collections

CSIRO hosts National Research Infrastructure on behalf of the broader scientific community to assist with the delivery of research. There are two types of National Research Infrastructure: National Research Facilities and National Biological Collections.

OBJECTIVES AND DELIVERABLES

We operate a range of specialised laboratories, scientific and testing equipment and other research facilities. These are available for use by Australian and international researchers and are not restricted to CSIRO staff. The National Research Facilities include:

- The Australian Animal Health Laboratory (AAHL)
- The Australia Telescope National Facility (ATNF)
- The Marine National Facility (MNF)
- Pawsey Centre.

CSIRO's National Research Collections Australia (NRCA) comprises six national biological collections and the Atlas of Living Australia (ALA), funded by the National Collaborative Research Infrastructure Strategy (NCRIS). These collections and the ALA are available to all researchers and are storehouses of information on Australia's biodiversity. They support a significant part of the country's taxonomic, genetic, bio-geographical and ecological research and are a vital resource for conservation and science.

The national biological collections include:

- Australian National Fish Collection (ANFC), specialising in marine fishes
- Australian National Herbarium (ANH), specialising in native plants and weeds
- Australian National Insect Collection (ANIC), specialising in terrestrial invertebrates
- Australian National Wildlife Collection (ANWC), specialising in terrestrial vertebrates
- Australian National Algae Culture Collection (ANACC), specialising in living microalgae cultures
- Australian Tree Seed Centre (ATSC), specialising in supplying tree seed to both domestic and overseas customers.

The Atlas of Living Australia (ALA) contains information on all the known species in Australia, aggregated from a wide range of data providers including museums, herbaria, community groups, government departments, individuals and universities.

CSIRO also manages over 20 smaller collections of interest that contribute to the discovery, inventory, understanding and conservation of Australia's biological diversity.

IN 2014–15, AMONG MANY OTHER ACHIEVEMENTS, WE HELPED MANAGE A MAJOR DISEASE OUTBREAK IN SOUTH EAST ASIA, BEGAN OPERATING THE MOST ADVANCED PUBLIC RESEARCH SUPERCOMPUTERS IN THE SOUTHERN HEMISPHERE AND MANAGED 15+ MILLION PHYSICAL SPECIMENS ON BEHALF OF AUSTRALIA.

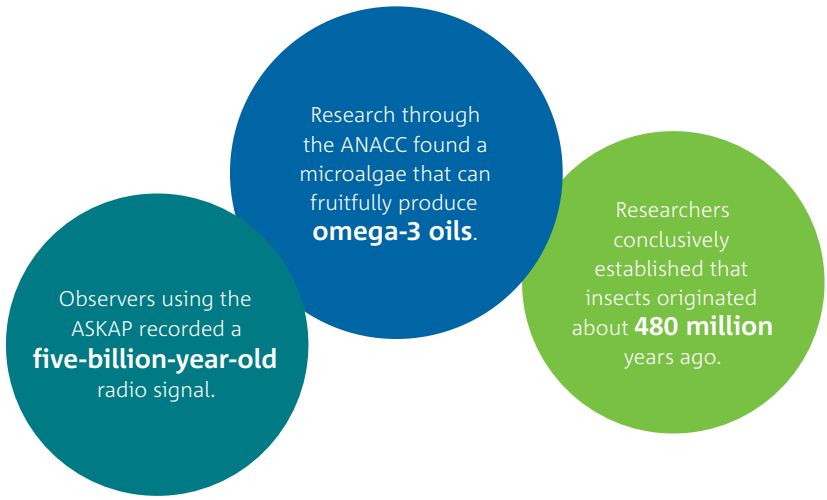
PROGRAM PERFORMANCE

This year, our National Research Infrastructure Program continued to perform well. An assessment of the Program's four key performance indicators (KPIs) identified in the Portfolio Budget Statements, showed we have largely met expectations and targets. Table 2.9 provides an overview of the evidence for each KPI with a more detailed analysis following.

TABLE 2.9: PERFORMANCE INDICATORS FOR PROGRAM 2 – NATIONAL RESEARCH INFRASTRUCTURE

KEY PERFORMANCE INDICATOR	TARGET (AND PERFORMANCE ASSESSMENT)	PERFORMANCE
Utilisation of the National Research Infrastructure and Collections	Maintain or Increase	We maintained the availability levels and supported an increase in the use of the National Research Infrastructure under its custodianship. The new MNF research vessel RV *Investigator* was launched and three scientific research voyages have been undertaken, for a total of 44 days at sea.
National Research Infrastructure maintained or operated to appropriate standards	Meet International Standards	We achieved compliance with relevant Australian and International Standards. The Science Operations Centre at the ATNF's headquarters in Sydney became the default location for observing with the Compact Array. Astronomers can now operate Parkes or the Compact Array from their home institutions.
Maintain or increase the proportion of collections available to researchers and the public, including digitised and non-digitised	Maintain or Increase	We maintained the proportion of the National Biological Collections that are digitised. The Australian National Algae Culture Collection achieved 100 per cent digitisation during the year.
Demonstrated response to national events	Timely Response	AAHL continued to play a key role in Avian influenza surveillance and diagnostics and is advancing Yellowhead virus diagnostics to protect Australia's shrimp and prawn industry.

Blue shading: indicates positive progress for the year and that the target has been achieved.



Australian Animal Health Laboratory

AAHL, located in Geelong, Victoria, is recognised nationally and internationally as a centre of excellence in disease diagnosis, research and policy advice in animal health and human diseases of animal origin (zoonoses). AAHL helps protect not only Australia's billion dollar livestock and aquaculture industries, but also the general public from exotic and emerging infectious diseases. One of the world's largest high-containment laboratories, our facilities enable work on the most dangerous pathogens and our expertise in biosecurity and biosafety is sought after by customers around the world.

Utilisation

AAHL is supported under the Australian Government's NCRIS as a crucial part of Australia's biosecurity infrastructure.

The user base for the AAHL laboratories has been expanding through a variety of initiatives. During the past year AAHL held international biosafety and biosecurity training courses involving delegates from seven countries. This training helps reduce the risks of bioterrorism, by enhancing biosecurity measures at high containment laboratories around the world.

We have trained diagnostic staff from the Asian region and provided diagnostic services to assist in the management of disease outbreaks both locally and more widely. Regional capability development such as this contributes to trade access, regional food security, improved public health in the Asia Pacific region, soft diplomacy and enhanced pre-border biosecurity for Australia.

We also established new collaborative partnerships with Barwon Health, one of Victoria's state health services, to facilitate research into two infectious pathogens of public health concern.

AAHL's unique large animal facility has enabled ground-breaking research into the development of an innovative animal model for testing disease pathogenesis. This model has attracted considerable interest due to its potential to facilitate the testing and registration of new human therapeutics against viruses such as Ebola.

Maintenance and operation

The AAHL modernisation program has progressed through the expression of interest stage to tender for design. Capital upgrade is essential to ensure the facility continues to meet or exceed all regulatory standards, now and into the future. It will also ensure AAHL is best equipped to meet the diagnostic and research demands involved in protecting Australia from infectious pathogens that may pose a threat to the health of our animals, industries and people.

Maintaining and reviewing the microbiological and physical security of AAHL has been a constant priority since AAHL was officially opened in April 1985. In addition to our regular reviews, this past year AAHL conducted a major Protective Security Risk Review. Recommendations from the review have been endorsed and significant upgrades to many of our security systems have commenced. AAHL continues with its aim of maintaining or exceeding the many regulatory requirements specified by the Department of Agriculture, the Office of the Gene Technology Regulator and the Department of Health's Security Sensitive Biological Agent legislation, while also ensuring all relevant ISO accreditation.

Demonstrated response to national events

While AAHL's involvement in terrestrial animal disease outbreaks has received widespread publicity over recent years, our work with aquatic animal species, from investigating diseases of risk to the Tasmanian salmon industry to characterising new viruses affecting Southern Australia's abalone populations, has quietly continued.

AAHL is designated by the World Organization for Animal Health as an international reference laboratory for Yellowhead virus (YHV), a viral infection of prawns, in particular the giant tiger prawn (*Penaeus monodon*), which has caused mass mortalities of farmed shrimp in Thailand.

Australian wild-caught and farmed prawn production, forecast at 24 kilotonnes in 2014–15, is valued at more than $310 million and is an important natural resource and valuable export industry, particularly for northern Australia.

The YHV1 genotype of the virus can cause 100 per cent mortality of farmed prawns in three to five days. This highly pathogenic strain is exotic to Australia, but a closely-related less pathogenic genotype, gill-associated virus (GAV or YHV2), has been known to be present in wild and farmed giant tiger prawns in eastern Australia.

As part of a research project to improve AAHL's Yellowhead virus diagnostic capability and uphold the quality of Australia's ongoing quarantine, AAHL's Fish Diseases Laboratory diagnosed two new YHV genotypes (YHV8 and YHV10) in imported prawns. AAHL has now commenced a research project to determine the potential risk of these new YHV genotypes, as well as to develop more sensitive and specific diagnostic tests for the various YHV genotypes. The findings will deliver impact to the Australian prawn market and also facilitate disease management strategies in the Asian region.

AAHL continues to play a key role in Avian influenza surveillance and diagnostics, and the past year has also seen us expand our work to include surveillance of Australian pigs as well as birds. While many of the viruses of risk to Australia are known as zoonotic diseases, those that pass from animals to human, influenza in swine is a 'reverse-zoonosis', meaning that pigs can be infected with human strains of the viruses. Our surveillance has shown that pigs can re-assort animal and human strains of the virus to form new pathogenic strains. Ongoing surveillance will be of great benefit in helping protect Australian pigs and people from the threat of a new pandemic strain.

AAHL helps manage disease outbreak in South East Asia

AAHL's expertise in the management of zoonotic diseases is well recognised nationally and internationally and AAHL is now a designated World Animal Health Organization International Reference Laboratory for Hendra and Nipah Virus, as well as an International Collaborating Centre for New and Emerging Diseases.

The World Health Organization (WHO) contacted AAHL on behalf of the Philippines Department of Health and the Research Institute of Tropical Medicine (RITM) to request assistance in the management of a deadly disease outbreak affecting both animals and people. One of AAHL's diagnostic veterinarians was deployed on the ground in the Philippines as part of an international effort involving staff from the Philippines Department of Health and Department of Agriculture, RITM, and the United States Centers for Disease Control and others. Samples were collected and sent back to AAHL to our team of diagnostic scientists, who characterized the virus and confirmed the diagnosis of highly pathogenic Nipah virus.

AAHL's role in the successful management of this outbreak has led to funding from the Australian Centre for International Agricultural Research to conduct a research project on the epidemiology of Henipaviruses in Sultan Kudarat, in the Philippines, which includes collaborations with the Bureau of Animal Industries and RITM.

Furthermore, at the request of the WHO, AAHL will host a visiting scientist from the RITM Special Pathogens Laboratory for three months of capability training. This scientist will work alongside one of our leading dangerous pathogens virologists to investigate the pathogenicity of the Ebola Reston strain, isolated from a separate disease outbreak in pigs in the Philippines some years ago.

AAHL Diagnostic Veterinarian Debbie Eagles collecting a blood sample from a buffalo with a fellow WHO Outbreak Response Team member in the Philippines.

Australia Telescope National Facility

Radio astronomy is one of the major branches of modern astronomy. Studying the radio waves emitted by stars, galaxies and gas clouds gives us a deeper understanding of astrophysical processes, just as an X-ray of a human body adds to what we can learn from an ordinary photograph.

CSIRO's radio astronomy observatories are collectively known as the Australia Telescope National Facility (ATNF). The ATNF operates three telescopes in New South Wales, near the towns of Parkes, Narrabri and Coonabarabran, and is developing a fourth, the Australian Square Kilometre Array Pathfinder (ASKAP), in Western Australia. These observatories are supported by staff and facilities at the ATNF's headquarters in Sydney.

CSIRO also operates the Canberra Deep Space Communication Complex (CDSCC), which is responsible for meeting the Government's obligations under the USA-Australia Agreements for deep space tracking and communications in Australia. CSIRO, through CDSCC, provides critical front line mission control support to NASA for all its deep space missions studying our Solar System. During 2014–15, CDSCC tracked over 40 interplanetary spacecraft missions and provided radio and radar astronomy observations for the exploration of the Solar System and the universe. The CSIRO activity is underpinned by a strategic partnership with NASA, within the framework of a bilateral space tracking treaty between Australia and the USA.

As a national facility, the ATNF operates major instruments that would be beyond the capacity of a single university to run. It is managed with the aim of maximising scientific return, as measured through the publication record of telescope users. All Australian and overseas researchers can apply to use ATNF facilities, under a competitive process, ensuring that the telescopes are used for the best possible science. Telescope operations are aimed at achieving high reliability and excellent data quality, and telescope users receive extensive support. Research conducted with ATNF facilities has high-level impact, with the Parkes and Compact Array telescopes ranked by an independent study as second and third in the world among radio telescopes, in terms of the total number of citations to research papers[15].

Utilisation

Observing time on ATNF telescopes is determined on the scientific merit of the observing proposals submitted by research teams. Proposals are assessed twice a year, and observations scheduled in two six-month semesters. In 2014 research teams of more than 890 individual astronomers submitted proposals. Observing time at the Mopra telescope near Coonabarabran is primarily dedicated to researchers from the National Astronomical Observatory of Japan, the University of NSW and the University of Adelaide, as the telescope is now funded by these groups. However, some observing time is made available to the general astronomical community as National Facility time.

Observers have an 18-month proprietary period after the observation during which they have sole access to their data. After this period the data are made publicly available to astronomers worldwide. Compact Array, Mopra, and some Parkes data are archived on the Australia Telescope On-line Archive[16], with most Parkes data from pulsar observing archived on the CSIRO Data Access Portal[17].

Time allocation is calculated by dividing the time awarded to an observing project by the number of members in that observing team. The figures for 2014 include the National Facility time allocation for the Compact Array, Parkes and Mopra.

TABLE 2.10: UTILISATION OF AUSTRALIA TELESCOPE NATIONAL FACILITY

ACCESS TO ATNF	2010–11	2011–12	2012–13	2013–14	2014–15
Time allocated to observations (%)	72.4	73.6	76.7	76.8	76.3
Time lost to equipment failure (%)	3.1	2.7	2.7	3.3	2.2
Time allocated to CSIRO staff (%)	24	22	22	19	22.5
Time allocated to other Australian researchers (%)	25	21	28	30.3	28.4
Time allocated to international researchers (%)	51	57	50	50.7	49.1

15 Reference: Trimble and Ceja (2008) *Astron. Nachr.*, **329**, 623–647.
16 www.atnf.csiro.au
17 https://data.csiro.au/dap/

Maintenance and operation

In 2013, systems were put in place to allow astronomers to control the Parkes radio telescope from the new Science Operations Centre (SOC) at the ATNF's headquarters in Sydney, and in 2014 the SOC also became the default location for observing with the Compact Array. Once qualified in its use, astronomers can operate Parkes or the Compact Array from their home institutions. Several times each year the ATNF telescopes combine with other telescopes in Australia and overseas to co-observe using a technique called Very Long Baseline Interferometry. This enables an improvement by a factor of several thousand in the detail that can be seen in resulting images of objects in our galaxy, or at the bright cores of distant galaxies and quasars.

The SOC is also used by the team commissioning the ASKAP in Western Australia; from the SOC, the team can make observations with the Boolardy Engineering Test Array (BETA), a set of six of ASKAP's 36 antennas. The BETA antennas have been fitted with first-generation widefield phased-array feeds, in essence, 'radio cameras' for imaging the sky, while development of improved second-generation feeds continues. This year has seen dramatic improvements in the images being produced by the BETA array. Several scientific papers on BETA results, described below, have been submitted for publication.

First science from the ASKAP

CSIRO is developing the ASKAP in Western Australia to be a world-class radio telescope for surveys of the whole sky. The telescope is being commissioned using six of its 36 antennas, outfitted with phased-array feeds 'radio cameras' giving an extremely wide field of view on the sky. Three results arising from commissioning projects carried out in 2014, all led by CSIRO scientists, have now been submitted for publication.

In one project, the research team found giant, starless clouds of hydrogen gas near a galaxy called IC 5270. This gas was probably stripped out of the galaxy by other galaxies passing close by. The finding confirms that ASKAP will be sensitive enough to spot such stripped gas around thousands of galaxies, helping us better understand galaxy evolution.

A second project involved observations of a pulsar (a small star that produces regular pulses of radio waves) called J1107-5907. Much of the time this pulsar is 'turned off', producing no detectable pulses. Such part-time pulsars are hard to find with traditional pulsar surveys. But ASKAP spotted the pulsar easily, suggesting it could uncover a new population of these objects.

ASKAP will also be able to detect galaxies other telescopes can't. In a third project, observers recorded a five-billion-year-old radio signal from the galaxy PKS B1740-517. A small dip showed that the signal had travelled through hydrogen gas in a galaxy on its way to Earth. The dip would have been missed at many radio observatories, but ASKAP's home, the Murchison Radio-astronomy Observatory, is so 'radio quiet' that it stood out clearly. The finding means that ASKAP will be able to discover thousands of galaxies up to eight billion years old, helping us learn why the universe forms fewer stars than it used to.

Last year the ASKAP commissioning team made an image that covered ten square degrees of the sky, or 50 times the area of the full moon. The team has now made an image covering an extraordinary 150 square degrees. Observations of this field taken weeks apart have confirmed that the telescope is extremely stable.

CSIRO's ASKAP Telescope under development at the Murchison Radio-astronomy Observatory in Western Australia.

Marine National Facility

Funded by the Australian Government since 1984 and hosted by CSIRO, the Marine National Facility (MNF) is a keystone element of the nation's research infrastructure, providing the only blue-water research capability available to Australian researchers and their international collaborators for work in Australia's vast marine estate. Access is provided through a competitive, independent, peer-reviewed applications process focused on scientific and/or technical excellence, the potential to contribute to Australia's national benefit and the ability of the research team. This ensures research undertaken through the MNF is specifically selected for its excellence and contribution to Australia's national benefit. It provides key information to government, industry and other stakeholders to support evidence-based decision-making focused on research challenges in fisheries management, geological resources, regional and global climate, coastal and offshore developments and marine operations.

Utilisation

With much of this year devoted to commissioning the new MNF research vessel RV *Investigator*, three scientific research voyages have been undertaken for a total of 44 days at sea (see Table 2.11). Participants in these voyages were 64 scientists from 11 Australian research agencies and their international collaborators from New Zealand, France and Canada. This number will increase significantly in coming years as commissioning activities give way to research voyages and the supplementary applications process seeks to fill unused berths on research and transit voyages.

The MNF has also maintained a commitment to developing the next generation of Australian blue-water scientists by providing training opportunities on board *Investigator*, primarily through the supplementary application process. In February 2015, the MNF Steering Committee furthered this commitment, joining a consortium of Australian higher education agencies to establish a national postgraduate level, sea-going training program. Led by Macquarie University, the Strategic Marine Alliance Research, Teaching and Training (SMART2) program aims to provide Australian post-graduate marine research students with targeted training and experience by establishing a national standard syllabus, with the incorporation of marine industry approved sea safety and survival training certification.

TABLE 2.11: UTILISATION OF THE MNF

ACCESS TO THE MNF	2014–15
Research days scheduled	44
Research days delivered	44
Scientist days possible	1,300
Scientist days delivered	947
Time allocated to CSIRO researchers (%)	61
Time allocated to other Australian researchers (%)	39

Maintenance and operation

Following delivery of *Investigator* to Hobart in September 2014, much of the 2014–15 period was dedicated to commissioning activities and trial voyages to fully test *Investigator* and associated scientific equipment, as well as providing training opportunities for marine crew, MNF support staff and scientists, prior to the first research voyages. The trial voyages have successfully tested the vessel's geoscience, atmospheric, oceanographic and biological research capabilities and included *Investigator's* maiden cold-water voyage to the Antarctic ice edge.

Feedback from all parties involved has been very positive, as excitement builds regarding new research possibilities now becoming available. Of particular note, both the crew and scientists have been impressed with the stability of the vessel in heavy seas and the effectiveness of the dynamic positioning system in holding the vessel on station, thus providing a safe and effective operational platform for scientific activities at sea.

Delivery and commissioning of Australia's new world class MNF research vessel

With two thirds of Australia's total territory located underwater, at nearly 14 million square kilometres we have the third largest marine jurisdiction globally, of which only about 25 per cent has been mapped or explored in any detail. Australia has sovereign rights over much of this vast estate and its associated fishing, mineral and petroleum resources. Underpinning the growth and sustainability of ocean-based industries, Australian territorial claims and international research obligations for future generations is the knowledge generated by Australian marine scientists, and the supporting infrastructure provided by the MNF.

In September 2014, Australia's new state of the art research vessel *Investigator* was delivered to the MNF in Hobart, marking a step change in Australian marine and atmospheric research capability. *Investigator* can undertake voyages from the tropics to the Antarctic ice edge of up to 60 days in duration with as many as 40 scientists, a substantial increase in capacity over the previous MNF research vessel RV *Southern Surveyor*, which could carry no more than 15 scientists on voyages of up to 28 days in duration. *Investigator* hosts an extensive suite of the latest scientific research equipment and is one of a handful of research vessels globally, designed for very quiet operation with the ability to undertake acoustic mapping and sampling to the deepest parts of our oceans. With these capabilities, *Investigator* will act as a catalyst for international collaboration.

With applications for sea time on *Investigator* currently seeking over 800 days per year, the MNF has developed a multi-year research schedule which has been optimised through supplementary applications to utilise any spare capacity available on voyages with student training and opportunistic science projects. Utilising *Investigator's* greatly increased capacities has also enabled multiple primary applications to be accommodated on a Southern Ocean voyage, which will undertake deep sea moorings servicing, atmospheric research and biogeochemical oceanography on a single voyage.

In May 2014 the Marine National Facility research vessel RV *Investigator* undertook a five day geoscience commissioning trial voyage off the coast of Tasmania.

Pawsey Supercomputing Centre

The Pawsey Supercomputing Centre commenced operations in 2014 and provides some of the most advanced compute and storage infrastructure in the world. The centre has two powerful supercomputers – Galaxy, specifically for radio astronomy operations and research, and Magnus, used for a variety of science. Enabling ground breaking scientific research is the central focus of Pawsey's purpose.

The Pawsey Supercomputing Centre received $90 million in funding between 2009–15, as part of the Australian Government's measures to enable national research infrastructure under NCRIS and related programs through the Commonwealth Department of Education.

Pawsey is currently serving over 80 organisations and achieving unprecedented results in science domains such as radio astronomy, geosciences, engineering, bioinformatics and health sciences. Pawsey also attracts research and development investment and up-skills scientists.

Pawsey's supercomputers and advanced data storage is critical to processing, storing and analysing the data from the Australian SKA Pathfinder (ASKAP) and the Murchison Wideband Array (MWA) and Pawsey partners closely with the International Centre for Radio Astronomy Research to curate and publish the data from these projects for the international research community.

Utilisation

Pawsey allocates compute time to researchers through project awards. Proposals for projects may be submitted through one of a number of schemes: the National Computational Merit Allocation Scheme (NCMAS), the Pawsey Geosciences Merit Allocation Scheme, the Astronomy Supercomputing Time Allocation Scheme, the Pawsey Partner Merit Allocation Scheme, and the Pawsey Director's Allocation Scheme.

Through these allocation schemes, Pawsey strives to maximise research impact, promote scientific advantage in priority domains such as radio astronomy and geosciences, provide leading-edge, supercomputing resources for researchers in Pawsey's partner institutions, and enable wider adoption of and benefit from supercomputing across Australia.

In addition, over the past year Pawsey held 68 training sessions and workshops that attracted over 700 attendees, providing the scientific-computing skills needed in the resources, biotechnology and engineering sectors.

CPU Time Allocation

Table 2.12 outlines the high level in principal central processing unit (CPU) time allocations on the Pawsey supercomputers Magnus (Petascale batch machine) and Galaxy (real-time processor for radio astronomy instruments ASKAP and MWA). The Radio Astronomy and NCMAS allocations are the only fixed allocations: all others are fluid depending on scientific merit and demand.

Data Storage Allocation

Data storage allocations at the Pawsey Centre are predominantly for the radio astronomy projects of ASKAP and MWA. Of the total approximately 35 Petabytes of data storage available, 80 per cent is dedicated to ASKAP and MWA and 20 per cent is available for general science.

TABLE 2.12: UTILISATION OF THE PAWSEY CPU AND DATA STORAGE ALLOCATION

CENTRAL PROCESSING UNIT TIME ALLOCATION	2014–15
Radio Astronomy (ASKAP & MWA)	25%
Partner Share (allocated through merit process)	30%
NCMAS	15%
Focussed Domain (Geoscience)	25%
Director's Discretion	5%
DATA STORAGE ALLOCATION	
Radio Astronomy	80%
General Science	20%

Maintenance and operation

Pawsey operates through an unincorporated joint venture, with the core members being the CSIRO, Curtin University, Edith Cowan University, Murdoch University and the University of Western Australia. It is governed by a Board made up of partner representatives and several independent members, including the Chairman, with CSIRO operating as Centre Agent. The primary funding partners for Pawsey are the Department of Education, the Minister for Science and Innovation (WA Government) and the Pawsey partners. Pawsey employs staff through all of its five partner organisations. CSIRO has employees dedicated to Pawsey, including the Executive Director. The primary site for Pawsey operations is the CSIRO Kensington site.

Pawsey Supercomputing Centre – tools and expertise to process and visualise

The Pawsey Supercomputing Centre is providing world-class tools and expertise to process and visualise astronomy data collected by the ASKAP, a major radio astronomy facility funded and constructed by CSIRO. ASKAP consists of 36 antennas, each equipped with a phased-array feed that generates 36 parallel signals on each antenna. The 36 antenna work together as a single instrument, generating enormous data rates at the equivalent of one DVD every two seconds. This data needs to be processed and the processed data archived synchronously with observations, requiring extremely high levels of computing power.

Galaxy, the real time supercomputer as part of the Pawsey Supercomputing Centre, is playing a crucial role in the ASKAP project, an integral part of the ASKAP telescope. With processing power in excess of 200 TeraFLOPS (200 trillion floating point operations per second), Galaxy runs the Central Science Processor for ASKAP, allowing real-time processing of the data delivered to the Centre from the Murchison Radio-astronomy Observatory near Boolardy, some 350 km inland from the coastal town of Geraldton in Western Australia.

By processing the data in near real-time, CSIRO researchers are able to achieve immediate results from observations in the form of scientifically useful data products like images and archives. This differs from previous, smaller radio telescopes such as the Australian Telescope Compact Array, which would produce data that would be queued for later processing. Pawsey also enables the data received to be reduced to a manageable and storable size before being accessed by the wider science community.

The Pawsey Supercomputing Centre is a critical piece of the infrastructure that will enable Australian scientists to stay at the forefront of radio astronomy, and is on the leading edge of real time computing capability in terms of 'big data' volumes.

At the present time Pawsey is managing data from just the first six antennas making up the ASKAP test array.

Magnus is the most powerful public research supercomputer in the southern hemisphere.
Image: Pawsey Supercomputing Centre

National Research Collections Australia

Australia is one of the 17 mega-diverse countries that harbour the majority of the planet's biological diversity. Australia is home to more than 500,000 species of plants and animals, of which approximately 70 per cent are found only on this continent. Managing this unique biodiversity is both a major challenge and an international responsibility with regard to environmental conservation, especially in the face of a changing environment. Importantly, it is a unique resource that can be exploited for bio-based industries, e.g. wild-caught fisheries and algae. Australia also has wild relatives of major crops such as cotton, soybean and macadamia.

Our collections are the most reliable set of nationally representative biological collections and the primary source of specimen-based information about Australia's unique biological assets.

NRCA aims to secure and mobilise the rich biological information of its world-class 'science ready' collections to explore, conserve and exploit our nation's unique biodiversity for the benefit of our environment, the community and industry. It enables us to identify, quantify and explore Australia's biodiversity over time so that we can measure and understand our country's biological diversity for conservation and sustainable management and inform public policy decisions and contribute to management science. It also allows the exploration of biodiversity for commercial purposes and account for cost and benefits in free market transactions.

Utilisation

The 15+ million physical specimens from the six national collections represent a 240-year time-series of data on the occurrence and distribution of native and introduced plants, terrestrial vertebrates, invertebrates, fish, algae and tree seeds.

These collections are available for use by the Australian and international community and are increasingly also publicly accessible. Collection activities include the curation of each collection and the essential core research to make it 'science usable'. The Atlas of Living Australia (ALA) is the primary mechanism for making the data available in electronic format to the wider community.

The Australian National Algae Culture Collection (ANACC), through the Australian National Algae Supply Service, supplied living microalgae cultures to 89 customers, 58 domestic and 31 international, from 19 countries. There were a total of 147 sales represented by 311 culture strains and revenue of $49,662. The collection hosted approximately 100 visitors during 2014–15. Of particular note was a visit by the NCRIS Executive to both ANACC and ANFC.

The Australian Tree Seed Centre (ATSC) supplied a total of 77 seed orders to 62 customers comprising 506 bulk seedlots and 1215 individual tree seedlots. This resulted in total sales revenue of $381,667.

TABLE 2.13: COMBINED UTILISATION OF NATIONAL BIOLOGICAL COLLECTIONS[18]

USE OF NATIONAL RESEARCH COLLECTIONS AUSTRALIA	2010–11	2011–12	2012–13	2013–14	2014–15
Number of specimens dispatched	25,925	15,548	13,660	30,514	20,156
Outward going loans	193	157	153	222	171
Tissue samples sent	4,447	3,819	2,415	8,461	4,033
Tissue sample grants	40	43	74	34	61
Number of visitors hosted	-	-	-	-	417
Total visitor research days	-	-	-	-	651
Number of tours hosted	-	-	-	-	90
Total number of visitors on tours	-	-	-	-	695

18 Excludes ATSC and ANACC, as the function of these collections is as a supply service not coverage.

Collections available to researchers and the public

The collections continue to place emphasis on digitising specimens for ease of access by researchers and the general public. However, this effort is only just keeping pace with collections growth, hence the perceived lack of improvement in the digitisation figures (Table 2.14).

The Australian National Insect Collection (ANIC) is currently focused on developing and serving a major database of genomic information based on sequencing of 600 Australian insects. The database will serve between 900 Gigabytes and 1 Terabyte of digital sequence data for a broad range of insect species, for use by researchers in CSIRO and elsewhere.

The Australian National Wildlife Collection (ANWC) focused on digitising bird specimens from several recent expeditions to remote locations including the Kimberley and Papua New Guinea, adding rare and valuable specimen record data to the ALA.

The majority of the Australian National Fish Collection (ANFC) specimen records are digitised. Approximately 65 per cent of the registered specimen records are available publicly through the Online Zoological Collections of Australian Museums and the ALA.

The majority of Australian National Herbarium (ANH) Australian specimen records are digitised and available through Australia's Virtual Herbarium and the ALA.

The ANACC specimens are 100 per cent digitised and form an irreplaceable backbone for curation of this living collection. Approximately 60 per cent of these data are available publicly through the ANACC public database and the ALA.

Digitising the ATSC has focused on two aspects. Paper records or 'provenance sheets' have been digitised into PDF format and made searchable from our web-served database. The 'born digital' initiative focuses on storing digital photographs, spreadsheet data and statistical analysis relating to the seedlots on the database.

The ALA has grown rapidly and delivers more than 55 million records and 3.78 billion downloads. Between July 2014 and May 2015, the ALA website was visited 1.19 million times by 620,000 users, an increase from the previous year of approximately 28 per cent. One hundred and sixty-four collections from around Australia contribute data. In a collaborative effort, the National Collections, the ALA and the Digital Productivity Flagship have been developing tools that will enable researchers to combine 3D scans of insect specimens with other data sets and create meaningful 3D annotations.

TABLE 2.14: DIGITISATION OF THE NATIONAL BIOLOGICAL COLLECTIONS

	PROPORTION OF COLLECTION DIGITISED (%)				
COLLECTION	2010–11	2011–12	2012–13	2013–14	2014–15
Australian National Insect Collection	5	5	5	5	5
Australian National Wildlife Collection (excluding sound collection)	91	91	92	92	92
Australian National Fish Collection	100	100	100	100	85
Australian National Herbarium	76	76	76	76	76
Australian National Algae Culture Collection	-	-	-	-	100
Australian Tree Seed Centre	65	66	67	68	70

Key achievements

Australian National Insect Collection

Using genomic analysis, scientists have for the first time been able to conclusively establish that insects originated approximately 480 million years ago, and developed the ability to fly about 80 million years later. The study involved 100 researchers from 16 countries, including five from the ANIC, and has been essential to understanding the millions of insect species that shape our environment, and both support and threaten our natural resources. The only way we can understand the enormous species richness and ecological importance of insects is with a reliable reconstruction of how they evolved and are related.

Australian National Wildlife Collection

This year ANWC research has emphasised applying powerful new genomics technologies, to address the ways in which different bird species are evolving when faced with major climatic changes. Understanding how the genome underpins the capacity of different bird species to live in different climates will be important in ensuring the survival of species and provide useful conservation and management tools in 'evolutionary rescue'.

Front cover of Science illustrating insect diversity and in which the ground-breaking insect phylogeny study was published. Image: *Science* Magazine

Collection Manager Robert Palmer prepares ANWC cryo-frozen tissue samples for DNA analysis.

Australian National Fish Collection

The ANFC is a vital resource for Australia's marine fish biodiversity, holding specimens of over 3000 species and an extensive tissue library. These resources are supporting a BioPlatforms Australia project: DNA Barcodes for Australian Fish[19].Employing cutting-edge genomic research, over 1000 specimens and 400 species have been barcoded to date: a standardised reference database for rapid species identification and increased species discovery, contributing to international barcode databases. This new research is developing genomic markers for intra and inter-species comparisons and up-skilling external domestic infrastructure providers such as the Ramaciotti Centre for Genomics.

Australian National Herbarium

ANH research on iconic Australian orchids, in conjunction with the Australian Tropical Herbarium, has produced significant classification insights into the evolutionary relationships and diversification of several ecologically and evolutionarily significant Australian terrestrial orchid groups, such as duck, hammer and spider orchids. These findings have helped stabilise the classification and relationships of species within these groups. This new understanding and classification clarity is vital for the conservation and management of species that are listed as either nationally threatened or endangered.

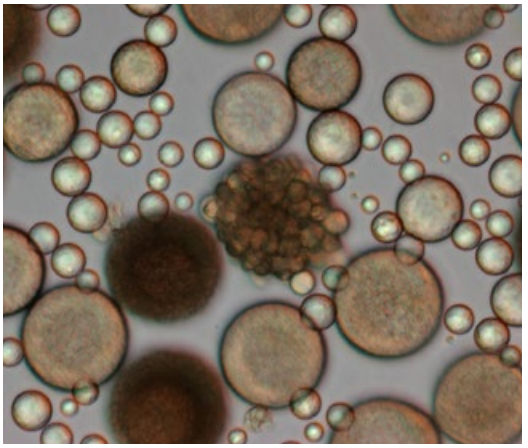
Dr Sharon Appleyard demonstrating the processes of DNA extractions in fish in the Hobart Genetics Facility to National Fisheries Authority, Papua New Guinea researcher Ms Leontine Baje.

Dr Katarina Schulte from the Australian Tropical Herbarium examines orchid specimens.

19 www.bioplatforms.com/dna-barcoding/

Australian National Algae Culture Collection

Microscopic algae inhabit our world's oceans and, as the primary producers of omega-3 oils, are a great potential alternative and renewable source for 'fish oil'. As concerns increase around depletion of natural fisheries and the health of fish supplies due to pollution, alternative sources of fish oil supplements are being investigated. Research conducted through the ANACC has demonstrated that a specially developed collection of unusual microalgae, called Thaustrochytrids, is an extremely fruitful producer of omega-3 oils. The microalgae have been fed using industrial waste carbon, in the form of crude glycerol. Production is being optimised and will soon be scaled up in the CSIRO Fermentation Facility, with commercial application in the next 10 years.



Unusual microalgae called Thaustrochytrids are extremely fruitful in producing omega-3 oils (magnified x20).

Australian Tree Seed Centre

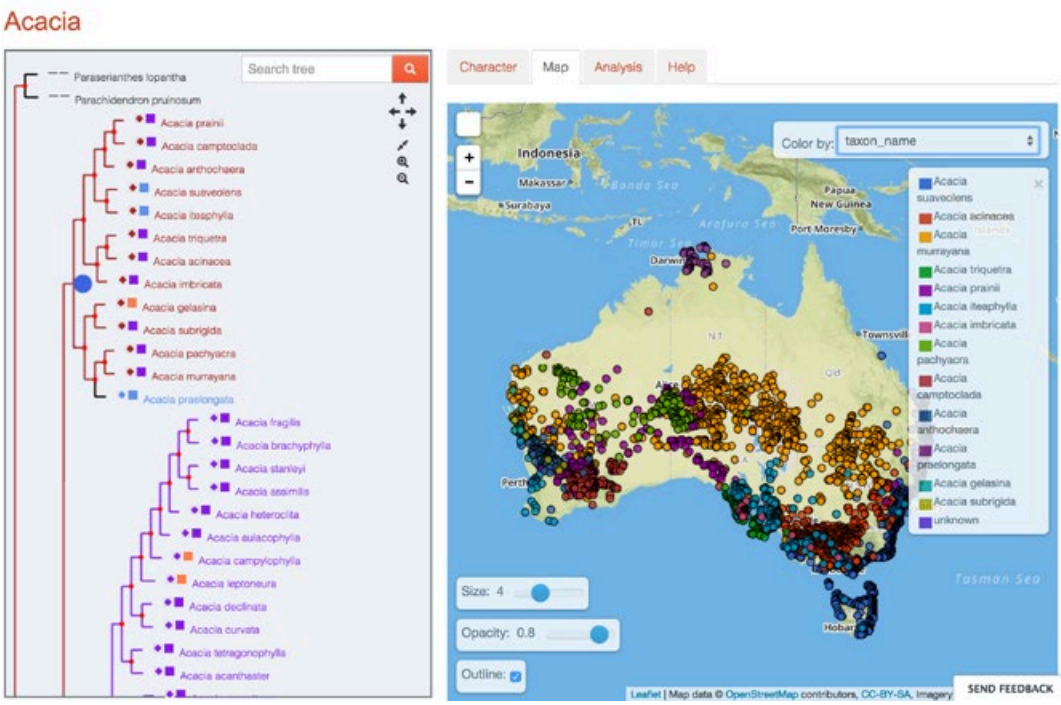
The ATSC's main research focus is on characterising and conserving forest genetic resources. The collection is used extensively by customers in Australia and overseas for breeding, as a source of wild seed, and for genetically improved seed of known pedigree. Research on quantitative and population genetic parameters is a major focus, to support conservation and tree breeding programs. In addition to the stored seed, the ATSC has an extensive network of planted trials, in partnership with other research organisations overseas and with farmers in Australia. The ATSC has worked extensively on development assistance projects in tropical Asia and the Pacific, where Australian forest genetic resources are a critical part of the sustainable plantation base. Key clients for this work include the Australian Centre for International Agricultural Research and DFAT. In Australia, a major focus is on new species that are well-adapted to drier and hotter climates, in anticipation of future land-use and climate change.

Harvesting from a seed orchard of *Acacia melanoxylon* (Blackwood) at Bunyip, Victoria.

Atlas of Living Australia

The ALA has released a new tool for visualising phylogenetic trees and exploring data from evolutionary relationship perspectives, called PhyloLink. This tool enables users to generate flexible, customised visualisations and biodiversity profiles and metrics, through its ability to intersect a phylogenetic tree with species occurrence records, environmental data and character information. Both novices and experts can use the tool, making data exploration and visualisation accessible to a broad range of audiences.

PHYLOLINK ENABLES USERS TO GENERATE FLEXIBLE, CUSTOMISED VISUALISATIONS AND BIODIVERSITY PROFILES MAKING DATA EXPLORATION AND VISUALISATION ACCESSIBLE TO A BROAD RANGE OF AUDIENCES.



ALA's new phylogenetic tools integrate phylogenetic trees and spatial mapping. Here, the occurrence of Acacia species from the clade highlighted by the blue node is mapped and coloured by species.

Program 3
Science and Industry Endowment Fund

The Science and Industry Endowment Fund (SIEF) is a separately constituted trust under the *Science and Industry Endowment Act 1926*. The Fund invests in science that addresses issues of national priority and contributes to Australia's sustainable future, including:

- fundamental research for sustainable resource use, environmental protection and community health
- tactical research seeking solutions to national challenges
- collaborative research between organisations working on solutions to national challenges
- scholarships sustaining young researchers capable of working on national challenges.

OBJECTIVES AND DELIVERABLES

Recognising that science will remain a key driver of Australia's economic, industrial, environmental and cultural development, the Fund invests in research that will contribute to Australia's sustainable growth.

CSIRO Chief Executive Dr Larry Marshall is Trustee, and awards funding to parties across the National Innovation System. The SIEF Advisory Council provides independent advice and recommendations on funding of proposals from across the National Innovation System. CSIRO manages the Fund on behalf of the Trustee.

Some programs operate on a competitive basis, others by invitation on the basis of identified needs. SIEF funds the:

- Research Project Program (competitive)
- Research Infrastructure Program
- Special Research Program
- Promotion of Science programs – Fellowships and Scholarships (competitive)
- Joint Chair appointment (CSIRO/ Macquarie University)
- SIEF – AAS Fellowships to the Lindau Nobel Laureate meeting – facilitated by the Australian Academy of Science (competitive)
- SIEF STEM+ Business Fellowships – facilitated by CSIRO.

PROGRAM PERFORMANCE

The contribution of research to solving issues of national importance can only be measured long-term, but key performance indicators are chosen for early program stages (see Table 2.15).

TABLE 2.15: PERFORMANCE INDICATORS FOR PROGRAM 3 – SIEF[20]

KEY PERFORMANCE INDICATOR	2011–12	2012–13	2013–14	2014–15
Projects involving research in areas of national priority[21]	100% Research Projects 76% Promotion of Science	100% Research Projects, Research Infrastructure and Special Research Program 83% Promotion of Science	100% Research Projects, Research Infrastructure and Special Research Program 84% Promotion of Science	100% Research Projects, Research Infrastructure and Special Research Program 84% Promotion of Science
Projects involving more than one organisation[22]	>85%	>90%	>92%	>92%
Financial contributions of partners	Approximately 57%	Approximately 69%	Approximately 68%	Approximately 70%
Publications from SIEF projects[23]	79	158	226	276
Early Career Researchers funded through SIEF projects[24]	23[25]	42	131[26]	241

20 For all projects awarded as at 30 June 2015.
21 Data includes Research Projects, Research Infrastructure, Special Research and Promotion of Science programs. Undergraduate degree scholarships are not included: there is no expectation they will address national priorities, collaborate, co-invest or publish.
22 Cumulative for all projects awarded up to 30 June 2015.
23 Excludes RI and SPR.
24 Does not include RI or SRP.
25 Promotion of Science Program only (including undergraduate scholarships).
26 Performance indicator expanded in 2013–14 to include Research Projects Program.

As the funds available for allocation diminishes and fewer new projects are commenced, some indicators do not change from previous years.

Proportion of projects involving research in areas of national priority

One of SIEF's primary purposes is to provide grants in support of research that is of national benefit. All SIEF research programs and most of our fellowships and scholarships are funded on this basis.

Recent grants, under the Research Infrastructure Program, target areas supporting Australian industry and agriculture:

- The Biomedical Materials Translational Facility (BMTF), based in Clayton, is led by Monash University and CSIRO, with partners MIMR-PHI and ANSTO. This $30+million initiative leverages SIEF funds with at least matching funds from CSIRO and Monash (plus partners), and additional investment from emerging industry partners. The BMTF will be a focal point to draw in, engage and stimulate industry. Within Australia's medtech sector there are a range of highly innovative companies with high growth potential. The BMTF's focus on translational biomedical materials research provides these companies with a means to proactively engage earlier in the R&D process.
- The National Agricultural & Environmental Sciences Precinct (NAESP) is a collaboration between CSIRO and ANU, working with partners and collaborators, to bring transformative changes to the way research and innovation are conducted in the Precinct, by fostering integrative and collaborative work patterns, and by enabling joint access to a suite of facilities. The facilities will also provide a major platform for co-location of external collaborators. SIEF is investing ($18 million) in two key elements of this emerging precinct – The Centre for Genomics, Metabolomics and Bioinformatics and a new life sciences building on the CSIRO Black Mountain campus, to ensure that CSIRO's laboratories, microscopy and analytical facilities support outstanding research excellence.

Proportion of projects involving more than one organisation

More than 92 per cent of SIEF-supported activities involve more than one organisation, fostering communication, interaction and collaboration.

Over 60 organisations are formally involved in one or more SIEF-funded projects, representing national and international research organisations as well as industry and end users. Many more organisations draw on SIEF funded activities, particularly via the Research Infrastructure and Special Research Programs, where development and/or availability of research infrastructure plays an important role in supporting Australian innovation for the future.

Financial contributions of partners

Promotion of Science activities (Scholarships and Fellowships) leverage an average 41.6 per cent co-investment from partner organisations, while Research Projects show an average co-investment rate of over 60 per cent. The Research Infrastructure and Special Research programs have higher co-investment levels (76.8 per cent and 85.7 per cent respectively), indicating the longer term commitment to these activities by the partner organisations.

Number of publications from SIEF projects

Publication numbers continue to increase year on year. However, it should be noted that the recorded publication numbers are likely to under-represent the true level of publications associated with SIEF funding. Publications resulting from grants in the Research Infrastructure and Special Research Programs are not included, and once SIEF funding has ended, it is challenging to capture all subsequent publications.

Early-career researchers funded through SIEF projects

SIEF supports early career researchers in a number of ways, including scholarships and fellowships, project funding and travel support. The number of early career researchers funded through SIEF projects has risen more than tenfold over the past three years.

The John Stocker Postgraduate Scholarship Program and the Honours and Vacation scholarship programs are no longer offering new scholarships, and the John Stocker Postdoctoral Fellowships program was suspended in 2014–15. Hence the increase in number of early-career researchers is mainly attributable to the Research Projects Program and Lindau Fellowships. Again, this number is likely to be an underestimate, as early-career researchers associated with the Research Infrastructure and Special Research Programs are not included.

CSIRO staff at Popina, in Melbourne. Popina use CSIRO's BARLEYmax for a range of products including cereal and bars in their Goodness Superfoods range.

Part 3 | Our organisation

At CSIRO we exist to make a positive impact and want the legacy of our work to last for many generations. We're committed to nurturing a work environment where people, innovation, collaboration and performance thrive.

Our operating model and governing legislation, authorities and activities that provide guidance to our strategic direction.

- Management and accountability | 82
- Board membership | 87
- Executive Team membership | 88

Our health, safety and environmental wellbeing is a core value of our organisation as we strive for Zero Harm.

- Health and safety | 89
- Environmental performance | 90

Our People Strategy underpins our commitment to developing and supporting our people.

- Our people | 93

Our people are renowned for their outstanding contributions to science and society.

- Awards and honours | 96

Management and accountability

OPERATING MODEL

Our Organisation operates within a model designed to support the successful execution of our strategy and delivery of our goals. It defines the roles, relationships and accountabilities of our leaders and operating units. It contains our processes for planning, investment, review and reporting and the CSIRO Policy Framework[27].

LEGISLATION AND GOVERNMENT POLICY

CSIRO is an Australian Government statutory authority constituted and operating under the provisions of the *Science and Industry Research Act 1949* (SIR Act).

Our primary functions are to:

- carry out scientific research to:
  - assist Australian industry and to further the interests of the Australian community
  - contribute to national and international objectives and responsibilities of the Commonwealth
- encourage or facilitate the application and use of the results of CSIRO scientific research.

Our secondary functions include international scientific liaison, training of research workers, publication of research results, technology transfer of other research, provision of scientific services and dissemination of information about science and technology.

Reporting, accountability and other rules for our operations in 2013–14 were set out in the *Commonwealth Authorities and Companies Act 1997* (CAC Act). The CAC Act was replaced by the *Public Governance, Performance and Accountability Act 2013* (PGPA Act) on 1 July 2014.

Pursuant to a service agreement, CSIRO also provides administrative support services to the Trustee of the Science and Industry Endowment Fund consistent with the *Science and Industry Endowment Act 1926*. The Fund has its own governance structure. See pages 78–79 for more information on the Fund.

In October 2014, CSIRO submitted an annual Compliance Report to the Australian Government regarding the Organisation's compliance with the CAC Act and its financial sustainability.

RESPONSIBLE MINISTER

As at 30 June 2015, the responsible Minister for CSIRO is the Hon Ian Macfarlane MP, Minister for Industry and Science.

The Hon Ian Macfarlane MP, Minister for Industry and Science

Under the SIR Act, the Minister has power to:

- add to the purposes for which CSIRO may carry out scientific research (SIR Act, section 9)
- provide to the CSIRO Board in writing, directions and guidelines with respect to the performance of the functions, or the exercise of the powers, of the Board or of the Organisation (SIR Act, section 13).

The Minister provides CSIRO with a Statement of Expectations and the Board responds with a Statement of Intent. These documents can be found at: www.csiro.au/Statement-of-Expectations

MINISTERIAL DIRECTIONS AND NOTIFICATIONS

On 15 July 2014 the CSIRO Minister directed the CSIRO Board to apply the Australian Government Public Sector Workplace Bargaining Policy to Enterprise Bargaining Agreement negotiations in CSIRO.

CSIRO kept the Minister and Finance Minister informed through the Board in accordance with Section 19 of the PGPA Act during 2014–15.

CSIRO BOARD

We are governed by a Board[28], which is responsible to the Australian Government for the overall strategy, governance and performance of our Organisation.

The CSIRO Board comprises nine part-time non-executive members including the Chairman, plus a full-time Chief Executive. All non-executive members are appointed by the Governor-General. The Chief Executive is appointed by the CSIRO Board, in consultation with the Minister.

27 Further information can be found at: www.csiro.au/governanceoverview
28 The Board Charter and membership profiles are available at: www.csiro.au/boardoverview

In 2014–15 our Board operated partly through two standing committees:

- Board Audit and Risk Committee
- Board People, Health and Safety Committee.

On appointment, Board members receive a formal induction on the Organisation and their duties. Members maintain their professional development, and to inform their decision-making they participate in visits to CSIRO sites and governance and business briefings. In the pursuit of their duties, Board members may take such independent professional advice as is considered necessary, and have complete access to senior management.

Under its Charter and Operating Guidelines, the CSIRO Board reviews its performance, composition and skill base at regular intervals to ensure it is operating efficiently, effectively and with regard for the principles of good corporate governance. At least once per year, the members of each Committee formally meet to discuss and document any item of business, but in particular its prior year performance, and then report to the Board meeting on these outcomes[29].

Details of our Board members, including their qualifications and terms of appointment, are on page 87. Details of remuneration, membership of Board Committees and attendance at meetings and related party directorships and associations are shown in the financial statements.

CSIRO EXECUTIVE MANAGEMENT

Our Chief Executive conducts the affairs of our Organisation in accordance with the strategy, plans and policies approved by our Board and the Board Directions to the Chief Executive.

Our Chief Executive is supported by our Executive Team. As a team and through their individual roles, the members lead, direct, coordinate and control CSIRO's operations and performance. Details of the members are on page 88. This year and in accordance with the Executive Team Charter, the Executive Team developed the CSIRO Strategy 2020, Corporate Plan 2015–16 and Budget.

The Executive Team is assisted by two standing committees:

- Science, Strategy, Investment and Impact Committee (SICOM) supports the ET direct and control organisation's strategic science, capability, investment and impact planning.
- Major Transactions Committee (MTC) directs and controls CSIRO's involvement in major transactions and related matters and investments.

During 2014–15 SICOM met eight times, and the MTC met 12 times. Our Executive Management Council of senior managers provides a forum for sharing and discussing issues relating to the management and future strategy for CSIRO.

DISCLOSURE OF INTERESTS AND RELATED ENTITY TRANSACTIONS

Board members and the Chief Executive declare material interests in accordance with the SIR Act and PGPA Act, as appropriate. The Board Governance Document contains processes for managing conflicts of interest including a requirement that members absent themselves from discussions and voting, where a member has declared a material personal interest, or where a potential or actual conflict of interest or duty arises.

In 2014–15, the Board did not consider any transactions where a Board member was also a director of the other entity involved in the transaction.

PLANNING AND MONITORING PERFORMANCE

The CSIRO Strategy 2011–15 outlined the broad objectives, policies and strategies to be achieved by 2015 and detailed how achievement against the objectives was to be measured. An assessment against our enterprise strategy measures (ESMs) is on pages 20–22. The Strategy maintained our focus on addressing national challenges and opportunities through our National Research Flagships, and on continuing to develop Australia's scientific capability and preparedness by investing in the people and infrastructure required.

29 The outcomes from the assessment are CSIRO internal and not for public release.

An Annual Directions Statement[30] provides the Chief Executive's guidance on enterprise priorities for the financial year. The Annual Directions Statement 2014–15 provided direction for our organisational budget and complemented our Strategy 2011–15, linking long-term goals with short-term planning priorities designed to address current circumstances.

In accordance with the requirements of the SIR Act, our annual Operational Plan 2014–15 set out the strategies and activities we committed to pursue and carry out and the resources allocated to these activities. Specifically, it included the annual delivery targets set by our Executive Team and agreed by our Board for the financial year, in the form of Key Executive Actions (KEAs). An assessment of our performance against this year's KEAs is on pages 16–19.

To ensure we remain on track, our Executive Team and Board receive regular updates on how we are performing against these plans, our annual KEAs and ESMs, our budget and other internal performance indicators. In addition, our Flagships are periodically reviewed by panels, chaired by independent experts, who assess the strength of our capability as well as the relevance and impact of our research. No Flagship reviews were undertaken in 2014–15 due to the merging of Divisions and Flagships into nine Flagships from 1 July 2014.

CSIRO'S REPUTATION HINGES UPON THE INTEGRITY AND QUALITY OF OUR SCIENCE AND OUR ABILITY TO DELIVER POSITIVE IMPACT FOR AUSTRALIA.

RISK MANAGEMENT

CSIRO is committed to effectively identifying and managing risk. Acceptance and effective management of risk is vital to successfully capturing the opportunities created through scientific research and delivering on our purpose as an organisation.

The management of risk is the responsibility of all our people. It is enabled by CSIRO's Risk System, a comprehensive framework that supports the identification and assessment of risk across the organisation within strategic, operational and tactical contexts. At the enterprise level, CSIRO develops and maintains an Organisational Risk Plan, in alignment with our Strategic Plan, which reflects CSIRO's approach and posture in managing risks that threaten the achievement of our goals and objectives. CSIRO manages the following key areas of risk:

Governance and Compliance

CSIRO's reputation hinges upon the integrity and quality of our science and our ability to deliver positive impact for Australia. This risk is managed across all levels of the organisation in ways that include establishing rigour in our scientific processes, effective governance processes to ensure transparency of decision making, financial management practices that ensure efficient use of resources and values-based engagement and commercial dealings with customers and stakeholders.

CSIRO recognises its obligations as a government entity that conducts a broad range of activities across multiple highly regulated environments. Compliance risk is managed systematically across our Lines of Business, enabled and supported by Enterprise Support functions.

Science and Innovation

Delivering innovative and impactful solutions for our customers requires challenging science, with a high inherent risk of failure. To manage these challenges we have robust processes for science quality and integrity, together with focused capability development activities to enhance the skills of our people.

Customers, Partnerships and Collaboration

Impact and value creation for customers is enabled by access to quality science, technology and capability. Failure to identify and then deliver impact and value is a fundamental risk. We manage this through continually developing and improving the end to end customer experience, applying rigorous impact and investment planning, monitoring and evaluation framework, and identifying, establishing and managing deep partnerships and collaborations to ensure we integrate the best solutions for our customers.

30 The Annual Directions Statement is a CSIRO Commercial-in-Confidence document and is therefore not publicly available.

People and Culture

People are at the heart of CSIRO's capability and capacity to deliver innovative solutions for our customers. We manage risks associated with the development and well-being of our people through a values-based approach, supported by processes and initiatives relating to recruitment, learning and development, workforce and succession planning and staff wellbeing.

General insurance including General Liability and Professional Indemnity insurance and Directors and Officers Liability insurance is through Comcover. CSIRO's workers' compensation liability is covered by a premium paid to Comcare.

ADVISORY MECHANISMS

Our Strategic Advisory Committees provide advice on our longer-term strategic directions and research and development priorities and on how we can meet the research, technical and business needs of customers or communities. The advice provided by these committees may be complemented by Flagship Advisory Committees that focus more specifically on maximising the effectiveness of our Flagship portfolio to achieve its goals. Both committees comprise of representatives from industry, government, non-government organisations and other stakeholders.

POLICIES, STANDARDS AND PROCEDURES

Our CSIRO Policy Framework comprises policies, standards, procedures and guidelines. It is supported by our CSIRO Delegations and Authorities Framework.

The policy statements, approved by our Board, cover our commitment in relation to:

- Science and Delivery
- People
- Governance
- Risk
- Health, Safety and Environmental Sustainability.

There is also a policy on Freedom to Conduct CSIRO Research and Technology Transfer[31].

The policy statements are reviewed annually to ensure they continue to clearly articulate CSIRO's commitments. During 2014–15 the Health, Safety and Environmental Sustainability policy was revised to better reflect the importance for all CSIRO officers to health, safety wellbeing and environmental sustainability. The amended policy provides a greater emphasis on wellbeing to our people and partners and supports CSIRO's 'Wellbeing at Work Strategy 2014–18'.

Standard

- Protective Security

Procedure

- Access Controls and Visitor Management
- Advisory Committee
- Code of Conduct
- Commercial Contracts
- Conflict of Interest
- Credit Card
- Enhanced Responsibilities
- F8 exemption from quotation process
- Grievance
- HSE Responsibilities
- Ministerial Notifications
- Misconduct
- Sanctions
- Secondments
- Staff with Indefinite Tenure
- Superior Performance Rating
- Probation
- Publications

Guidelines

- Classified Document Management
- Duress Alarm and Response

31 Key policy statements are available at: www.csiro.au/org/Key-policy-statements.html

ETHICS AND THE CODE OF CONDUCT

Our CSIRO Code of Conduct sets out the standard of behaviour expected of CSIRO and of everyone working in it. The Code aligns with our Values Compass and is a key component of our staff induction program.

In addition, we have procedures on ethical conduct in human research and on the care and use of animals for scientific purposes. Our practices comply with national codes and relevant state and federal legislative requirements. CSIRO operates two human research ethics committees to cover its social and interdisciplinary science and also its health and medical related research. These committees review around 200 new projects each year and provide monitoring and support for over 450 active projects at any given time. These committees provide independent expert advice regarding the appropriate engagement of people and communities in research and ensuring issues such as privacy, informed consent and the management of risks and benefits flowing from research are effectively managed throughout all stages of a project's implementation.

CSIRO also operates seven animal research ethics committees (AEC's) which provide review of all CSIRO research involving the care and use of animals. This research covers a diverse range of fields including wildlife conservation, farm animal production, nutrition, disease control and prevention, and human health. Approximately 150 new projects are reviewed each year. AECs also play an active role in monitoring the ongoing care and wellbeing of animals throughout the duration of any research and ensuring CSIRO's compliance with all regulatory requirements.

INTERNAL CONTROLS

Assurances about our financial state of affairs, compliance and control environment are provided through a range of processes, including the role of the Internal Audit, Risk, Legal, Fraud Control and Security units, system design and monitoring, compliance reporting by senior managers and the operation of our CSIRO Public Interest Disclosure Scheme.

From a fraud control perspective, and as a corporate Commonwealth entity, CSIRO complies with the PGPA Act, which the Commonwealth Fraud Control Framework 2014 ('Framework') underpins. The CSIRO Fraud Control Team continues to review and update CSIRO's Fraud Risk, Governance and fraud control strategies. During 2014–15, there were no instances of fraud reported to or identified by the Fraud Control Team. Across 2014–15, the CSIRO Security Teams continued to progress compliance against the Australian Government Protective Security Policy Framework and the Information Security Manual, on a risk-based approach in line with our business model. The progress is being overseen by the CSIRO Security Committee and Security Executive, who endorse all changes to security governance and risk mitigation strategies within CSIRO.

REVIEWS BY OUTSIDE BODIES

External audit is provided by the Australian National Audit Office. During 2014–15, there were no reports on the operations of CSIRO by the Auditor-General (other than on the financial statements), a Parliamentary Committee or the Commonwealth Ombudsman.

The Senate Standing Committee on Economics examines the operations of CSIRO following the Federal Budget, the tabling in Parliament of our CSIRO Annual Report and the introduction to Parliament of the additional appropriation bills later in the financial year. This year senior executives appeared before the Committee on three occasions and responded to all related questions on notice. The Committee reviewed the Annual Report 2013–14 and commended the CSIRO on a comprehensive annual report.

JUDICIAL DECISIONS

During 2014–15, there were no judicial decisions or decisions of administrative tribunals that have had, or may have, a significant effect on the operations of CSIRO.

Board membership

Mr Simon McKeon AO

(Chairman)
BCom LLB FAICD
Company Director
28 June 2010 – 27 June 2015

Dr Eileen Doyle

(Deputy Chairman from 25 October 2012)
BMath (Hons) MMath PhD FAICD
Company Director
15 February 2006 – 14 February 2016

Dr Megan Clark AC

(Chief Executive)
BSc (Hons) PhD Hon DSc Hon DApSc FTSE GAICD
1 January 2009 – 20 November 2014

Dr Larry Marshall

(Chief Executive)
BSc (Hons) PhD Physics
1 January 2015– 31 December 2016

Ms Jane Bennett

Company Director
25 October 2012 – 24 October 2015

Ms Mary Boydell

BCom FCA
Company Director
26 June 2009 – 25 September 2014

Prof Peter Høj

MSc PhD DUniv (honoris causa) FTSE
Vice Chancellor and President
University of Queensland
7 December 2011 – 6 December 2014

Ms Shirley In't Veld

BCom LLB
Company Director
28 June 2012 – 27 June 2015

Mr Hutch Ranck

BSc Economics FAICD
Company Director
1 May 2011 – 30 April 2016

Prof Tom Spurling AM

BSc (Hons) PhD FRACI FTSE
Research Professor
Swinburne University of Technology
1 May 2008 – 30 April 2012
Reappointed: 28 June 2012 – 27 June 2015

Dr Peter Riddles

BSc(Hons) PhD Grad Dip Bus FAICD
Company Director
24 April 2014 – 23 April 2017

Details on the operation of our Board are on pages 82–83.

Executive Team membership

Dr Larry Marshall

BSc (Hons) PhD Physics
Chief Executive (Start 1 January 15)

Mr Craig Roy

BSc MSc MBA FAICD
Deputy Chief Executive

Ms Hazel Bennett

BSc (Hons) ACA FAIM
Chief Finance Officer

Dr Anita Hill

BEng (Hons) MSc PhD FTSE GAICD
Executive Director, Manufacturing, Productivity and Services

Dr Andrew Johnson

BAgrSc (Hons) PhD MPA
Executive Director, Environment

Dr Brian Keating

BAgrSc (Hons) PhD
Executive Director, Agriculture, Food and Health
(Start 18 October 14)

Dr David Williams

BSc PhD
Executive Director, National Facilities and Collections

Dr Alex Wonhas

Bsc (Hons) Msc (Hons) PhD
Executive Director, Energy and Resources

Previous members

- Dr Megan Clark AC, BSc (Hons) PhD Hon DSc Hon DApSc FTSE GAICD, Chief Executive (End 20 November 14)
- Prof Maurice Moloney, BSc PhD, Executive Director, Agriculture, Food and Health (End 17 October 14)

Details on our Executive management are on page 83.

Members of the Executive Team from L to R: Dr Andrew Johnson, Dr Anita Hill, Dr David Williams, Dr Alex Wonhas, Dr Larry Marshall, Mr Craig Roy, Ms Hazel Bennett, Dr Brian Keating.

Health and safety

At CSIRO we aspire to Zero Harm and are committed to the safety, health and wellbeing of our people, partners, customers and the environment. In 2014–15, 34 staff suffered an injury serious enough to prevent them from coming to work, four fewer than in 2013–14. These injuries occurred at a rate of 3.6 per million hours worked, equal to the lost time injury frequency rate of 2013–14. This equivalent frequency rate is due to the decrease in staff numbers that occurred during the year (an overall drop of 9 per cent in hours worked).

Musculoskeletal disorders continue to remain the most frequent cause of injury to our people. Although not life-threatening, these injuries are always painful and often debilitating. In 2014–15, 129 of our staff experienced an injury which required time off work or medical treatment, and 60 percent of these were musculoskeletal. The Wellnomics computer work-pace and risk management software installed on all Windows computers last year has been rolled out to other users and the data is helping people to change their computer habits, thus reducing the risks and a 17 per cent drop in the occurrence of these injuries.

We are also focused on preventing injuries that are low frequency, but have the potential to cause death or permanent disability. These high-potential incidents are typically reportable to Comcare. In 2014–15 there were 11 reportable incidents, down from 13 in 2013–14 (15 per cent reduction). All of these incidents have been fully investigated by CSIRO and preventative measures are being implemented. Comcare did not issue CSIRO any improvement notices under Section 19 of the *Work Health and Safety Act 2011* (WHS Act).

In 2014–15 there were two radiation incidents that were reportable to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). These incidents have been fully investigated by CSIRO. ARPANSA have not yet notified CSIRO of any decision relating to how these incidents will be treated by the regulator.

FIGURE 3.1: CSIRO LOST TIME INJURY FREQUENCY RATE

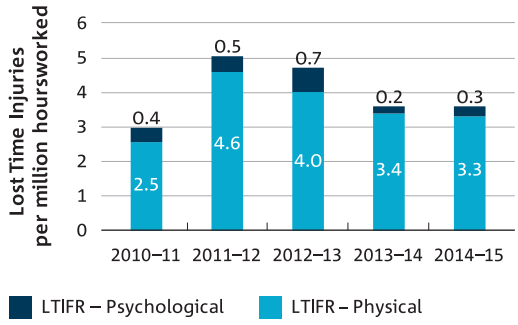


FIGURE 3.2: CSIRO RECORDABLE INJURY FREQUENCY RATE

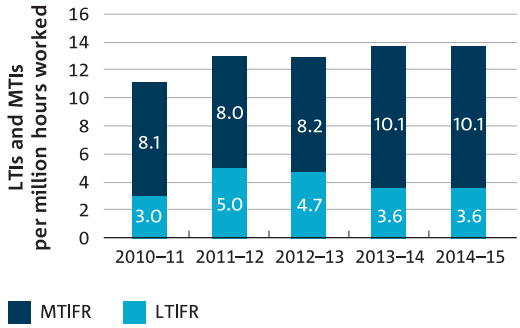
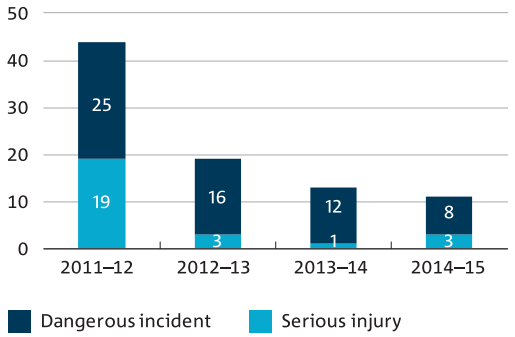


FIGURE 3.3: COMCARE NOTIFIABLE INCIDENTS[32]



32 The *Work Health and Safety Act 2011* came into effect on 1 January 2012, changing the criteria that determine which incidents must be notified to Comcare. This change accounts for much of the steep decline in notifiable incidents between 2011–12 and 2012–13.

HSE STRATEGY

In 2014–15 key initiatives in the CSIRO 2011–15 Health Safety and Environment (HSE) Strategy were progressed with a major focus on fatality risk prevention, with programs implemented to reduce the risks associated with all-terrain vehicles, forklifts, electrical work and pressure vessels. CSIRO has reduced the number of all-terrain vehicles from 35 to three, with controls and training in place for the remaining vehicles. A trial is being completed at the Pullenvale site with respect to forklift controls, and a cohort of electrical engineers from across CSIRO has finalised the procedures and training required with respect to electrical safety.

Key elements of the CSIRO Wellbeing at Work Strategy have been rolled out with psychosocial risk assessments conducted across CSIRO during the organisational restructure.

Mental health awareness training has been provided across the organisation.

The focus on musculoskeletal injuries has continued, with the development of an online training module and the further rollout of components of the Wellnomics Risk Manager program.

Contractor HSE Management training has been delivered to assist staff to identify and manage risks arising from work by contractors.

The HSE team have also been working to develop the 2015–2020 HSE plan, which builds on the 2011–2015 HSE Strategy and clearly supports the overarching CSIRO Strategy. The focus in the next 12 months will be primarily on fatality prevention, musculoskeletal disorders and the continued development of a culture in which all staff recognise health, safety and environmental risks, and the ongoing management of these risks becomes entrenched in the way we approach our work and do business.

Environmental performance

CSIRO has established an aggressive 20 per cent carbon emission reduction target, measured against business as usual projections and to achieved by the end of June 2020. Under the strategy, CSIRO's carbon emissions will fall from a projected business as usual level of 282 kilotonnes carbon dioxide equivalent ($ktCO_2e$) (Scope 1, 2 and 3) to approximately 227 $ktCO_2e$ by 2020, an emission target below 1999–2000 levels.

CSIRO will achieve the carbon reduction targets through six key focus areas:

- Sustainable buildings
- Sustainable laboratories
- Travel and transport
- Low emission energy technologies
- Sustainable procurement
- Site consolidation.

BUILDING ENERGY EFFICIENCY

The Building Energy Efficiency and Low Emission Energy technology programs have positively impacted the Organisation's carbon targets.

- The Solar Photovoltaic System (solar panels) installation at the Pawsey Centre and ARRC in Kensington, WA, will produce a combined average of 390 MWh electricity per year and savings of approx. 296 tCO_2e per year.
- Re-commissioning projects at the Waterford and Black Mountain sites are nearing completion and are expected to reduce CSIRO's carbon footprint by approximately 300 tCO_2e.
- Phase 1 of a lighting upgrade to energy-efficient LEDs at the Clayton site focused on corridors, stairways, exits and balconies. Substantial savings are expected from this upgrade, including $22,000 annual financial savings and 147 tCO_2e savings.
- Detailed Energy Efficiency Studies were completed at Clayton, Waite and Kensington to identify energy opportunities equivalent to 2 $ktCO_2e$ savings or more. Implementation of agreed recommendations will commence in 2015–16.

Due to an ever-present and increasing need for high quality environmental performance data, CSIRO has developed an organisation-wide Submetering Strategy that outlines the purpose, principles and approach to submetering across CSIRO sites. The strategy will be supported by a submetering system solution currently in development.

CSIRO HAS ESTABLISHED AN AGGRESSIVE 20% CARBON EMISSION REDUCTION TARGET, TO BE ACHIEVED BY END OF JUNE 2020.

WASTE AND RECYCLING

Improved oversight of waste and recycling practices across our national sites under the CSIRO National Waste and Recycling Services Contract highlights the benefits of a nationally coordinated approach to waste and recycling, with the added bonus of a national dataset. We continue to actively manage 23 recycling streams.

CSIRO diverted 10,521 cubic metres waste from landfill, equating to 994 tCO_2e saved in the period May 2014 to April 2015. The organisation currently remains at an approximate 40 per cent diversion rate. The likelihood of reaching the target of 50 per cent diversion from landfill by December 2015 has been reduced due to two large site consolidations. These increased the use of large landfill bulk bins and generated major collections from site closures and clean-ups. Significant efforts are made to recycle as much demolition waste as possible. Despite these efforts, large quantities go to landfill. Furthermore, anticipated access to a new downstream recycling facility in NSW will not occur, placing additional pressure on achieving the waste diversion target.

ENGAGEMENT

Change management is key to achieving a cultural shift necessary for staff to incorporate environmental sustainability in their day-to-day decision-making. CSIRO's commitment to environmental sustainability was increased to build staff accountability regarding energy, carbon and recycling programs.

The Fume Cupboard program, 'Shut the Sash', which aims 90 per cent of fume cupboards to be closed when unattended, was rolled out across our top 12 energy sites, impacting about 3,000 lab staff. The program aims to reduce energy consumption and costs, while increasing lab safety. Furthermore, it has the potential to reduce emissions by up to 4 $ktCO_2e$ across the organisation, by reducing energy consumption associated with fume cupboard motors and discharge of conditioned laboratory air. Comparisons to pre-program baseline data will be conducted in August 2015 to determine if targets have been met. CSIRO has produced a laboratory-based training video involving research staff to highlight the benefits of 'Shutting the Sash' on both the environment and safety. The video will be incorporated in staff induction for all relevant laboratory staff.

In addition to focussed projects such as 'Shut the Sash', CSIRO's change management approach to increase staff buy-in and accountability during 2014–15 was underpinned by a variety of marketing campaigns. The Earth Hour 'Bright Sparks' campaign motivated staff to switch off non-essential lighting at the end of every day and staff generated behaviour change ideas, driven by a washroom poster competition, which included turning off electronic equipment at wall sockets, paper and cardboard recycling processes, mixed recycling, organic and batteries. We launched organics recycling at the Marsfield site, and highlighted energy reduction building innovations through online discussion forums, news stories and regular intranet weekly promotions.

CSIRO'S COMMITMENT TO ENVIRONMENTAL SUSTAINABILITY WAS INCREASED TO BUILD STAFF ACCOUNTABILITY REGARDING ENERGY, CARBON AND RECYCLING PROGRAMS.

ENVIRONMENTAL MANAGEMENT AND HERITAGE

CSIRO recognises its responsibility to protect and conserve the Commonwealth and national heritage values of the places it owns or controls, using suitable advice consistent with best practice in conservation and property management and its obligations under the *Environmental Protection and Biodiversity Conservation Act 1999*.

CSIRO will comply with Commonwealth Heritage Management Principles to identify, protect, conserve, present and transmit the heritage values of the places it owns or controls to all generations.

The CSIRO Land and Building Heritage Register, which includes information on any known land or buildings with heritage significance, will be available on the csiro.au web site in late 2015.

Environmental performance

Energy consumption remained steady compared with 2013–14 (see Figure 3.4), an increase of one and a half percent in electricity consumption being offset by a four percent reduction in gas consumption. Noting that electricity consumption decreased across 22 sites during 2014–15, significant increases occurred at:

- the Pawsey Centre (Kensington, WA) due to the progressive rise in supercomputer processing power required to support projects such as ASKAP[33]
- New Horizons (Clayton, VIC), where CSIRO is a new tenant
- Tidbinbilla (ACT) due to the installation of a new radioantenna
- Hobart, due to the arrival of the RV *Investigator*
- Newcastle, due to refurbishment of the onsite co-generation plant.

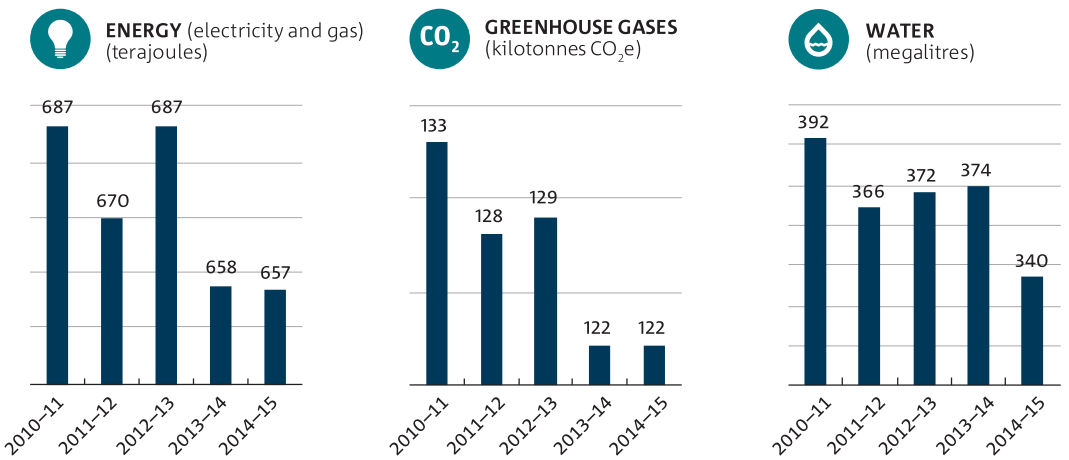
Site consolidation activities in Canberra saw an eight percent decrease in electricity consumption at our Black Mountain site, attributed to building demolition or closure and the temporary relocation of some staff to our Crace site. Although Crace electricity consumption rose during the year, the site consolidation activities resulted in approximately one ktCO2e emission savings (Scope 1 and 2) during 2014–15.

Despite the slight increase in electricity consumption, the four per cent fall in gas consumption enabled CSIRO to maintain its Scope 1 and 2 carbon emissions at 122 $ktCO_2e$ attributed to electricity and gas consumption over the past year. Energy consumption has reduced approximately four percent over the past five years, while our emissions have decreased by eight per cent over the same period. Focussed efforts to improve building energy efficiency and engagement with staff through CSIRO's Carbon Strategy, along with site closures, have contributed to the emission reduction.

Our water consumption decreased by seven per cent compared with the previous year, a decrease of 25 megalitres (ML). The most significant reduction occurred due to the closure of our Belmont site (18 ML), with staff relocating to Deakin University. Large reductions also occurred at our Waterford and Floreat sites.

Under our Carbon Strategy, we have set the target of three per cent reduction in air kilometres travelled per annum. In 2014–15, we achieved a reduction in air travel of approximately 22 million air kilometres compared with 2013–14, a 19.5 per cent decrease (see Table 3.1). The reduction in travel has been driven by Federal and internal policy. The kilometres travelled per staff member (FTE) decreased by 10 per cent compared with the previous year, and an average of six percent over the last five years.

FIGURE 3.4: CSIRO ENERGY AND GREENHOUSE GAS EMISSIONS (ELECTRICITY AND GAS ONLY) AND WATER CONSUMPTION



33 Australian Square Kilometre Array Project: www.csiro.au/ASKAP

TABLE 3.1: CSIRO ENERGY, AIR TRAVEL AND WATER INTENSITIES

PERFORMANCE MEASURE	INDICATOR(S)	2010–11	2011–12	2012–13	2013–14	2014–15
Energy	Purchased energy (electricity and gas) consumed per employee (GJ/FTE)[34]	119	117	119	121	136
Air travel	Million air kilometres travelled	116	114	116	113	91
	Air travel per employee (km/FTE)	20,069	19,930	20,214	20,853	18,874
Relative mains water use	Amount of total water use per employee (kilolitres /FTE)	68	64	65	69	70

Our people

Our people and culture are fundamental to our current and future success in delivering positive impact for Australia and humanity. We seek to lift our capacity for innovation by providing the environment, facilities and opportunities our people need to work collaboratively and creatively.

Our People Strategy underpins our commitment to developing and supporting our people. Our Human Resources and Organisation Development functions provide support and leadership on people issues to leaders and staff across our Organisation as well as guidance and compliance with the *Equal Employment Opportunity (Commonwealth Authorities) Act 1997*. During 2014–15, we focused on the following areas from our People Strategy:

Capability planning

- design and implementation of the new line of business structure, new key leadership, manager and team leader roles and support arrangements
- change management, especially supporting the Integrated Reform Program
- supporting significant workforce restructuring
- workforce planning and deployment.

Inclusion and innovation culture

- diversity and inclusion initiatives
- improving performance.

Learning and development

- building our leadership capability
- extending our reach and efficiency of delivery by increasing the proportion of eLearning programs within our curriculum.

ENTERPRISE AGREEMENTS

Enterprise agreements set the terms and conditions of employment for CSIRO staff. Two enterprise agreements are in operation: CSIRO Enterprise Agreement 2011–14 and the CSIRO Canberra Deep Space Communication Complex (CDSCC) Enterprise Agreement 2014–17.

The CSIRO Enterprise Agreement came into operation on 7 July 2011 following formal approval processes and a staff vote. This Agreement reached its nominal expiry date in August 2014 and continues in operation until it is replaced or terminated in accordance with the *Fair Work Act 2009*. Negotiations for a replacement Agreement commenced in July 2014 and are ongoing. The Australian Government Public Sector Workplace Bargaining Policy was released on 28 March 2014 and applies to the Australian Public Service (APS) and non-APS Australian Government agencies, including CSIRO.

The CDSCC Enterprise Agreement covers non-managerial CSIRO staff employed at CDSCC, Tidbinbilla, Canberra and came into operation on 18 June 2014. It will reach its nominal expiry date in June 2017.

34 FTE refers to CSIRO Officers as of June 2015.

LEARNING AND DEVELOPMENT

In 2014–15, CSIRO delivered 4903 development days, a small increase on the previous year. In a year of significant organisational reform this demonstrated ongoing commitment to development and performance. The new 'Team Formation' and 'Leading and Navigating During Times of Change' programs were well attended and highly rated by participants. Interest in leadership programs was steady during 2014–15, while demand for the science curriculum was not as high as in previous years.

2518 people participated in the new eLearning programs 'Impact', 'Diversity and Inclusion', and 'Behaviours'. Ninety-eight per cent of participants indicated they would apply the learning in the workplace and the same number indicated they understood the importance of their contribution to these critical areas. The eLearning programs were introduced in May 2015 to support alignment and engagement with the new Organisational strategy due for release in July 2015.

DIVERSITY AND INCLUSION

Diversity and inclusion continued to be an enterprise-wide focus during 2014–15, as implementation of our 2012–15 Diversity and Inclusion Plan continues. The plan builds on the foundations of past plans and seeks to produce a step-change in our diversity and inclusion performance through enhanced leader responsibility, visibility and engagement.

Some highlights during 2014–15 include:

- implementation of enhanced recruitment and selection processes to support greater gender and Culturally and Linguistically Diverse (CALD) outcomes within leadership roles throughout the Integrated Reform Program
- Setting of targets across Group and Team Leader appointments (20 percent women, 20 percent CALD) signed off by SICOM
- continuation of the Chief Executive-led Diversity and Inclusion Steering Committee and annual progress reporting on diversity and inclusion metrics
- launch of a mandatory Diversity and Inclusion @ CSIRO eLearning module to all staff
- continuation of unconscious bias and inclusion training for leadership teams
- progressing the activity of the Gay, Lesbian, Bisexual, Transgender and Intersex Network to provide support and social networking for our people who identify themselves in these groups
- establishment of new diversity and inclusion reference groups within Flagships to support the rollout of enterprise and local initiatives.

Our Indigenous Engagement Strategy, which aims to achieve greater Indigenous participation in our research and development agenda and activities, continues to progress (more on page 26). This includes Indigenous cadetship and traineeship programs for undergraduates and high school leavers, which combine formal study with work-based training. As at 30 June 2015, we have 63 (1.2 per cent) Indigenous employees within CSIRO, an increase from 22 (0.3 per cent) on 30 June 2011.

STAFF DEMOGRAPHICS

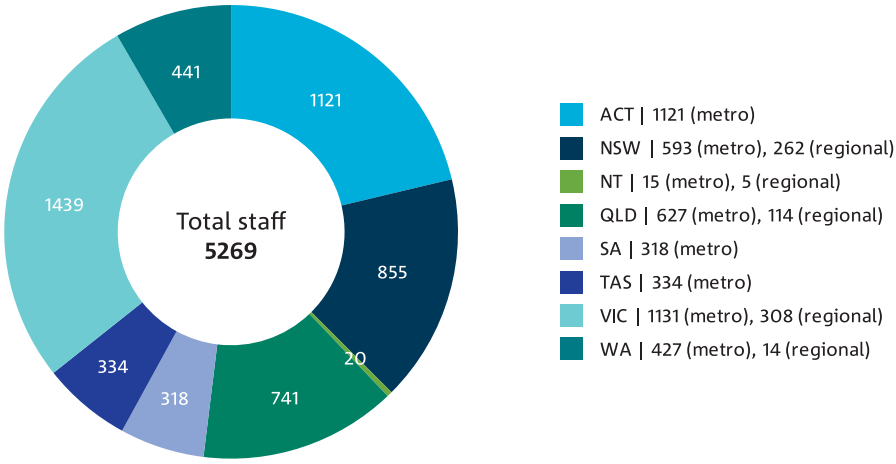
Our people are employed under Section 32 of the *Science and Industry Research Act 1949*. At 30 June 2015, CSIRO had a total of 5269 staff, a full-time equivalent (FTE) of 4836. Table 3.2 shows the number of staff employed in different functional areas and Table 3.3 shows staff by state.

Overall, the total number of staff decreased by 11.7 per cent (695) over the last 12 months. Research Science staff decreased by 15.5 per cent (278). Voluntary staff turnover remained low at 4.6 per cent. The proportion of female staff remained constant at 40 per cent, and the proportion of female Research Science staff increased from 25 to 26 per cent over the past 12 months.

TABLE 3.2: STAFF NUMBERS (HEADCOUNT)

FUNCTIONAL AREA	2010–11	2011–12	2012–13	2013–14	2014–15	% FEMALE FOR 2014–15
Research Scientists	1,865	1,948	1,858	1,798	1,520	26
Research Project Staff	2,166	2,094	2,149	1,874	1,669	43
Senior Specialists	12	11	25	17	21	48
Research Management	165	166	177	181	254	16
Research Consulting	40	42	47	47	40	15
Technical Services	643	613	623	569	537	12
Communication and Information Services	375	391	369	326	201	76
General Services	56	40	38	34	16	50
Administrative Support[35]	1,048	1,057	1,068	980	908	75
General Management	144	130	123	138	103	36
Total headcount	6,514	6,492	6,477	5,964	5,269	40
FTE	5,780	5,720	5,751	5,423	4,836	38

FIGURE 3.5: STAFF NUMBERS (HEADCOUNT) BY STATE



35 Administrative Support: Staff who provide science-based administrative and management services and systems.

Awards and honours

Outstanding performance in research is recognised by various international and national award schemes. Here are just a few examples of awards and honours granted in 2014–15 that demonstrate our effectiveness in research and its application in industry and the community and the calibre of our people[36].

ORDER OF AUSTRALIA

The Order of Australia is the principal and most prestigious means of recognising outstanding members of the community at a national level. In 2015, three CSIRO affiliates were recognised.

Officer of the Order (AO)

The late **Prof John Freney** for distinguished service to conservation and the environment through research into greenhouse gas production, climate change and the efficient use of nitrogen fertiliser.

Member of the Order (AM)

Peter Lewis for significant service to international trade and the Australian biotechnology and information technology industries.

Medal of the Order (OAM)

Dr Glen Patten for service to the surf lifesaving movement, and to nutritional science, having spent more than three decades juggling his loves of science and lifesaving.

MERITORIOUS SERVICE

Public Service Medal

Toni Moate for outstanding public service in Australian marine and atmospheric science.

AUSTRALIAN MUSEUM EUREKA PRIZES 2014

Presented annually by the Australian Museum, the Eureka Prizes reward excellence in the fields of scientific research and innovation, science leadership, school science and science journalism and communication.

The Hendra Virus research team was awarded the Australian Infectious Diseases Research Centre Eureka Prize for Infectious Diseases Research for the development of the first horse vaccine and human treatment for the Hendra virus. Until this breakthrough, Hendra virus was an unmanaged emerging infectious disease. This vaccine provides Australia and the world with the first targeted tools to protect people and animals against this deadly virus.

The Water Use Efficiency Initiative was awarded the Department of Agriculture Landcare Eureka Prize for Sustainable Agriculture. The initiative has delivered innovative farming systems science and achieved widely adopted and profound impact on crop productivity and sustainability, as well as environmental benefits through the implementation of achievable practice change for growers.

Dr Mark Talbot was awarded the New Scientist Eureka Prize for Science Photography. The winning entry was the image 'Wheat through the looking glass'. The scanning electron microscope image shows young flower buds of wheat that will eventually become seeds.

THE SIR IAN CLUNIES ROSS AWARD

Awarded by the Australian Academy of Technological Sciences and Engineering, the Sir Ian Clunies Ross Award recognises outstanding application of science and technology that provides economic, social and/or environmental benefit to Australia.

Dr Cathy Foley and **Dr Keith Leslie** were recognised for developing LANDTEM, a portable exploration tool that is far more environmentally friendly and efficient than conventional exploration technology, such as drilling, in detecting highly conductive ores like nickel sulphides, gold and silver. The work continues to significantly enhancing the sensitivity and functionality of LANDTEM, to make it able to detect ore bodies even deeper underground.

THE FEYNMAN PRIZE – THEORY

The prize is awarded for excellence in theory to the researchers whose recent work has most advanced the achievement of Feynman's goal for nanotechnology: molecular manufacturing, defined as the construction of atomically-precise products through the use of molecular machine systems.

36 Further information on our CSIRO Award recipients can be found at: www.csiro.au/staff-awards

Dr Amanda Barnard is the first person in the southern hemisphere, and the first woman, to win the Feynman Prize. She received the award for spearheading the understanding of the structure and stability of carbon nanostructures, and the role that shape plays in establishing their properties and interactions under different conditions. It is her work on diamond nanoparticles (nanodiamonds) that has the greatest impact in the area of molecular nanotechnology.

CSIRO CHAIRMAN'S MEDAL

The CSIRO Chairman's Medal honours the very best in CSIRO research. It is awarded to the scientist or team whose research is of national or international importance in advancing scientific knowledge, technology application or commercialisation.

The **Silverleaf Whitefly Integrated Pest Management Team** was awarded the 2014 CSIRO Chairman's Medal for the pioneering development of a long-term sustainable solution for controlling silverleaf whitefly, which combines the use of natural enemies with the use of insecticides and on-farm management practices. Globally, the silverleaf whitefly causes crop losses in excess of US$2 billion per year. Australian industry continues to support this research, which has delivered direct benefits to growers through cost-savings from reduced application of insecticides and management practices that promote ecological benefits.

Team members:
Paul De Barro, Nancy Schellhorn, Peter Hart, Ali Rezaian, Veronica Brancatini, Shama Khan, Marc Coombs, Stefan Schmidt, Ian Naumann, John Curran, Felice Driver, Jo Cardale, Leslie McKenzie, Di Hartley, Bob Sutherst, Karryn Warren, Andrew Hulthen, Lynita Howie, Anna Marcora, Nadiah Kristensen, Mark Wade, Felix Bianchi, Wee Tek Tay, Leon Court, Samia Elfekih, Karl Gordon, Darren Kriticos, Anne Bourne, Mary Carver, Juan Villanueva-Jimenez, Sharon Van Brunschot and Andrew White.

CSIRO MEDAL FOR LIFETIME ACHIEVEMENT

The CSIRO Medal for Lifetime Achievement is awarded to individuals who have a record of sustained and meritorious achievement over a prolonged period of CSIRO service.

Dr Elizabeth Dennis was awarded the 2014 CSIRO Medal for Lifetime Achievement for a distinguished career in plant molecular biology that established CSIRO as a world leader in this field, with multiple paradigm-changing discoveries, an outstanding publication record and science citizenship recognised by numerous fellowships and awards. Her career spans 42 years with CSIRO as a pioneer of plant molecular biology and among the most distinguished CSIRO scientists.

Silverleaf Whitefly Integrated Pest Management Team – our 2014 CSIRO Chairman's Medal winner.

Part 4 | Financial statements

CSIRO researchers operating a dry slag granulation rig. A novel dry method for slag granulation could help the cement, iron and steel industries develop sustainable practices and derive value from waste.

Australian National
Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Minister for Industry and Science

I have audited the accompanying annual financial statements of the Commonwealth Scientific and Industrial Research Organisation and the consolidated entity for the year ended 30 June 2015, which comprise:

- Statement by the Deputy Chairman of the Board, Chief Executive and Chief Finance Officer;
- Statements of Comprehensive Income;
- Statements of Financial Position;
- Statements of Changes in Equity;
- Cash Flow Statements;
- Schedules of Commitments; and
- Notes comprising a Summary of Significant Accounting Policies and other explanatory information.

The consolidated entity comprises the Commonwealth Scientific and Industrial Research Organisation and the entities it controlled at the year's end or from time to time during the year.

Member's Responsibility for the Financial Statements

The members of the Commonwealth Scientific and Industrial Research Organisation are responsible under the *Public Governance, Performance and Accountability Act 2013* for the preparation and fair presentation of annual financial statements that comply with Australian Accounting Standards and the rules made under that Act. The members are also responsible for such internal control as is necessary to enable the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. I have conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These auditing standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not

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for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made by the members of the Commonwealth Scientific and Industrial Research Organisation, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting my audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

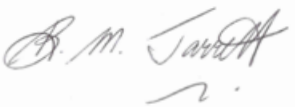
Opinion

In my opinion, the financial statements of the Commonwealth Scientific and Industrial Research Organisation and the consolidated entity:

(a) comply with Australian Accounting Standards and the *Public Governance, Performance and Accountability (Financial Reporting) Rule 2015*; and

(b) present fairly the financial positions of the Commonwealth Scientific and Industrial Research Organisation and the consolidated entity as at 30 June 2015 and their financial performance and cash flows for the year then ended.

Australian National Audit Office



Brandon Jarrett
Executive Director

Delegate of the Auditor-General

Canberra
28 August 2015

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
Financial Statements

for the period ended 30 June 2015

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
STATEMENT BY THE DEPUTY CHAIRMAN OF THE BOARD, CHIEF EXECUTIVE AND CHIEF FINANCE OFFICER

In our opinion, the attached financial statements for the year ended 30 June 2015 are based on properly maintained financial records and present fairly the matters required by the Financial Reporting Rule made under sections 41(2) and 42(2) of the Public Governance, Performance and Accountability Act 2013, as amended.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and its subsidiaries will be able to pay its debts as and when they fall due.

This statement is made in accordance with a resolution of the directors.

Eileen Doyle
Deputy Chairman of the Board
28 August 2015

Larry Marshall
Chief Executive and Board Member
28 August 2015

Hazel Bennett
Chief Finance Officer
28 August 2015

CONSOLIDATED FINANCIAL STATEMENTS
STATEMENT OF COMPREHENSIVE INCOME
For the period ended 30 June 2015

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
NET COST OF SERVICES					
Expenses					
Employee benefits	3.1	**664,584**	741,850	**664,129**	741,016
Suppliers	3.2	**433,012**	397,489	**416,375**	385,698
Depreciation and amortisation	3.3	**146,094**	133,174	**146,041**	133,173
Finance leases		**2,535**	2,891	**2,521**	2,888
Write-down and impairment of assets	3.4	**14,791**	4,083	**14,791**	4,083
Foreign exchange losses - non-speculative		**254**	1,398	**250**	1,398
Losses from asset sales	3.5	**905**	2,369	**905**	2,369
Total expenses		**1,262,175**	1,283,254	**1,245,012**	1,270,625
Own-Source Income					
Own-source revenue					
Sale of goods and rendering of services	4.1	**370,648**	383,904	**377,473**	394,445
Interest - bank and term deposits		**12,946**	13,908	**9,707**	9,464
Rental income		**8,633**	7,096	**8,633**	7,096
Royalties and licence fees		**60,809**	29,133	**60,809**	29,133
Other revenues	4.2	**22,630**	27,270	**22,153**	26,629
Total own-source revenue		**475,666**	461,311	**478,775**	466,767
Gains					
Gain on recognition of assets		**6,722**	-	**6,722**	-
Total gains		**6,722**	-	**6,722**	-
Total own-source income		**482,388**	461,311	**485,497**	466,767
Net cost of services		**(779,787)**	(821,943)	**(759,515)**	(803,858)
Revenue from Government		**745,268**	778,177	**745,268**	778,177
Share of net operating surplus/(deficit) of joint venture accounted for using equity method		**(300)**	(37)	**(300)**	(37)
Surplus on continuing operation		**744,968**	778,140	**744,968**	778,140
Surplus/(Deficit) attributable to the Australian Government		**(34,819)**	(43,803)	**(14,547)**	(25,718)
OTHER COMPREHENSIVE INCOME					
Items not subject to subsequent reclassification to net cost of services					
Increase/(decrease) in asset revaluation reserves	5.1	**42,078**	25,791	**42,078**	25,791
Items subject to subsequent reclassification to net cost of services					
Increase/(decrease) in other reserves	5.2	**(2,246)**	1,870	**(2,269)**	1,870
Total comprehensive income		**39,832**	27,661	**39,809**	27,661
Total comprehensive income/(loss) attributable to the Australian Government		**5,013**	(16,142)	**25,262**	1,943

The above Statement should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS
STATEMENT OF FINANCIAL POSITION
As at 30 June 2015

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
ASSETS					
Financial Assets					
Cash and cash equivalents		**267,129**	398,173	**182,331**	295,575
Trade and other receivables	7	**73,482**	71,327	**69,453**	67,562
Investments accounted for using the equity method	8	**10**	309	**10**	309
Other investments	9	**12,601**	14,621	**12,601**	14,621
Total financial assets		**353,222**	484,430	**264,395**	378,067
Non-Financial Assets					
Land and buildings	10	**1,604,300**	1,563,338	**1,604,300**	1,563,338
Plant and equipment	11	**597,147**	548,398	**596,703**	548,392
Heritage and cultural	12	**4,206**	4,217	**4,206**	4,217
Intangibles	13	**21,377**	31,373	**21,377**	31,373
Investment properties	14	**49,292**	48,288	**49,292**	48,288
Inventories		**1,235**	1,180	**1,235**	1,180
Other non-financial assets	15	**115,810**	93,426	**115,779**	93,382
Total non-financial assets		**2,393,367**	2,290,220	**2,392,892**	2,290,170
Properties held for sale		**5,200**	9,091	**5,200**	9,091
Total assets		**2,751,789**	2,783,741	**2,662,487**	2,677,328
LIABILITIES					
Payables					
Suppliers	16	**111,505**	54,773	**110,539**	54,347
Other payables	17	**146,877**	181,097	**140,275**	177,945
Total payables		**258,382**	235,870	**250,814**	232,292
Interest Bearing Liabilities					
Leases	18	**48,725**	53,475	**48,725**	53,475
Deposits	19	**5,559**	4,567	**6,609**	4,567
Total Interest bearing liabilities		**54,284**	58,042	**55,334**	58,042
Provisions					
Employee provisions	20	**201,185**	259,338	**201,095**	259,338
Total provisions		**201,185**	259,338	**201,095**	259,338
Total liabilities		**513,851**	553,250	**507,243**	549,672
Net assets		**2,237,938**	2,230,491	**2,155,244**	2,127,656
EQUITY					
Contributed equity		**270,954**	268,520	**270,646**	268,320
Asset revaluation reserves		**1,389,396**	1,347,318	**1,389,396**	1,347,318
Other reserves		**(745)**	1,501	**(768)**	1,501
Retained surplus		**578,333**	613,152	**495,970**	510,517
Total equity		**2,237,938**	2,230,491	**2,155,244**	2,127,656

The above Statement should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS
STATEMENT OF CHANGES IN EQUITY – CONSOLIDATED
For the period ended 30 June 2015

	Retained earnings		Asset revaluation reserve		Other reserves		Contributed equity/capital		Total equity	
	2015	2014	**2015**	2014	**2015**	2014	**2015**	2014	**2015**	2014
	$'000	$'000	**$'000**	$'000	**$'000**	$'000	**$'000**	$'000	**$'000**	$'000
Opening balance	**613,152**	656,561	**1,347,318**	1,321,527	**1,501**	(369)	**268,520**	259,220	**2,230,491**	2,236,939
Comprehensive income										
Other comprehensive income[1]	**-**	-	**42,078**	25,791	**(2,246)**	1,870		-	**39,832**	27,661
Surplus/(deficit) for the period	**(34,819)**	(43,803)	**-**	-	-	-	**-**	-	**(34,819)**	(43,803)
Total comprehensive income	**(34,819)**	(43,803)	**42,078**	25,791	**(2,246)**	1,870	**-**	-	**5,013**	(16,142)
Transactions with owners										
Contributions by owners										
Equity injection	**-**	-	**-**	-	**-**	-	**2,326**	9,300	**2,326**	9,300
Payment to the Commonwealth	**-**	394	**-**	-	**-**	-	**-**	-	**-**	394
Contributions by owners – other	**-**	-	**-**	-	**-**	-	**108**	-	**108**	-
Closing balance	**578,333**	613,152	**1,389,396**	1,347,318	**(745)**	1,501	**270,954**	268,520	**2,237,938**	2,230,491

The above Statement should be read in conjunction with the accompanying notes.

1. See Note 5.1 and 5.2.

CONSOLIDATED FINANCIAL STATEMENTS
STATEMENT OF CHANGES IN EQUITY – CSIRO
For the period ended 30 June 2015

	Retained earnings		Asset revaluation reserve		Other reserves		Contributed equity/capital		Total equity	
	2015	2014	**2015**	2014	**2015**	2014	**2015**	2014	**2015**	2014
	$'000	$'000	**$'000**	$'000	**$'000**	$'000	**$'000**	$'000	**$'000**	$'000
Opening balance	**510,517**	535,841	**1,347,318**	1,321,527	**1,501**	(369)	**268,320**	259,020	**2,127,656**	2,116,019
Comprehensive income										
Other comprehensive income[1]	**-**	-	**42,078**	25,791	**(2,269)**	1,870	**-**	-	**39,809**	27,661
Surplus/(deficit) for the period	**(14,547)**	(25,718)	**-**	-	-	-	**-**	-	**(14,547)**	(25,718)
Total comprehensive income	**(14,547)**	(25,718)	**42,078**	25,791	**(2,269)**	1,870	**-**	-	**25,262**	1,943
Transactions with owners										
Contributions by owners										
Equity injection	**-**	-	**-**	-	**-**	-	**2,326**	9,300	**2,326**	9,300
Payment to the Commonwealth	**-**	394	**-**	-	**-**	-	**-**	-	**-**	394
Contributions by owners – other	**-**	-	**-**	-	**-**	-	**-**	-	**-**	-
Closing balance	**495,970**	510,517	**1,389,396**	1,347,318	**(768)**	1,501	**270,646**	268,320	**2,155,244**	2,127,656

The above Statement should be read in conjunction with the accompanying notes.

1. See Note 5.1 and 5.2

CONSOLIDATED FINANCIAL STATEMENTS
CASH FLOW STATEMENT
For the period ended 30 June 2015

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
OPERATING ACTIVITIES					
Cash received					
Receipts from Government		**745,268**	778,177	**745,268**	778,177
Sale of goods and rendering of services		**500,703**	587,827	**506,454**	600,654
Interest		**12,140**	16,181	**8,906**	11,042
Net GST received		**8,913**	16,685	**16,013**	13,644
Total cash received		**1,267,024**	1,398,870	**1,276,641**	1,403,517
Cash used					
Employees		**724,123**	748,224	**723,534**	746,966
Suppliers		**468,036**	506,484	**461,879**	493,448
Finance costs		**2,535**	2,721	**2,521**	2,721
Deposits		**7,989**	4,379	**6,939**	4,379
Total cash used		**1,202,683**	1,261,808	**1,194,873**	1,247,514
Net cash from operating activities	21	**64,341**	137,062	**81,768**	156,003
INVESTING ACTIVITIES					
Cash received					
Proceeds from sales of property, plant and equipment		**3,294**	416	**3,294**	416
Proceeds from sales of equity investments and intellectual property		**1,108**	291	**1,108**	291
Total cash received		**4,402**	707	**4,402**	707
Cash used					
Purchase of property, plant and equipment		**167,647**	147,951	**167,273**	147,944
Equity investments		**1,343**	1,494	**1,344**	1,415
Other selling costs		**477**	321	**477**	321
Total cash used		**169,467**	149,766	**169,094**	149,680
Net cash from (used by) investing activities		**(165,065)**	(149,059)	**(164,692)**	(148,973)
FINANCING ACTIVITIES					
Cash received					
Contributed equity		**2,326**	9,300	**2,326**	9,300
Total cash received		**2,326**	9,300	**2,326**	9,300
Cash used					
Payment to the Commonwealth		**27,896**	-	**27,896**	-
Finance leases		**4,750**	3,768	**4,750**	3,768
Total cash used		**32,646**	3,768	**32,646**	3,768
Net cash from financing activities		**(30,320)**	5,532	**(30,320)**	5,532
Net increase (decrease) in cash held		**(131,044)**	(6,465)	**(113,244)**	12,562
Cash and cash equivalents at the beginning of the reporting period		**398,173**	404,638	**295,575**	283,013
Cash and cash equivalents at the end of the reporting period		**267,129**	398,173	**182,331**	295,575

The above Statement should be read in conjunction with the accompanying notes.

CONSOLIDATED FINANCIAL STATEMENTS
SCHEDULE OF COMMITMENTS
As at 30 June 2015

	Consolidated		CSIRO	
	2015	2014	**2015**	2014
BY TYPE	**$'000**	$'000	**$'000**	$'000
Commitments receivable				
Research and development commitments[5]	**(396,510)**	(418,985)	**(396,510)**	(418,985)
Other receivables	**(32,047)**	(33,714)	**(32,047)**	(33,714)
Net GST receivable	**(18,545)**	(42,281)	**(14,263)**	(39,517)
Total commitments receivable	**(447,102)**	(494,980)	**(442,820)**	(492,216)
Capital commitments payable				
Land and buildings[1]	**19,275**	63,614	**19,275**	63,614
Plant and equipment[2]	**5,412**	21,040	**5,412**	21,040
Investments[3]	**4,075**	2,350	**4,075**	2,350
Total capital commitments payable	**28,762**	87,004	**28,762**	87,004
Other commitments payable				
Operating leases[4]	**214,933**	246,662	**214,933**	246,662
Research and development commitments[5]	**729,979**	757,992	**682,665**	727,121
Other commitments	**69,841**	71,496	**69,841**	71,496
Total other commitments payable	**1,014,753**	1,076,150	**967,439**	1,045,279
Net commitments by type	**596,413**	668,174	**553,381**	640,067
BY MATURITY				
Commitments receivable				
One year or less	**(226,845)**	(270,533)	**(225,171)**	(269,364)
From one to five years	**(201,964)**	(191,353)	**(199,356)**	(189,765)
Over five years	**(18,293)**	(33,094)	**(18,293)**	(33,087)
Total commitments receivable	**(447,102)**	(494,980)	**(442,820)**	(492,216)
Commitments payable				
Capital commitments payable				
One year or less	**27,312**	84,514	**27,312**	84,514
From one to five years	**1,450**	2,490	**1,450**	2,490
Total capital commitments payable	**28,762**	87,004	**28,762**	87,004
Operating lease commitments payable				
One year or less	**42,231**	38,927	**42,231**	38,927
From one to five years	**123,491**	128,891	**123,491**	128,891
Over five years	**49,211**	78,844	**49,211**	78,844
Total operating lease commitments payable	**214,933**	246,662	**214,933**	246,662
Other commitments payable				
One year or less	**446,346**	440,600	**427,816**	427,584
From one to five years	**345,427**	365,446	**316,643**	347,674
Over five years	**8,047**	23,442	**8,047**	23,359
Total other commitments payable	**799,820**	829,488	**752,506**	798,617
Net commitments by maturity	**596,413**	668,174	**553,381**	640,067

The above Schedule should be read in conjunction with the accompanying notes.

SCHEDULE OF COMMITMENTS (cont)

1. Land and building commitments are outstanding contractual payments for buildings under construction.
2. Plant and equipment commitments are for the purchase of plant and equipment.
3. Investment commitments are for additional contributions to equity investments.
4. Operating leases are effectively non-cancellable and comprise:

Nature of lease	General description of leasing arrangement
Leases for office and scientific research accommodation	Lease payments are subject to an annual increase in accordance with the terms of agreement, e.g. upward movements in the Consumer Price Index. The accommodation leases are still current and each may be renewed at the Group's option.
Leases for motor vehicles	No contingent rentals exist. There are no purchase options available to the Group.
Leases for computer equipment	The lessor provides computer equipment designated as necessary in the supply contract for general period of 2-3 years.

5. Research and development commitments are Agreements Equally Proportionally Unperformed (AEPU) commitments payable and receivable for research and development contracts. AEPU commitments are contractual obligations where neither party has provided goods or services.

Note: Commitments are GST inclusive where relevant.

CONSOLIDATED FINANCIAL STATEMENTS
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
For the year ended 30 June 2015

Note 1: Summary of the significant accounting policies

1.1 Objective of the CSIRO and its Subsidiaries (the Group)

CSIRO is an Australian Government controlled not-for-profit entity. It is a research enterprise that aims to deliver great science and innovative solutions for industry, society and the environment.

CSIRO is structured to meet the following outcome:

> Innovative scientific and technology solutions to national challenges and opportunities to benefit industry, the environment and the community, through scientific research and capability development, services and advice.

The continued existence of CSIRO in its present form and with its present programs is dependent on Government policy and on continuing funding by Parliament for CSIRO's administration and programs.

For the purposes of AASB 10 *Consolidated Financial Statements*, consolidated accounts are prepared to include the following subsidiaries: WLAN Services Pty Ltd (WLAN), Science and Industry Endowment Fund (SIEF), and the Fundación CSIRO Chile Research (Fundación) - refer Note 1.5.

1.2 Basis of Preparation of the Financial Statements

The financial statements are required by section 42 of the *Public Governance, Performance and Accountability Act 2013* and are general purpose financial statements.

CSIRO and the Group's Consolidated Financial Statements have been prepared in accordance with:

- Financial Reporting Rule (FRRs) for reporting periods ending on or after 1 July 2014; and
- Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The financial statements have been prepared on an accrual basis and in accordance with the historical cost convention, except for certain assets and liabilities at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

The financial statements are presented in Australian dollars and values are rounded to the nearest thousand dollars unless otherwise specified.

Unless an alternative treatment is specifically required by an Accounting Standard or the FRR, assets and liabilities are recognised in the Statement of Financial Position when, and only when, it is probable that future economic benefits will be required and the amounts of the assets or liabilities can be reliably measured. However, assets and liabilities arising under executor contracts are not recognised unless required by an Accounting Standard. Liabilities and assets that are unrecognised are reported in the Schedule of Commitments or the Contingencies note.

Unless alternative treatment is specifically required by an Accounting Standard, income and expenses are recognised in the Statement of Comprehensive Income when, and only when, the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

1.3 Significant Accounting Judgements and Estimates

In the process of applying the accounting policies listed in this note, CSIRO has made the following judgements that have the most significant impact on the amounts recorded in the financial statements:

- The fair value of properties classified as 'properties held for sale' has been taken to be the market value (level 1 inputs), and for 'investment properties' has been taken to be the market value (level 2 inputs), of similar properties as determined by an independent valuer;
- The fair value of land which will continue to be used for research activities, and buildings held for specialised purposes and where there is no readily available market price has been taken to be Fair Value- Highest and Best Use (level 3 inputs), as determined by an independent valuer;
- The fair value of plant and equipment has been taken to be Fair Value – Highest and Best Use (level 3 inputs) as determined by an independent valuer; and
- Regarding the fair value of: listed companies (level 1 inputs); unlisted companies (level 1 and 3 inputs) and commercial vehicles (level 3 inputs). Gains or losses arising from changes in fair value are recognised in reserves or equity with the exception of impairment. Investments in listed companies have been assessed for impairment and the decline in fair value does not represent impairment. Hence, the total decline in fair value is recognised directly in reserves or equity.

No accounting assumptions and estimates have been identified that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next reporting period.

1.4 New Australian Accounting Standards

Adoption of new Australian Accounting Standard requirements

No Accounting Standard has been adopted earlier than the application date as stated in the standard.

CSIRO has reviewed new standards, revised standards and interpretations/amending standards issued prior to the signing of the financial statements and considers that none of these have had a material financial impact. The following new or revised standards have been adopted and their implementation requires enhanced disclosures:

Standard	Impact
AASB 10 Consolidated Financial Statements	Change to consolidation requirements for investment entities. No impact to CSIRO's accounting policies.
AASB 11 Joint Arrangements	Change to consolidation requirements. No impact to CSIRO's accounting policies other than increased disclosure requirements in the notes.
AASB 12 Disclosure of Interests in Other Entities	Increased disclosure requirements for interests in other entities. Refer to Note 9 and 23.
AASB 1055 Budgetary Reporting	New standard requiring disclosure of budgetary information and variance explanations. Refer to disclosure in Note 34.

Future Australian Accounting Standard requirements

No new or revised pronouncements were issued by the Australian Accounting Standards Board prior to the finalisation of the financial statements which are expected to have a material financial impact on the entity in future reporting periods. The following new or revised standards will be adopted and their implementation will require enhanced disclosure in future reporting periods:

Standard	Effective for annual reporting periods beginning on or after:	Nature of impending changes and likely impact on application
AASB 9 'Financial Instruments'	1 January 2017	Change to requirements for classifying and measuring financial assets and liabilities.
AASB 15 Revenue from Contracts with Customers	1 January 2017	Specifies the accounting treatment of revenue arising from contracts with customers.

1.5 Consolidation

AASB 10 *Consolidated Financial Statement* requires a parent entity that is in a group to present consolidated financial statements that consolidate its investments in controlled entities in accordance with AASB 10. The parent and controlled entities apply consistent accounting policies and the effects of all transactions and balances between the entities are eliminated in full. The financial statements of the controlled entities are prepared for the same reporting period as the parent entity.

The consolidated financial statements incorporate the assets and liabilities of all entities controlled by CSIRO as at 30 June and the results of the controlled entities for the year then ended.

The Fundación operates in a jurisdiction that reports on a calendar year basis. CSIRO has been granted an exemption by the Minister for Finance for the Fundación to operate and report with an annual accounting period different to its parent entity CSIRO.

1.6 Revenue

Revenue from sale of goods is recognised when:

- The risks and rewards of ownership have been transferred to the buyer;
- The entity retains no managerial involvement or effective control over the goods;
- The revenue and transaction costs incurred can be reliably measured; and
- It is probable that the economic benefits associated with the transaction will flow to the entity.

Revenue from rendering of services is recognised by reference to the stage of completion of contracts at the reporting date. The revenue is recognised when:

- The amount of revenue, stage of completion and transaction costs incurred can be reliably measured; and
- It is probable that the economic benefits associated with the transaction will flow to the entity.

The stage of completion of contracts at the reporting date is determined by reference to the proportion that costs incurred to date bear to the total costs of the transaction. The balances of contract research and development activities in progress are accounted as either contract research work in progress (Note 15), being the gross unbilled amount expected to be collected from clients for contract research and services performed as at 30 June 2015, or contract research revenue received in advance (Note 17), where revenue for contract research and services received and/or billed exceeded revenue earned.

Receivables for goods and services, which have 30 day terms, are recognised at the nominal amounts due less any impairment allowance. Collectability of debts is reviewed on an ongoing basis and allowances are made when collectability of the debt is no longer probable.

Interest revenue is recognised using the effective interest method as set out in AASB 139 *Financial Instruments: Recognition and Measurement*.

Royalties and licence revenue are recognised on an accrual basis in accordance with the substance of the relevant royalty agreements.

Revenue from legal settlements related to intellectual property is recognised on an accrual basis in accordance with the substance of the relevant licensing agreements.

Revenue disclosed in Note 4.2 Other Revenues-Other includes sale of CSIRO publications and products, conferences and 'pass through' funding for costs of suppliers and external service providers.

Revenues from Government

Funding received from the Australian Government Department of Industry and Science (appropriated to CSIRO as a corporate Commonwealth entity payment item) is recognised as Revenue from Government unless it is in the nature of an equity injection or a loan.

1.7 Gains

Resources Received Free of Charge

Resources received free of charge are recognised as either revenue or gains depending on their nature. They are recorded as revenue when, and only when, the fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

Contributions of assets at no cost of acquisition or for nominal consideration are recognised as gains at their fair value when the asset qualifies for recognition, unless received from another Government agency or authority as a consequence of a restructuring of administrative arrangements.

Sale of Assets

Gains from disposal of non-current assets are recognised when control of the asset has passed to the buyer.

1.8 Transactions with the Government as Owners

Equity Injections

Amounts that are designated as equity injections for a year are recognised directly in contributed equity in that year.

1.9 Research and Development Expenditure and Intellectual Property

All research and development costs, including costs associated with protecting intellectual property (e.g. patents and trade marks), are expensed as incurred.

1.10 Employee Benefits

Liabilities for short-term employee benefits (as defined in AASB 119 *Employee Benefits*) and termination benefits due within twelve months of the end of the reporting period are measured at their nominal amounts. The nominal amount is calculated with regard to the rate expected to be paid on settlement of the liability.

Other long-term employee benefit liabilities are measured at the present value of the estimated future cash outflows to be made in respect of services provided by employees up to the reporting date.

Leave

The liability for employee benefits includes provisions for annual leave, long service leave and severance payments. No provision has been made for sick leave as all sick leave is non-vesting and the average sick leave taken in future years by employees is estimated to be less than the annual

entitlement for sick leave.

The leave liabilities are calculated on the basis of employees' remuneration at the estimated salary rates that will apply at the time the leave is taken, including the employer superannuation contribution rates to the extent that the leave is likely to be taken during service rather than paid out on termination.

The liability at 30 June 2015 for long service leave and annual leave has been determined by the short hand method and reference to the work of the Australian Government Actuary (AGA). The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

Separation and Redundancy

Provision is made for separation and redundancy benefit payments. A CSIRO plan of termination is binding when the following criteria are met:

a) actions required to complete the plan indicate that it is unlikely that significant changes to the plan will be made;

b) the plan identifies the number of employees whose employment is to be terminated; and

c) the plan established the termination benefits that employees will receive.

Superannuation

Employees of CSIRO are members of the Commonwealth Superannuation Scheme (CSS), the Public Sector Superannuation Scheme (PSS), or the PSS accumulation plan (PSSap). The CSS and PSS are defined benefit schemes for the Australian Government. The PSSap is a defined contribution scheme.

The liability for defined benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course. This liability is reported by the Department of Finance as an administered item.

CSIRO makes employer contributions to the employee superannuation schemes at rates determined by an actuary to be sufficient to meet the cost to the Government of the superannuation entitlements of the Group's employees. CSIRO accounts for the contributions as if they were contributions to defined contribution plans.

The liability for superannuation recognised as at 30 June 2015 represents outstanding contributions for the financial year.

1.11 Cash

Cash and cash equivalents includes cash on hand and demand deposits in bank accounts with an original maturity of six months or less that are readily convertible to known amounts of cash and subject to insignificant risk of change in value. Cash is recognised at its nominal amount. The total cash held includes deposits held on behalf of third parties (as disclosed in Note 19)

1.12 Financial Assets

CSIRO classifies its financial assets in the following categories:

- Available for sale financial assets; and
- Loans and receivables.

The classification depends on the nature and the purpose of financial assets and is determined at the time of initial recognition. Financial assets are recognised and derecognised upon trade date.

Effective Interest Method

The effective interest method is a method of calculating the amortised cost of a financial asset and of allocating interest income over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset or, where appropriate, a shorter period.

Income is recognised on an effective interest rate basis, except for financial assets that are recognised at fair value through profit and loss.

Available-for-Sale Financial Assets

Available-for-sale financial assets are non-derivatives that are either designated in this category or not classified in any of the other categories. Available-for-sale financial assets are recorded at fair value. Gains and losses arising from changes in fair value are recognised directly in the reserves (equity) with the exception of impairment losses. Interest is calculated using the effective interest method and foreign exchange gains and losses on monetary assets are recognised directly in profit or loss. Where the asset is disposed of or is determined to be impaired, part (or all) of the cumulative gain or loss previously recognised in the reserve is included in the operating result for the period.

CSIRO has investments in a number of unlisted start-up companies over which it does not have significant influence or control. These companies have been established for the purpose of commercialisation of CSIRO's intellectual property.

CSIRO also has some investments in companies which have, since initial start-up, been listed on the Australian Stock Exchange.

CSIRO's investments in listed and unlisted companies are accounted for in accordance with AASB 139 *Financial Instruments: Recognition and Measurement*, and have been designated as 'available-for-sale' financial assets.

Fair value of Investments in Listed Companies

The fair value of investments in listed companies has been determined by reference to their closing bid price at the reporting date.

Fair value of Investments in Unlisted Companies

For investments in unlisted companies where there is no readily available market pricing for the equity instruments, the fair value has been determined by applying valuation techniques in line with the generally accepted valuation guidelines 'International Private Equity and Venture Capital Valuation (IPEV) Guidelines'.

Where recent transactions for the unlisted companies' equity have taken place, these equity transaction prices are used to value CSIRO's investment.

For unlisted companies that have not had any recent equity transactions, other IPEV valuation techniques are used such as discounted cash flows and share of net assets.

In addition, independent valuations are performed as at reporting date for unlisted companies that are considered to have a material impact on CSIRO's investment portfolio.

Investments in special purpose entities are either valued at cost or share of net realisable assets since a reliable estimate of fair value cannot be established. These entities have been set up primarily to gain access to research facilities/networks, or to provide services to owners. Hence, there is no 'active market' for these equity investments. CSIRO is a long-term shareholder and is unlikely to dispose of its interest in these investments.

Loans and Receivables

Trade receivables, loans and other receivables that have fixed or determinable payments that are not quoted in an active market, are classified as 'loans and receivables'. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate. All trade and other receivables are expected to be recovered in no more than 12 months.

Impairment of Financial Assets

Financial assets are assessed for impairment at the end of each reporting period.

Financial assets held at amortised cost- Where there is objective evidence that an impairment loss has been incurred for loans and receivables, the amount of the loss is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows discounted at the asset's original effective interest rate. The carrying amount is reduced by way of an allowance account. The loss is recognised in the Statement of Comprehensive Income.

Available-for-sale financial assets– Where there is objective evidence that an impairment loss on an available-for-sale financial asset has been incurred, the amount of the difference between its cost, less principal repayments and amortisation, and its current fair value, less any impairment loss previously recognised in expenses, is transferred from equity to the Statement of Comprehensive Income.

Available-for-sale financial assets (held at cost)- Where there is objective evidence that an impairment loss has been incurred, the amount of the impairment loss is the difference between the carrying amount of the asset and the present value of the estimated future cash flows discounted at the current market rate for similar assets.

1.13 Financial liabilities

Financial liabilities are recognised and derecognised upon trade date. Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

1.14 Acquisition of Assets

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Financial assets are initially measured at their fair value plus transaction costs where appropriate.

Assets acquired at no cost or for nominal considerations are initially recognised as assets and revenues at their fair value at the date of acquisition.

Property, plant and equipment which are purchased from contract research funds and where the control and subsequent sale proceeds are refunded to contributors under the terms of the agreements, are expensed during the year of purchase.

1.15 Property, Plant and Equipment including Land, Buildings and Heritage and Cultural Assets

Asset Recognition Threshold

Purchases of property, plant and equipment are recognised initially at cost in the Statement of Financial Position, except for purchases costing less than $3,000, which are expensed in the year of acquisition (other than where they form part of a group of similar items which are significant in total).

The initial cost of an asset includes an estimate of the cost of dismantling and removing the item and restoring the site on which it is located.

Revaluations

Following initial recognition at cost, property, plant and equipment, including assets under finance leases are carried at fair value less accumulated depreciation and accumulated impairment losses. Valuations are conducted with sufficient frequency to ensure the carrying amount of assets do not differ materially from the assets' fair value as at reporting date. The regularity of valuation depends upon the volatility of movements in the market values for the relevant assets.

Revaluation adjustments are made on a class basis. Any revaluation increment is credited to equity under asset revaluation reserve, except to the extent that it reverses a previous revaluation decrement of the same asset class that was previously recognised in the surplus or deficit. Revaluation decrements for a class of assets are recognised directly through surplus/deficit except to the extent that they reverse a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is restated proportionately with the change in the gross carrying amount of the asset so that the carrying amount of the asset after revaluation equals its revalued amount.

Land and buildings, including heritage buildings and investment properties, underwent a full revaluation as at 30 June 2015 by independent valuers (Savills). Plant and equipment were revalued as at 30 June 2012 by a panel of independent valuers, with the primary valuer being the Australian Valuation Office.

Fair value for each class of asset is determined as follows:

- Land, which will continue to be used for research activity, is valued by independent valuers at Fair Value –Highest and Best Use. Highest and Best Use is determined from the perspective of market participants. An entity's current use of a non-financial asset is presumed to be its highest and best use unless market or other factors suggest otherwise;
- Buildings and leasehold improvements, which will continue to be used for research activities, are valued by independent valuers at their Highest and Best Use. Building valuations include plant, fit-outs, fixtures and fittings, which form an integral part of buildings;
- Plant and equipment which will continue to be used for research activities are valued by independent valuers, at fair value being the Highest and Best Use;
- Properties held or identified for sale and investment properties are valued at market value by independent valuers as at the reporting date; and
- Heritage and cultural assets are valued by independent valuers at their depreciated replacement cost.

Depreciation and Amortisation

Depreciable property, plant and equipment assets are written-off to their estimated residual values over their estimated useful lives using, in all cases, the straight-line method of depreciation. Leasehold improvements are depreciated on a straight-line basis over the lesser of the estimated useful life of the improvements or the unexpired period of the lease. Land is not depreciated.

Depreciation/amortisation rates (useful lives), residual values and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate.

Depreciation rates applying to each class of depreciable asset are based on the following useful lives:

	2015	**2014**
Buildings on freehold land	40 to 80 years	40 to 80 years
Leasehold improvements	Lease term	Lease term
Buildings under finance lease	Lease term	Lease term
Passenger vehicles	7 years	7 years
Agricultural and transport equipment	8 to 20 years	8 to 20 years
Computing equipment	2 to 5 years	2 to 5 years

Scientific equipment	5 to 20 years	5 to 20 years
Furniture and office equipment	5 to 15 years	5 to 15 years
Workshop equipment	20 to 25 years	20 to 25 years
Research vessel	25 years	25 years
Australia Telescope	15 to 58 years	15 to 58 years
Heritage and Cultural Assets	Indefinite	Indefinite

Impairment

All assets were assessed for impairment as at 30 June 2015. Where indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

The recoverable amount of an asset is the higher of its fair value less costs to sell and its value in use. Value in use is the present value of the future cash flows expected to be derived from the asset. Where the future economic benefit of an asset is not primarily dependent on the asset's ability to generate future cash flows, and the asset would be replaced if the entity were deprived of the asset, its value in use is taken to be its depreciated replacement cost.

No indications of impairment were identified at 30 June 2015, except for one item of plant and equipment.

Derecognition

An item of property, plant and equipment is derecognised upon disposal or when no further future economic benefits are expected from its use or disposal.

Heritage and Cultural Assets

Heritage and cultural items include buildings of historical or cultural significance. CSIRO has classified them as heritage and cultural assets as they are primarily used for purposes that relate to their cultural significance and original purpose. Heritage and cultural assets are stored and managed in ways to preserve their heritage and cultural value over time. Where conservation and preservation activities, specified in an asset's Heritage Management Plan, demonstrate that an asset will be maintained for an indefinite period, these items are considered to have indefinite useful lives and therefore, not subject to depreciation. Copies of the Heritage Management Plans may be obtained by contacting enquiries@CSIRO.au.

1.16 Intangibles

Intangibles comprise licenses and internally developed and acquired software for internal use. These assets are carried at cost, less accumulated amortisation and impairment losses, except where the estimated cost of software is less than the $250,000 threshold and expensed in the year of acquisition.

Licenses and software are amortised on a straight-line basis over its anticipated useful life. The useful lives are 2 to 10 years (2014: 2 to 10 years).

All software assets were assessed for indications of impairment as at 30 June 2015.

1.17 Inventories

Inventories held for sale represent books, CD-ROMs and videos of publishing and media products. They are valued at the lower of cost and net realisable value.

1.18 Leases

A distinction is made between finance leases and operating leases. Finance leases effectively transfer from the lessor to the lessee substantially all the risks and rewards incidental to ownership of leased assets. An operating lease is a lease that is not a finance lease. In operating leases, the lessor effectively retains all such risks and benefits.

Where an asset is acquired by means of a finance lease, the asset is capitalised at either the fair value of the lease or, if lower, the present value of minimum lease payments at the inception of the contract and a liability recognised at the same time and for the same amount.

The discount rate used is the interest rate implicit in the lease. Leased assets are amortised over the period of the lease. Lease payments are allocated between the principal component and the interest expense.

Operating lease payments are expensed on a straight-line basis which is representative of the pattern of benefits derived from the leased assets.

1.19 Taxation/Competitive Neutrality

Taxation

In accordance with Section 53 of the *Science and Industry Research Act 1949*, CSIRO is exempt from all forms of Australian taxation except fringe benefits tax (FBT) and the goods and services tax (GST). The Group pays applicable taxes in overseas countries.

Revenues, expenses, assets and liabilities are recognised net of GST except:

- where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- for receivables and payables.

The SIEF is exempt from income tax in Australia. WLAN is subject to all applicable taxes in Australia and the Fundación is subject to all applicable taxes in Chile.

Competitive Neutrality

The Australian Government *Competitive Neutrality Guidelines for Managers* require government bodies to operate with no net competitive advantages over private sector competitors. CSIRO's competitive neutrality policy is applied to consulting and services. Neutrality is achieved by incorporating tax equivalence and rate of return components in pricing of these services.

1.20 Joint Arrangements

Joint Operations – Cooperative Research Centres (CRCs)

The proportionate interests in CRCs regarded as joint operations are disclosed in the financial statements under appropriate headings. Their primary source of funding is from the Australian Government and funding is progressively drawn down over the life of the CRCs and distributed to participants, including CSIRO and universities, for research and development purposes. CSIRO's contributions to the CRCs are expensed as incurred and funds received from CRCs are recognised as revenue to the extent that work has been performed in the Statement of Comprehensive Income. CSIRO has been a participant in 17 CRCs during the financial year (refer Note 23).

Joint Venture Entities – Unincorporated

CSIRO's 50.0% (2014: 33.3%) interest in the Murray-Darling Freshwater Research Centre (MDFRC) is accounted for using the equity method (refer to Note 8). The MDFRC is a collaborative joint venture for the purpose of Murray-Darling Basin Freshwater Research to support the generation of knowledge required to ensure the sustainable management of water and associated environmental resources of the Murray-Darling Basin. In accordance with the joint venture agreement, the operating surplus/(deficit)

is shared by participants in the joint venture. CSIRO's share of the MDFRC's operating deficit was $431,500 (2014 $36,642 deficit).

1.21 Contingent Liabilities and Contingent Assets

Contingent liabilities and contingent assets are not recognised in the Statement of Financial Position but are reported in the relevant schedules and notes. They may arise from uncertainty as to the existence of a liability or asset, or represent a liability or asset in respect of which the amount cannot be reliably measured. Contingent assets are disclosed when settlement is probable but not virtually certain and contingent liabilities are disclosed when settlement is greater than remote.

Bank guarantees issued on behalf of CSIRO are disclosed as contingent liabilities.

Bank guarantees received by CSIRO are not disclosed as contingent assets but are the subject of a footnote in Note 22: Contingent Assets and Liabilities.

1.22 Properties Held for Sale

Properties which are expected to be recovered primarily through sale rather than through continuing use are classified as 'properties held for sale'. Immediately before classification, the properties are remeasured in accordance with the Group's accounting policies. Thereafter, at reporting date the properties are measured at the lower of their carrying amount and fair value less cost to sell.

Impairment losses on initial classification as held for sale and subsequent gains or losses on re-measurement are recognised in the Statement of Comprehensive Income.

1.23 Presentation of Financial Statements

CSIRO presents in the consolidated Statement of Changes in Equity all owner changes in equity, whereas all non-owner changes in equity are presented in the consolidated Statement of Comprehensive Income.

Note 2: Events After the Reporting Period

On 28 August 2015, the members of National ICT Australia Limited (NICTA) resolved to adopt a revised company constitution which provides CSIRO with effective control of NICTA. NICTA is Australia's ICT Research Centre of Excellence and undertakes internationally recognised research in partnership with industry, government and researchers to create national benefit and wealth for Australia.

At the time of completion of this note, the Group is not aware of any other significant events occurring after the reporting date.

Note 3: Expenses

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
3.1 Employee Benefits					
Wages and salaries		**500,744**	551,479	**500,435**	550,653
Superannuation - defined contribution plans		**83,070**	94,788	**83,003**	94,780
Leave and other entitlements		**82,321**	53,264	**82,242**	53,264
Separation and redundancies		**1,411**	52,396	**1,411**	52,396
Gross employee benefits		**667,546**	751,927	**667,091**	751,093
Less					
Capitalised labour		**(2,714)**	(9,889)	**(2,714)**	(9,889)
Employee cost recovery from subsidiary companies		**(248)**	(188)	**(248)**	(188)
Total employee benefits		**664,584**	741,850	**664,129**	741,016
3.2 Suppliers					
Goods and services supplied or rendered					
Goods		**134,594**	66,202	**132,086**	65,192
Services		**282,835**	318,040	**268,712**	307,263
Total goods and services supplied or rendered		**417,429**	384,242	**400,798**	372,455
Goods supplied in connection with					
Related parties		**522**	575	**522**	575
External parties		**134,072**	65,627	**131,564**	64,617
Total goods supplied		**134,594**	66,202	**132,086**	65,192
Services rendered in connection with					
Related parties		**45,295**	16,064	**44,237**	16,064
External parties		**237,540**	301,976	**224,475**	291,199
Total services rendered		**282,835**	318,040	**268,712**	307,263
Total goods and services supplied or rendered		**417,429**	384,242	**400,798**	372,455
Other supplier expenses					
Operating lease rentals					
Minimum lease payments		**10,012**	8,920	**10,012**	8,920
Workers compensation expenses		**5,571**	4,327	**5,565**	4,323
Total other supplier expenses		**15,583**	13,247	**15,577**	13,243
Total supplier expenses		**433,012**	397,489	**416,375**	385,698
3.3 Depreciation and amortisation					
Depreciation					
Buildings and leasehold improvements		**76,104**	74,018	**76,104**	74,018
Plant and equipment		**62,870**	53,576	**62,817**	53,575
Heritage Buildings		**-**	-	**-**	-
Total depreciation		**138,974**	127,594	**138,921**	127,593
Amortisation					
Intangibles		**7,120**	5,580	**7,120**	5,580
Total depreciation and amortisation		**146,094**	133,174	**146,041**	133,173

Note 3: Expenses (cont.)

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
3.4 Write-down and impairment of assets					
Asset write-downs and impairments from:					
Bad debts		**128**	600	**128**	600
Decrease in allowance for impairment of receivable		**(368)**	(190)	**(368)**	(190)
Impairment of available for sale investments		**150**	397	**150**	397
Net impairment loss on revaluation of properties held for sale and investment properties		**(64)**	3,167	**(64)**	3,167
Net realisation of fair value loss reserve on available for sale investments		**943**	6	**943**	6
Write down and impairment of assets		**14,002**	103	**14,002**	103
Total write-down and impairment of assets		**14,791**	4,083	**14,791**	4,083
3.5 Losses from Asset Sales					
Equity investment and intellectual property					
Proceeds from sale of equity investments		**(1,363)**	(42)	**(1,363)**	(42)
Proceeds from sale of intellectual property		**(35)**	(1,503)	**(35)**	(1,503)
Total proceeds		**(1,398)**	(1,545)	**(1,398)**	(1,545)
Carrying value of assets sold		**290**	35	**290**	35
Selling expense		**138**	8	**138**	8
Net (gain)/loss from equity investment and intellectual property		**(970)**	(1,502)	**(970)**	(1,502)
Land and buildings					
Carrying value of assets sold		**639**	34	**639**	34
Selling expense		**326**	303	**326**	303
Net (gain)/loss from sale of land and buildings		**965**	337	**965**	337
Plant and equipment					
Proceeds from sale		**(344)**	(416)	**(344)**	(416)
Carrying value of assets sold		**1,241**	3,926	**1,241**	3,926
Selling expense		**13**	10	**13**	10
Net (gain)/loss from sale of plant and equipment		**910**	3,520	**910**	3,520
Investment Properties					
Carrying value of assets sold		**-**	14	**-**	14
Net (gain)/loss from sale of investment properties		**-**	14	**-**	14
Total losses from asset sales		**905**	2,369	**905**	2,369

Note 4: Own-source income

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
4.1 Sale of goods and rendering of services					
Sale of goods in connection with					
Related parties		**4**	-	**4**	-
External parties		**10,291**	10,236	**10,291**	10,236
Total sale of goods		**10,295**	10,236	**10,295**	10,236
Rendering of services in connection with					
Related parties		**131,448**	148,192	**131,448**	158,732
External parties		**228,905**	225,476	**235,730**	225,477
Total rendering of services		**360,353**	373,668	**367,178**	384,209
Total sale of goods and rendering of services		**370,648**	383,904	**377,473**	394,445
4.2 Other revenues					
Sale of primary produce		**1,293**	1,064	**1,293**	1,064
Donation		**20**	153	**20**	153
Capital contributions		**5,945**	3,329	**7,945**	4,529
Education programs and subscriptions		**1,497**	3,439	**1,497**	3,439
Other		**13,875**	19,285	**11,398**	17,444
Total other revenues		**22,630**	27,270	**22,153**	26,629

Note 5: Other comprehensive income

Items that will not be classified to profit or loss					
5.1 Changes in asset revaluation reserves					
Revaluation of land and buildings		**42,089**	24,837	**42,089**	24,837
Revaluation of plant and equipment		**-**	-	**-**	-
Revaluation of Heritage and Cultural assets		**(11)**	954	**(11)**	954
Net decrease in asset revaluation reserves		**42,078**	25,791	**42,078**	25,791
Items that may be reclassified to profit and loss					
5.2 Change in other reserve					
Net change in fair value gain/(loss) of available for sale of investments		**(2,139)**	1,864	**(2,139)**	1,864
Net change arising from foreign exchange movements on conversion of subsidiary accounts		**23**	-	**-**	-
Realisation of fair value loss on sale and impairment of available for sale investment		**(130)**	6	**(130)**	6
Net increase/(decrease) in other reserve		**(2,246)**	1,870	**(2,269)**	1,870

Note 6: Fair value measurements

The following tables provide an analysis of assets and liabilities that are measured at fair value for 2014-15.
The different levels of the fair value hierarchy are defined below.

Level 1: Quoted prices (unadjusted) in active markets for identical assets or liabilities that the entity can access at measurement date.
Level 2: Inputs other than quoted prices included within Level 1 that are observable for the asset or liability, either directly or indirectly.
Level 3: Unobservable inputs for the asset or liability.

6.1 Fair value measurements

Fair value measurements at 30 June by hierarchy for assets and liabilities[1]

	Fair value measurements at the end of the reporting period			For Levels 2 and 3 fair value measurements			
	2015 $'000	2014 $'000	Category (Level 1, 2 or 3)	Valuation technique	Inputs used	Range (weighted average)[2]	Sensitivity of the fair value measurement to changes in unobservable inputs[5]
Financial assets							
Available for sale financial assets[3] -listed	**3,970**	5,643	**1**	N/A	N/A	-	-
-unlisted	**8,631**	8,978	**3**	Share of net assets; Latest equity or unit transaction price; Contract value	Net assets; Percentage shareholding; Equity or unit transaction price; Contract value	N/A	-
Total financial assets	**12,601**	**14,621**					
Non-financial assets							
Land	**382,413**	365,868	**2**	Active and liquid market approach	Market value of similar properties; Dollar rate per square metre; Derived escalation rate on similar land sales	-	-
Buildings[4]	**1,221,887**	1,197,470	**3**	Depreciated replacement cost approach	Escalation rate on construction cost change; Market value of similar properties	N/A	-
Property, plant and equipment[4]	**597,147**	548,398	**3**	Depreciated replacement cost approach	Observable inputs such as the market value of similar P&E	N/A	-
Investment Properties	**49,292**	48,288	**2**	Market approach and capitalisation	Market value of similar properties; Dollar rate per m2	-	-
Properties Held For Sale	**5,200**	9,091	**1**	Market approach and capitalisation	Market value of similar properties	-	-
Heritage and cultural[4]	**4,206**	4,217	**3**	Depreciated replacement cost approach	Market value of similar properties; Escalation rate for building cost premium	N/A	-
Total non-financial assets	**2,260,145**	**2,173,332**					
Total fair value measurements (assets)	**2,272,746**	**2,187,953**					

1. The above disclosure represents the consolidated financial position of the Group.

2. Under AASB 13 disclosure is required for significant unobservable inputs only on level 3 assets or liabilities. This is not applicable to the level 3 items disclosed as only one valuation technique has been used.

3. For investments in unlisted companies where there is no readily available market pricing, the fair value has been determined by applying valuation techniques in line with the generally accepted valuation guidelines 'International Private Equity and Venture Capital Valuation Guidelines (IPEV)'.

Where recent transactions for the unlisted companies' equity have taken place, these equity transaction prices are used to value CSIRO's investment.

For unlisted companies that have not had any recent equity transactions, other IPEV valuation techniques are used such as discounted cash flows and share of net assets.

Investments in special purpose entities are either valued at cost of share of net realisable assets since a reliable estimate of fair value cannot be established. These entities have been set up primarily to gain access to research facilities/networks, or to provide services to owners. Hence, there is not 'active market' for these equity investments.

4. Plant and Equipment are classified as level 3 as they mainly comprise of specialised research equipment.

5. Recurring level 3 value measurements – sensitivity of inputs:

The significant unobservable inputs and/or market inputs for the property, plant and equipment under level 3 inputs are affected by changes in life (useful life policies and remaining useful life) and obsolescence (accumulated depreciation).

Note 6: Fair Value Measurements (cont)

6.2 Reconciliation for recurring Level 3 fair value measurements

There have been no transfers between levels for non-financial assets

Recurring Level 3 fair value measurements - reconciliation for assets

	Non-financial assets				Financial assets
	Buildings	Property, plant and equipment	Heritage and Cultural	Total Non-Financial	Total Financial
	2015	2015	2015	2015	2015
	$'000	$'000	$'000	$'000	$'000
Opening balance	**1,197,470**	**548,398**	**4,217**	**1,750,085**	**8,978**
Total gains/(losses) recognised in net cost of services[1]	**(82,856)**	**(63,399)**	**-**	**(146,255)**	**(1,537)**
Transfers	**4,564**	**(10)**	**-**	**4,554**	**-**
Purchases	**77,693**	**113,401**	**-**	**191,094**	**1,676**
Disposals	**(637)**	**(1,243)**	**-**	**(1,880)**	**(486)**
Revaluations	**25,653**	**-**	**(11)**	**25,642**	**-**
Closing balance	**1,221,887**	**597,147**	**4,206**	**1,823,240**	**8,631**

1. These gains/(losses) are presented in the Statement of Comprehensive Income under 'Gain on recognition of assets', 'Depreciation and amortisation' and 'Write-down and Impairment of assets'.

Note 7: Trade and other receivables

	Consolidated		CSIRO	
	2015	2014	**2015**	2014
	$'000	$'000	**$'000**	$'000
Goods and services receivables in connection with				
Related parties	**9,855**	11,350	**9,855**	12,887
External parties	**34,036**	48,928	**34,130**	48,908
Total goods and services receivables	**43,891**	60,278	**43,985**	61,795
Other receivables				
Statutory receivables	**9,826**	4,358	**9,175**	3,765
Interest	**1,959**	1,153	**1,211**	410
Other receivables	**18,082**	6,182	**15,358**	2,236
Total other receivables (gross)	**29,867**	11,693	**25,744**	6,411
Total trade and other receivables (gross)	**73,758**	71,971	**69,729**	68,206
Less impairment allowance for				
Goods and services	**(276)**	(644)	**(276)**	(644)
Total trade and other receivables (net)	**73,482**	71,327	**69,453**	67,562
Trade and other receivables (gross) aged as follows				
Not overdue	**66,853**	60,891	**62,824**	57,133
Overdue by				
0 to 30 days	**4,213**	9,589	**4,213**	9,582
31 to 60 days	**1,529**	997	**1,529**	997
61 to 90 days	**564**	177	**564**	177
More than 90 days	**599**	317	**599**	317
Total receivables (gross)	**73,758**	71,971	**69,729**	68,206
Impairment allowance aged as follows				
Not overdue	**-**	371	**-**	371
Overdue by				
0 to 30 days	**-**	-	**-**	-
31 to 60 days	**-**	6	**-**	6
61 to 90 days	**-**	-	**-**	-
More than 90 days	**276**	267	**276**	267
Total impairment allowance	**276**	644	**276**	644

Reconciliation of impairment allowance:	**Consolidated**	**CSIRO**
Movements in relation to 2015	**Goods and services**	**Goods and services**
	$'000	**$'000**
Opening balance	**644**	**644**
Decrease recognised in net surplus	**(368)**	**(368)**
Closing balance	**276**	**276**
Movements in relation to 2014		
Opening balance	834	834
Decrease recognised in net surplus	(190)	(190)
Closing balance	644	644

Note 8: Investments accounted for using the equity method

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Movements of the carrying amount of investment in the MDFRC joint venture entity are as follows:					
Carrying amount at beginning of the financial year		**309**	346	**309**	346
Share of MDFRC's net operating surplus/(deficit) for the year		**(431)**	(37)	**(431)**	(37)
Adjusted based on audited accounts		**132**	-	**132**	-
Adjusted share of MDFRC's net operating surplus/(deficit) for the year		**(299)**	(37)	**(299)**	(37)
Carrying amount of investment in MDFRC as at 30 June		**10**	309	**10**	309

No indicators of impairment were found for investments accounted for using the equity method.
No investments accounted for using the equity method are expected to be sold within the next 12 months.

Note 9: Other investments

At fair value classified as available for sale investments:	1.12				
Shares (or equity investments)					
Listed companies		**3,970**	4,280	**3,970**	4,280
Unlisted companies		**8,631**	10,341	**8,631**	10,341
Total investments		**12,601**	14,621	**12,601**	14,621

All other investments are expected to be recovered in more than 12 months.
Available for sale investments were impaired by $0.2m in 2015 (2014: $0.4m)

Note 10: Land and buildings

	Consolidated		CSIRO	
	2015	2014	**2015**	2014
	$'000	$'000	**$'000**	$'000
Freehold land - fair value	**382,413**	365,868	**382,413**	365,868
Buildings on freehold land				
- fair value	**1,843,407**	1,811,630	**1,843,408**	1,811,630
- accumulated depreciation	**(1,131,087)**	(1,081,049)	**(1,131,088)**	(1,081,049)
	712,320	730,581	**712,320**	730,581
- work in progress	**115,043**	51,837	**115,043**	51,837
Total buildings on freehold land	**827,363**	782,418	**827,363**	782,418
Leasehold improvements				
- fair value	**428,855**	433,631	**428,855**	433,631
- accumulated depreciation	**(149,572)**	(140,963)	**(149,572)**	(140,963)
	279,283	292,668	**279,283**	292,668
- work in progress	**4,905**	6,165	**4,905**	6,165
Total leasehold improvements	**284,188**	298,833	**284,188**	298,833
Buildings under finance lease				
- fair value	**200,957**	196,099	**200,957**	196,099
- accumulated depreciation	**(90,621)**	(79,880)	**(90,621)**	(79,880)
Total buildings under finance lease	**110,336**	116,219	**110,336**	116,219
Total land and buildings	**1,604,300**	1,563,338	**1,604,300**	1,563,338

Note 11: Plant and equipment

Plant and equipment				
- fair value	**924,626**	856,422	**924,128**	856,415
- accumulated depreciation	**(545,407)**	(511,259)	**(545,353)**	(511,258)
	379,219	345,163	**378,775**	345,157
- work in progress	**94,940**	100,799	**94,940**	100,799
Total plant and equipment	**474,159**	445,962	**473,715**	445,956
Research vessel				
- fair value	**125,145**	1,062	**125,145**	1,062
- accumulated depreciation	**(2,724)**	(694)	**(2,724)**	(694)
	122,421	368	**122,421**	368
- work in progress	**567**	102,068	**567**	102,068
Total research vessel	**122,988**	102,436	**122,988**	102,436
Total plant and equipment	**597,147**	548,398	**596,703**	548,392

Note 12: Heritage and cultural

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Heritage and Cultural					
Buildings					
- fair value		**4,206**	4,217	**4,206**	4,217
Total heritage and cultural		**4,206**	4,217	**4,206**	4,217

Note 13: Intangibles

Intangibles	1.16				
Internally developed – in use		**49,237**	54,369	**49,237**	54,369
Internally developed – in progress		**1,787**	270	**1,787**	270
		51,024	54,639	**51,024**	54,639
Accumulated amortisation		**(29,647)**	(23,266)	**(29,647)**	(23,266)
Total intangibles		**21,377**	31,373	**21,377**	31,373

Note 14: Investment properties

Reconciliation of the opening and closing balances of investment properties	1.15				
As at 1 July		**48,288**	52,150	**48,288**	52,150
Net gain/(loss) from fair value adjustments		**1,004**	(3,862)	**1,004**	(3,862)
Carrying value of assets sold		**-**	-	**-**	-
Net book value as at 30 June		**49,292**	48,288	**49,292**	48,288

As at 30 June 2015 investment properties comprise properties that are leased to third parties. The leases contain an initial non-cancellable period of ten years.

No indicators of impairment were identified for investment properties.

Continued from Notes 11 – 14 Land, buildings, plant and equipment and intangibles

(a) Reconciliation of the opening and closing balances of Land and Buildings, Plant and Equipment and Intangibles (2014-15) - Consolidated

	Land	Buildings	Total land and buildings	Plant and equipment	Heritage and Cultural	Intangibles	Total
	$'000	$'000	$'000	$'000	$'000	$'000	$'000
As at 1 July 2014							
Gross book value	365,868	2,499,362	2,865,230	1,060,351	11,713	54,639	3,991,933
Accumulated depreciation and impairment	-	(1,301,892)	(1,301,892)	(511,953)	(7,496)	(23,266)	(1,844,607)
Net book value as at 1 July 2014	365,868	1,197,470	1,563,338	548,398	4,217	31,373	2,147,326
Additions:							
By purchase	-	77,693	77,693	113,401	-	1,787	192,881
Gain on recognition of assets included in net cost of services	-	6,722	6,722	-	-	-	6,722
Reclassification	109	4,564	4,673	(10)	-	(4,663)	-
Revaluations recognised in other comprehensive income	16,436	25,653	42,089	-	(11)	-	42,078
Impairments recognised in net cost of services	-	-	-	(529)	-	-	(529)
Depreciation expense	-	(76,104)	(76,104)	(62,870)	-	(7,120)	(146,094)
Disposals	-	(637)	(637)	(1,243)	-	-	(1,880)
Write off of assets recognised in net cost of services	-	(13,474)	(13,474)	-	-	-	(13,474)
Other (adjustment to prior period)	-	-	-	-	-	-	-
Net book value as at 30 June 2015	382,413	1,221,887	1,604,300	597,147	4,206	21,377	2,227,030
Net book value as at 30 June 2015 represented by:							
Gross book value	382,413	2,593,167	2,975,580	1,145,278	11,947	51,024	4,183,829
Accumulated depreciation and impairment	-	(1,371,280)	(1,371,280)	(548,131)	(7,741)	(29,647)	(1,956,799)
	382,413	1,221,887	1,604,300	597,147	4,206	21,377	2,227,030

(b) Reconciliation of the opening and closing balances of Land and Buildings, Plant and Equipment and Intangibles (2013-14) - Consolidated

	Land	Buildings	Total land and buildings	Plant and equipment	Heritage and Cultural	Intangibles	Total
	$'000	$'000	$'000	$'000	$'000	$'000	$'000
As at 1 July 2013							
Gross book value	378,593	2,355,250	2,733,843	1,085,026	9,062	43,491	3,871,422
Accumulated depreciation and impairment	-	(1,170,020)	(1,170,020)	(566,600)	(5,799)	(18,356)	(1,760,775)
Net book value as at 1 July 2013	378,593	1,185,230	1,563,823	518,426	3,263	25,135	2,110,647
Additions:							
By purchase	4,338	42,804	47,142	93,716	-	7,093	147,951
Reclassification	(511)	2,202	1,691	(6,242)	-	4,725	174
Revaluations recognised in other comprehensive income	(16,552)	41,389	24,837	-	954	-	25,791
Impairments recognised in net cost of services	-	(103)	(103)	-	-	-	(103)
Depreciation expense	-	(74,018)	(74,018)	(53,576)	-	(5,580)	(133,174)
Disposals	-	(34)	(34)	(3,926)	-	-	(3,960)
Other (adjustment to prior period)	-	-	-	-	-	-	-
Net book value as at 30 June 2014	365,868	1,197,470	1,563,338	548,398	4,217	31,373	2,147,326
Net book value as at 30 June 2014 represented by:							
Gross book value	365,868	2,499,362	2,865,230	1,060,351	11,713	54,639	3,991,933
Accumulated depreciation and impairment	-	(1,301,892)	(1,301,892)	(511,953)	(7,496)	(23,266)	(1,844,607)
	365,868	1,197,470	1,563,338	548,398	4,217	31,373	2,147,326

(c) Reconciliation of the opening and closing balances of Land and Buildings, Plant and Equipment and Intangibles (2014-15) - CSIRO

	Land	Buildings	Total land and buildings	Plant and equipment	Heritage and Cultural	Intangibles	Total
	$'000	$'000	$'000	$'000	$'000	$'000	$'000
As at 1 July 2014							
Gross book value	365,868	2,499,362	2,865,230	1,060,344	11,713	54,639	3,991,926
Accumulated depreciation and impairment	-	(1,301,892)	(1,301,892)	(511,952)	(7,496)	(23,266)	(1,844,606)
Net book value as at 1 July 2014	365,868	1,197,470	1,563,338	548,392	4,217	31,373	2,147,320
Additions:							
By purchase	-	77,694	77,694	112,909	-	1,787	192,390
Gain on recognition of assets included in net cost of services	-	6,722	6,722	-	-	-	6,722
Reclassification	109	4,564	4,673	(10)	-	(4,663)	-
Revaluations recognised in other comprehensive income	16,436	25,653	42,089	-	(11)	-	42,078
Impairments recognised in net cost of services	-	-	-	(529)	-	-	(529)
Depreciation expense	-	(76,104)	(76,104)	(62,817)	-	(7,120)	(146,041)
Disposals	-	(638)	(638)	(1,242)	-	-	(1,880)
Write off of assets recognised in net cost of services	-	(13,474)	(13,474)	-	-	-	(13,474)
Other (adjustment to prior period)	-	-	-	-	-	-	-
Net book value as at 30 June 2015	382,413	1,221,887	1,604,300	596,703	4,206	21,377	2,226,586
Net book value as at 30 June 2015 represented by:							
Gross book value	382,413	2,593,168	2,975,581	1,144,780	11,947	51,024	4,183,332
Accumulated depreciation and impairment	-	(1,371,281)	(1,371,281)	(548,077)	(7,741)	(29,647)	(1,956,746)
	382,413	1,221,887	1,604,300	596,703	4,206	21,377	2,226,586

(d) Reconciliation of the opening and closing balances of Land and Buildings, Plant and Equipment and Intangibles (2013-14) - CSIRO

	Land	Buildings	Total land and buildings	Plant and equipment	Heritage and Cultural	Intangibles	Total
	$'000	$'000	$'000	$'000	$'000	$'000	$'000
As at 1 July 2013							
Gross book value	378,593	2,355,250	2,733,843	1,085,026	9,062	43,491	3,871,422
Accumulated depreciation and impairment	-	(1,170,020)	(1,170,020)	(566,600)	(5,799)	(18,356)	(1,760,775)
Net book value as at 1 July 2013	378,593	1,185,230	1,563,823	518,426	3,263	25,135	2,110,647
Additions:							
By purchase	4,338	42,804	47,142	93,709	-	7,093	147,944
Reclassification	(511)	2,202	1,691	(6,242)	-	4,725	174
Revaluations recognised in other comprehensive income	(16,552)	41,389	24,837	-	954	-	25,791
Impairments recognised in net cost of services	-	(103)	(103)	-	-	-	(103)
Depreciation expense	-	(74,018)	(74,018)	(53,575)	-	(5,580)	(133,173)
Disposals	-	(34)	(34)	(3,926)	-	-	(3,960)
Other (adjustment to prior period)	-	-	-	-	-	-	-
Net book value as at 30 June 2014	365,868	1,197,470	1,563,338	548,392	4,217	31,373	2,147,320
Net book value as at 30 June 2014 represented by:							
Gross book value	365,868	2,499,362	2,865,230	1,060,344	11,713	54,639	3,991,926
Accumulated depreciation and impairment	-	(1,301,892)	(1,301,892)	(511,952)	(7,496)	(23,266)	(1,844,606)
	365,868	1,197,470	1,563,338	548,392	4,217	31,373	2,147,320

Note 15: Other non-financial assets

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Contract research work in progress - at cost	1.6	**34,273**	36,686	**34,273**	36,686
Capital prepayments		**63,689**	48,564	**63,689**	48,564
Other prepayments		**7,848**	8,176	**7,817**	8,132
Uniseed Fund Payment[1]		**10,000**	-	**10,000**	-
Total other non-financial assets		**115,810**	93,426	**115,779**	93,382

[1] CSIRO has provided $10m to be held on trust by Uniseed Management Pty Ltd for the purpose of establishing a new pre-seed and seed fund that is expected to invest in early stage technology development. Once established through 2015-16, this is expected to be reclassified as an Investment.

No indicators of impairment were identified for other non-financial assets.

All other non-financial assets are expected to be recovered in no more than 12 months.

Note 16: Suppliers

Suppliers payable expected to be settled within 12 months:				
Related parties	**2,280**	1,193	**2,280**	1,193
External parties	**109,225**	53,580	**108,259**	53,154
Total	**111,505**	54,773	**110,539**	54,347

Settlement is usually made within 30 days.

Note 17: Other payables

Accrued salaries and wages		**22,148**	23,071	**22,000**	22,699
Contract research revenue received in advance	1.6	**99,089**	96,791	**99,089**	97,691
Other revenue received in advance		**16,234**	10,559	**11,174**	10,559
Other creditors and accrued expenses		**9,406**	22,780	**8,012**	19,100
Payment to the Commonwealth		**-**	27,896	**-**	27,896
Total other payables		**146,877**	181,097	**140,275**	177,945

All other payables are expected to be settled within 12 months.

Note 18: Finance Leases

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Payable					
Within one year					
Minimum lease payments		**7,217**	8,400	**7,217**	8,400
Deduct: future finance charges		**(2,210)**	(2,471)	**(2,210)**	(2,471)
Total payable within one year (current)		**5,007**	5,929	**5,007**	5,929
In one to five years					
Minimum lease payments		**24,768**	25,020	**24,768**	25,020
Deduct: future finance charges		**(6,611)**	(7,541)	**(6,611)**	(7,541)
Total payable within one to five years		**18,157**	17,479	**18,157**	17,479
In more than five years					
Minimum lease payments		**28,033**	33,909	**28,033**	33,909
Deduct: future finance charges		**(2,472)**	(3,842)	**(2,472)**	(3,842)
Total payable in more than five years		**25,561**	30,067	**25,561**	30,067
Total finance leases recognised on the statement of financial position		**48,725**	53,475	**48,725**	53,475

Finance leases exist in relation to certain buildings and major equipment assets. The leases are non-cancellable and for fixed terms ranging from 2 to 25 years. CSIRO guarantees the residual values of all assets leased. There are no contingent rentals. The interest rate implicit in the leases averaged 5% per annum (2014: 5% per annum). The lease liabilities are secured by the lease assets.

Note 19: Deposits

Deposits represent monies held on behalf of the following third parties:				
Goyder Institute of Water Research	**4,072**	3,455	**4,072**	3,455
Others	**1,487**	1,112	**2,537**	1,112
Total deposits	**5,559**	4,567	**6,609**	4,567

All deposits are expected to be settled within the next 12 months

Note 20: Employee provisions

Annual leave	**55,788**	61,257	**55,698**	61,257
Long service leave	**130,296**	141,128	**130,296**	141,128
Severance pay	**5,434**	6,913	**5,434**	6,913
Redundancies	**9,667**	50,040	**9,667**	50,040
Total employee provisions	**201,185**	259,338	**201,095**	259,338
Employee provisions are expected to be settled in				
No more than 12 months	**47,104**	89,931	**47,104**	89,931
More than 12 months	**154,081**	169,407	**153,991**	169,407
Total employee provisions	**201,185**	259,338	**201,095**	259,338

Note 21: Cash flow reconciliation

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Reconciliation of cash and cash equivalents as per statement of financial position to cash flow statement					
Cash and cash equivalents as per Cash Flow Statement and Statement of Financial Position		**267,129**	398,173	**182,331**	295,575
Reconciliation of net cost of services to net cash from operating activities					
Net cost of services		**(779,787)**	(821,943)	**(759,515)**	(803,858)
Revenue from Government		**745,268**	778,177	**745,268**	778,177
Share of net operating surplus/(deficit) of joint venture accounted for using the equity method		**(300)**	(37)	**(300)**	(37)
Adjustments for non-cash items					
Depreciation and amortisation		**146,094**	133,174	**146,041**	133,173
Net write-down and impairment of assets		**14,791**	3,673	**14,791**	3,673
Gain on recognition of asset		**(6,722)**	-	**(6,722)**	-
(Gains)/loss from sale of property, plant and equipment		**891**	2,355	**891**	2,355
(Gains)/loss from sale of equity investments and intellectual property		**14**	14	**14**	14
Other revenue not providing cash		**300**	37	**300**	37
Movements in assets and liabilities					
Assets					
(Increase)/decrease in trade and other receivables		**3,313**	99,797	**3,519**	103,952
(Increase)/decrease in inventories		**(55)**	(18)	**(55)**	(18)
(Increase)/decrease in other non-financial assets		**(22,384)**	(40,319)	**(22,397)**	(40,275)
(Increase)/decrease in GST receivable		**(5,468)**	(925)	**(5,410)**	(1,673)
Liabilities					
Increase/(decrease) in employee liabilities		**(58,153)**	(7,600)	**(58,243)**	(7,600)
Increase/(decrease) in supplier payables		**31,871**	(7,582)	**31,318**	(7,433)
Increase/(decrease) in other payables		**(6,324)**	29	**(9,774)**	(2,714)
Increase/(decrease) in deposits-liabilities		**992**	(1,770)	**2,042**	(1,770)
Net cash from operating activities		**64,341**	137,062	**81,768**	156,003

Note 22: Contingent assets and liabilities

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Quantifiable Contingencies					
Contingent assets					
Bank guarantees received from suppliers		**57,997**	72,764	**57,997**	72,764
Total contingent assets		**57,997**	72,764	**57,997**	72,764
Contingent liabilities					
Estimated legal claims[1]		**(300)**	(400)	**(300)**	(400)
Financial guarantee for a bank loan		**-**	(294)	**-**	(294)
Total contingent liabilities		**(300)**	(694)	**(300)**	(694)
Total net contingent asset/(liability)		**57,697**	72,070	**57,697**	72,070

Depending on the materiality of risks involved with certain commercial transactions, CSIRO has requested bank guarantees where necessary to mitigate such risks, notably where substantial advance payments were made. At 30 June 2015 CSIRO was the beneficiary of bank guarantees adding to a total value of $ 57,997,000.

[1]Estimated legal claims arising from employment, motor vehicle accidents, commercial and patent disputes. The Group has denied liability and is defending the claims. The estimate is based on precedent in such cases.

Unquantifiable contingencies

CSIRO is currently involved in one legal proceeding in the US relating to CSIRO's US patent for its wireless local area network (WLAN) invention, which it owns and has licensed broadly. The proceeding is an appeal to the US Court of Appeals for the Federal Circuit from the decision of a trial court handed down in July 2014. The trial decision and appeal relate primarily to the legal question of what is the appropriate method for calculating patent damages. The damages award by the trial court in the decision that has been appealed was for USD 16 million plus interest. It is conceivable, but presently unknown, that the appeal court could remit a portion of the matter back to the trial court for further determination. It is also conceivable that any decision of the appeal court could become the subject of a further appeal. The final amount of the damages award that will be determined by the US courts is presently unknown, although it is considered unlikely to be increased from the amount awarded at trial. Accordingly, at this stage, the final revenue and costs associated with this proceeding are considered unquantifiable.

Note 23: Cooperative Research Centres (CRCs)

All CRCs have been classified as joint operations as the purpose is for the pursuit of collaborative scientific research where participants share in the scientific outcomes and outputs of the CRCs. In the event that CRC research results in a move to commercialisation, a separate legal entity is established and the CSIRO's share of the new entity is treated either as subsidiary, joint venture or associate in the Statement of Financial Position as appropriate.

CSIRO's total cash and in-kind contribution (e.g. staff and use of assets) to CRCs from its own resources was $12.5 million for the year (2014: $11.5 million). Contributions made by CSIRO are expensed as incurred and these are included in the Statement of Comprehensive Income.

No contingent liabilities were reported by the CRC's in which CSIRO is a participant.

CSIRO is a participant in the following CRCs as at 30 June 2015.

Name of CRC	Expected Termination Date
Antarctic Climate and Ecosystems CRC	30/06/19
Australian Poultry CRC	31/12/16
Australasian Invasive Animals CRC	30/06/18
Automotive Australia 2020 CRC	30/06/17
CRC for Cancer Therapeutics	30/06/20
CRC for Contaminated Assessment and Remediation of the Environment (CRC for CARE)	30/06/20
CRC for Low Carbon Living	30/06/19
CRC for Mental Health	30/06/18
CRC for Polymers	30/06/17
Deep Exploration Technologies CRC	04/02/18
National Plant Biosecurity CRC	30/06/18
Rail Manufacturing CRC	30/06/20
Remote Economic Participation CRC	30/06/17

The following CRCs have terminated and/or CSIROs participation have concluded as at 30 June 15:

Greenhouse Gas Technologies CRC	30/12/14
Pork CRC	28/02/15
Vision CRC	30/06/15
Australian Seafood CRC	30/06/15

Note 24: Monies held in trust

	2015 $'000	2014 $'000
Monies held in trust represented by cash, deposits and investments for the benefit of the Group which are not included in the Statement of Financial Position are:		
The Sir Ian McLennan Achievement for Industry Award - established to award outstanding contributions by the Group's scientists and engineers to national development.	**356**	336
The Elwood and Hannah Zimmerman Trust Fund - established to fund weevil research and the curation of the Australian National Insect Collection (ANIC) weevil collection.	**5,260**	5,184
The Schlinger Trust - established to research the taxonomy, biosystematics, general biology and biogeography of Australasian Diptera conducted by the Australian National Insect Collection.	**2,426**	2,504
Total monies held in trust as at 30 June	**8,042**	8,024

Movement summary of monies held in trust:

	McLennan $'000	Zimmerman $'000	Schlinger $'000	Total $'000
Balance as at 1 July 2014	336	5,184	2,504	8,024
Adjustments	-	2	-	2
Interest and distribution	20	431	88	539
Expenditure	-	(357)	(166)	(523)
Balance as at 30 June 2015	**356**	**5,260**	**2,426**	**8,042**

Note 25: Collections

CSIRO has a number of collections used for scientific research. These collections have been established over time and cover an extensive range of evolution and change in species. The collections are irreplaceable, bear scientific and historical value and are not reliably measurable in monetary terms. Therefore, CSIRO has not recognised them as an asset in its financial statements.

The main collections held by CSIRO are:

- Australian National Herbarium (ANH) – The ANH is one of the largest plant collections in Australia with approximately one million preserved plant specimens. It is unique among the Australian Herbaria in having a national focus for its collections, acquisition and research programs.
- Australian National Insect Collection (ANIC) – The ANIC has over 12 million specimens and is the largest research collection of Australian insects and related organisms in the world.
- Australian National Wildlife Collection (ANWC) – The ANWC, with over 200,000 specimens, holds land vertebrate collections, including the most comprehensively documented collections of Australian-New Guinean birds in the world.
- CSIRO National Fish Collection (ANFC) – The ANFC houses more than 105,000 finfish specimens representing more than 3000 species. These include Australian, Antarctica, and Indo-Pacific oceanic, inshore, estuarine and river fishes. The collection is internationally recognised for its Indo-Pacific sharks and rays and temperate and Southern Ocean species. It acts as a focal point for national and international collaboration.
- The Australian Tree Seed Collection (ATSC) – For over 40 years ATSC has been collecting, researching and supplying quality, fully documented tree seed to both domestic and overseas customers. Collections of seed are sourced from wild populations and genetically improved seed from our domestication and improvement programs.

Other collections include, but are not limited to, Australian National Algae Culture Collection (CSIRO collection of living microalgae), the Dadswell Memorial Wood Collection, the Wood-Inhabiting Fungi Collection and the Tropical Herbarium.

Note 26: Remuneration of Auditors

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$	$	**$**	$
Amounts received or due and receivable by the Group's auditors for:					
An audit of the financial statements of CSIRO and the consolidated entity[1]		**271,681**	238,800	**227,000**	226,000
Other non-audit related[1]		**41,063**	103,638	**24,596**	103,638
		312,744	342,438	**251,596**	329,638

[1] CSIRO's auditor is the Australian National Audit Office (ANAO) who has retained KPMG to assist with the assignment.
[2] These services are performed by KPMG directly and include taxation, governance services and financial reporting software.

Note 27: Remuneration of Board Members

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$	$	**$**	$
Remuneration and superannuation benefits received or due and receivable by full-time and part-time Board Members, excluding the Chief Executive Officer were:					
Board Members' remuneration		**599,865**	544,420	**599,865**	544,420
Payments to superannuation funds for Board Members		**49,166**	45,714	**49,166**	45,714
Total remuneration		**649,031**	590,134	**649,031**	590,134

The remuneration of the Chief Executive Officer, who is also a Board Member of the Group is reported under Note 28 Senior Management Personnel Remuneration. The total number of Board members that are included in the above table is 9 (2014: 9).

With effect from the 1st March 2014, the Commonwealth Remuneration Tribunal determined that the role of CSIRO Chairman would be remunerated at $130,070 per annum. The Chairman chose to maintain his remuneration at the lower level of $108,310 previously determined by the Remuneration Tribunal.

Note 28: Senior Management Personnel Remuneration

Short-term employee benefits				
Salary	**5,022,540**	7,693,211	**5,022,540**	7,693,211
Performance bonuses	**1,504,470**	2,327,239	**1,504,470**	2,327,239
Additional allowances	**310,114**	449,740	**310,114**	449,740
Total short-term employee benefits	**6,837,124**	10,470,190	**6,837,124**	10,470,190
Post-employment benefits				
Superannuation	**685,228**	1,166,007	**685,228**	1,166,007
Total post-employment benefits	**685,228**	1,166,007	**685,228**	1,166,007
Other long-term benefits				
Annual leave accrued	**383,774**	581,123	**383,774**	581,123
Long-service leave accrued	**150,032**	307,923	**150,032**	307,923
Total other long-term benefits	**533,806**	889,046	**533,806**	889,046
Termination benefits				
Termination benefits	**-**	-	**-**	-
Total termination benefits	**-**	-	**-**	-
Total	**8,056,158**	12,525,243	**8,056,158**	12,525,243

The total number of senior management personnel that are included in the above table is 22 (2014: 35).

This note has been prepared on an accrual basis for substantive and long term acting senior management personnel during the period. Comparatives have been restated in accordance with the new disclosure requirements under section 27 of the Financial Reporting Rule 2015.

Note 29: Meetings of the Board and Board Committees

During the financial year 2014-15, 8 Board meetings (1 out of session), 5 Board Audit & Risk Committee meetings and 6 Board People, Health & Safety Committee meetings (1 out of session) were held. The number of meetings attended by each of the Board members was as follows:

Board member	CSIRO Board		CSIRO Board Audit & Risk Committee		CSIRO Board People, Health & Safety Committee	
	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended
J Bennett	8	8	5	5	-	1
M S Boydell	3	3	3	3	-	1
M Clark	4	4	-	3	-	3
E J Doyle	8	7	5	5	6	5
P Høj	5	3	4	1	-	-
S In't Veld	8	7	5	4	-	2
L Marshall *	3	4	-	2	-	4
S McKeon	8	8	-	4	6	6
J H Ranck	8	8	-	2	6	6
P Riddles *	8	8	1	4	-	4
C Roy *	1	1	-	1	-	1
T H Spurling	8	8	-	2	6	6

* ***Notes***:

Dr Clark stepped down from the Chief Executive role effective 20 November 2014. She attended the December 2014 meetings as Advisor to the Board

Dr Marshall attended the December 2014 meeting as an observer

Mr Roy assumed the role of Chief Executive from 20 November 2014 to 31 December 2014

Note 29: Meetings of the Board and Board Committees – (cont)

During the financial year 2013-14, eleven Board meetings (six out of session), five Board Audit & Risk Committee meetings and five Board People, Health & Safety Committee meetings were held. The number of meetings attended by each of the Board members was as follows:

Board member	CSIRO Board		CSIRO Board Audit & Risk Committee		CSIRO Board People, Health & Safety Committee	
	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended	Number eligible to attend as a member	Number attended
J Bennett	11	11	5	5	-	3
M S Boydell	11	11	5	5	-	4
M Clark	11	10	-	5	-	4
E J Doyle	11	11	5	5	5	5
P Høj	11	9	5	3	-	-
S In't Veld	11	9	5	5	-	2
S McKeon	11	11	-	3	5	5
J H Ranck	11	11	-	1	5	4
P Riddles *	3	2	-	1	-	1
T H Spurling	11	11	-	3	5	5

Notes:

Dr Riddles was appointed on 24 April 2014.

Note 30: Related party disclosures

(a) Controlled Entities

SIEF was established under the *Science and Industry Endowment Act 1926*. The Fund is deemed to be a CSIRO controlled entity in accordance with AASB 10 *Consolidated Financial Statements* and UIG 112. The Science and Industry Endowment Fund's separate financial statements are reported in the CSIRO Annual Report.

The principal activity of the SIEF is to provide assistance to persons engaged in scientific research and in training of students in scientific research.

WLAN was established in 2005. The company is a CSIRO controlled entity in accordance with AASB 10 *Consolidated Financial Statements* and UIG 112. The principal activity is to provide services to CSIRO.

The Fundación was established in October 2013. The Fundación is a controlled entity governed by a Board in accordance with the Constitution of the Fundación. The Fundación is working with industry and leading Chilean Universities to develop cutting-edge technologies to reduce the environmental impact of mining and increase productivity.

Names	**CSIRO Investment Amount**		**% Equity Interest Held**		**Board Control**	
	2015 $	2014 $	**2015**	2014	**2015**	2014
SIEF			**100%**	100%		
WLAN	**1**	1	**100%**	100%		
Fundación					**Yes**	Yes
Total	**1**	1				

(b) Board Members

The Board Members of the Group during the financial year were:

S McKeon AO (Chairman) (term completed 27 June 2015)
E J Doyle (Deputy Chairman)
M E Clark AC (Chief Executive to 20 November 2014)
L Marshall (Chief Executive from 1 January 2015)
J Bennett
M S Boydell (term completed 25 September 2014)
P Høj (term completed 6 December 2014)
S In't Veld (Reappointed 28 June 2015)
J H Ranck
P W Riddles
T H Spurling (term completed 27 June 2015)

Remuneration – the aggregate remuneration of Board Members is disclosed in Note 28.

(c) Board Members' interest in contracts

Since 1 July 2014 no Board Member of CSIRO has received or become entitled to receive a benefit, other than a benefit included in the aggregate amount of remuneration received or due and receivable shown in Note 28 by reason of a contract made by CSIRO with the Board Member or with a firm of which the Board Member is a member or with a company in which the Board Member has a substantial financial interest.

This information relates to the period 1 July 2014 to 30 June 2015.

Note 30: Related party disclosures (cont)

(d) Other transactions of Board Members – related entities

Ms J Bennett is a non-Executive Director of Australian Farm Institute, Australian Broadcasting Corporation, Tasmanian Ports Corporation and The Van Diemen's Land Company. She is also a Director of Tasmanian Land Co and a Board Member of Nuffield Australia and Food Innovation Australia Ltd. During 2014-15 Ms Bennett ceased as a Member of the Tasmanian Food Industry Advisory Council and as a Member of the Board of the Brand Tasmania Council. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Ms M S Boydell is the Chair of the Gladstone Area Water Board to 31 December 2014 and Chairman of Yalari Limited (Executive Chairman to April 2015). Ms Boydell is a also Director of Uniquest Pty Limited, Eagle Street Associates Pty Ltd and other private companies. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Dr M Clark is a member of the STS Forum's Council, a member of the Australian Advisory Board of Bank of America Merrill Lynch and in Nov 2014 was appointed as a Director of Rio Tinto. Dr Clark is also a Director of a family company, registered 27 June 2011: Cradle Mountain Carbon Pty Ltd. ACN 151 512 220, the business purpose of which is as a vehicle to hold land for conservation. Dr Clark is a Director of a family company, registered 27 February 2007: Ballantyne Holdings Pty Ltd. ACN 008 729 002, the business purpose of which is commercial property.

During 2014-15 Dr Clark became a member of the Advisory Board for the World Economic Forum 2015 Global Risk Report and the Global Foundation Board. During 2014-15 Dr Clark ceased to be a member of: the Prime Minister's Science, Engineering and Innovation Council; the Executive Committee of the Global Research Alliance; the Advisory Board for the World Economic Forum Global Risk Report; the Global Foundation Board; the Chairman's panel of the Great Barrier Reef Foundation; the Advisory Council of the Global Foundation; the Business Council of Australia Panel on Industry Value Add; the World Economic Forum - Council for Measuring Sustainability and the National Precincts Board. At the conclusion of her term as Chief Executive, ceased as Trustee of the Science and Industry Endowment Fund and as a member of the CSIRO Board. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Dr E J Doyle is Chair of the Hunter Valley Research Foundation. She is a Non Executive Director of the GPT Group of companies, Boral Ltd, Bradken Limited, Knights Rugby League Pty Ltd and various private companies. Dr Doyle is also a Conjoint Professor at the University of Newcastle, Graduate School of Business and a member of O'Connell Street Associates. During 2014-15 Dr Doyle ceased as Chair of Hunter Founders Forum and as Non Executive Director of Newcastle Port Corporation. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Professor P Høj is President and Vice Chancellor of The University of Queensland. He is a Fellow of the Australian Academy of Technological Sciences and Engineering and a foreign member of the Danish Academy of Sciences and Letters. He is Co-Deputy Chair of Strengthened Export Controls Steering Group and member of the Q20 - established by the Government to work to maximise the benefits to Queensland of Australia's presidency of the G20. Professor Høj is also Senior Consultant to Hanban (Confucius Institute Headquarters) and an Advisory Board Member of EdX. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member

Ms S In't Veld is a Director of Asciano Limited. She is also an Advisory Council Member of SMART Infrastructure and a council member of AICD (WA), a non-Executive Director of the DUET Group and a member of the CSIRO Energy Strategic Advisory Committee. Ms In't Veld is Nominee Director for Sunsuper and Group Super (Commonwealth Bank) for Perth Airport, a non-Executive Director of Juniper Uniting Church Community. During 2014-15 she was appointed to the Queensland Government – Electricity Expert Panel which also ceased during the year. The Renewable Energy Target (RET) Review also ceased during the 2014-15 year. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Note 30: Related party disclosures (cont)

(d) Other transactions of Board Members – related entities

Dr L Marshall is Trustee of the Science and Industry Endowment Fund. Dr Marshall is also a beneficiary of Southern Cross Venture Partners Trusco Pty Ltd Third Party Trust and Southern Cross Venture Partners Management Pty Ltd Third Party Trust. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Mr S McKeon is Chair of AMP Limited, a Director of Red Dust Role Models, a Fellow of the Australian Institute of Company Directors, Chair of In2Science and a Business Events Ambassador for the Northern Territory Government.
He is also a consultant to Macquarie Group's Melbourne Office, although he retains the title of Chair, Melbourne Office. During 2014-15 he ceased as Chair of Global Poverty Project Australia Pty Ltd. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Mr J H Ranck is Chair of Elders Limited, a Director of Innotegic Pty Ltd and Iluka Resources, a member of the Sydney University Senate Committee on Risk and Safety and a fellow of the Australian Institute of Company Directors. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Dr P W Riddles is Founder and Director of ViciBio Pty Ltd, a Director of the Hear and Say Centre for Deaf Children and the National Stem Cell Foundation of Australia. Dr Riddles is also Chair of the Wound Management Innovation CRC, Griffith Enterprise Advisory Board and a Fellow of the California Technology Council. During 2014-15 Dr Riddles was appointed to the Interim Advisory Committee for the Accelerating Commercialisation Program of the Federal Government which ceased on 30 June 2015. He also ceased to be Chair of Life Sciences Queensland and a Member of the Alberta Research and Innovation Authority, Canada. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Professor T H Spurling is Professor of Innovation Studies, Centre for Transformative Innovation, Faculty of Business and Law at Swinburne University. He is also a member of the Board of the International Centre for Radio Astronomy Research, RMIT University Design Research Institute Commercial and Industrial Committee, Science and Engineering Advisory Committee of EPA Victoria, Chair of Advanced Molecular Technologies Pty Ltd and a Fellow of the Australian Academy of Technological Sciences and Engineering (ATSE). During 2014-15 he was appointed a Member of working group for Project 9 of the Australian Council of Learned Academies (ACOLA) project to prepare a paper under the title 'Translating research for economic and social benefit: country comparisons'. Professor Spurling is representing ATSE on this project. During the year he ceased to be a member of Working Group #4 of the Australian Council of Learned Academies (ACOLA) project to prepare a series of papers under the general title 'Securing Australia's Future' and ceased as Advisory Committee Member (representing the Chief Scientist of Victoria) of the Australian Institute for Teaching and School Leadership. All contracts and transactions between these entities and CSIRO are based on normal commercial terms and conditions and there is no personal benefit to the CSIRO Board Member.

Note 31: Financial instruments

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
(a) Categories of financial instruments					
Financial Assets					
Available for sale financial assets					
Investments	9	**12,601**	14,621	**12,601**	14,621
Loans and receivables					
Cash at bank		**15,398**	29,101	**9,331**	25,982
Term deposits		**251,731**	369,072	**173,000**	269,893
Receivable for goods and services	7	**43,891**	60,278	**43,985**	61,795
Other receivables	7	**20,041**	7,335	**16,569**	2,646
Carrying amount of financial assets		**343,662**	480,407	**255,486**	374,937
Financial Liabilities					
Finance lease liabilities	18	**48,725**	53,475	**48,725**	53,475
Trade creditors	16	**111,505**	54,773	**110,539**	54,347
Research revenue received in advance	17	**99,089**	96,791	**99,089**	97,691
Deposits	19	**5,559**	4,567	**6,609**	4,567
Other creditors	17	**47,788**	84,306	**41,186**	80,254
Carrying amount of financial liabilities		**312,666**	293,912	**306,148**	290,334
(b) Net income and expense from financial assets					
Cash at bank and term deposits					
Interest revenue		**12,946**	13,908	**9,707**	9,464
Net gain from financial assets		**12,946**	13,908	**9,707**	9,464
(c) Net income and expense from financial liabilities					
Finance Leases					
Interest expense		**2,535**	2,891	**2,521**	2,888
Net loss from financial liabilities		**2,535**	2,891	**2,521**	2,888

(d) Fair value of financial instruments

A comparison between the fair value and carrying amount of the Group's financial assets and liabilities is not disclosed because the Group considers that the carrying amounts reported in the Statement of Financial Position are a reasonable approximation of the fair value of these financial assets and liabilities.

Note 31: Financial instruments (cont)

(e) Credit risk

The maximum exposure to credit risk is the risk that arises from potential default of a debtor. This amount is equal to the total amount of trade and other receivables of $60.3 million (2014 $63.8 million). The Group has assessed the risk of the default on payment and has allocated $0.4 million (2014 $0.6 million) to an allowance for impairment account.

The Group manages its credit risk by undertaking background and credit checks prior to allowing a debtor relationship. In addition, the Group has policies and procedures that guide employees to apply debt recovery techniques. The Group holds no collateral to mitigate against credit risk.

Credit risk of financial instruments not past due or individually determined as impaired - Consolidated

	Notes	**Not past due nor impaired**	Not past due nor impaired	**Past due or impaired**	Past due or impaired
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Cash at bank		**15,398**	29,101	**-**	-
Term deposits		**251,731**	369,072	**-**	-
Receivables for goods and services	7	**36,986**	49,198	**6,905**	11,080
Other receivables	7	**20,041**	7,335	**-**	-
Investments	9	**12,601**	14,621	**-**	-
Total		**336,757**	469,327	**6,905**	11,080

Credit risk of financial instruments not past due or individually determined as impaired - CSIRO

	Notes	**Not past due nor impaired**	Not past due nor impaired	**Past due or impaired**	Past due or impaired
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
Cash at bank		**9,331**	25,982	**-**	-
Term deposits		**173,000**	269,593	**-**	-
Receivables for goods and services	7	**37,080**	50,722	**6,905**	11,073
Other receivables	7	**16,569**	2,646	**-**	-
Investments	9	**12,601**	14,621	**-**	-
Total		**248,581**	363,564	**6,905**	11,073

Ageing of financial assets that were past due but not impaired for 2015 - Consolidated

	0 to 30 days	**31 to 60 days**	**61 to 90 days**	**90+ days**	**Total**
	$'000	**$'000**	**$'000**	**$'000**	**$'000**
Receivables for goods and services	**4,213**	**1,529**	**564**	**599**	**6,905**
Total	**4,213**	**1,529**	**564**	**599**	**6,905**

Ageing of financial assets that were past due but not impaired for 2014 - Consolidated

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	$'000	$'000	$'000	$'000	$'000
Receivables for goods and services	9,589	997	177	317	11,080
Total	9,589	997	177	317	11,080

(e) Credit risk (cont)

Ageing of financial assets that were past due but not impaired for 2015 - CSIRO

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	$'000	$'000	$'000	$'000	$'000
Receivables for goods and services	4,213	1,529	564	599	6,905
Total	4,213	1,529	564	599	6,905

Ageing of financial assets that were past due but not impaired for 2014 - CSIRO

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	$'000	$'000	$'000	$'000	$'000
Receivables for goods and services	9,582	997	177	317	11,073
Total	9,582	997	177	317	11,073

(f) Liquidity risk

The Group's financial liabilities are payables, finance leases and other interest bearing liabilities. The exposure to liquidity risk is based on the notion that the Group will encounter difficulty in meeting its obligations associated with financial liabilities. This is highly unlikely due to Australian Government funding and internal policies and procedures put in place to ensure there are appropriate resources to meet its financial obligations.

The group manages its budgeted funds to ensure it has adequate funds to meet payments as they fall due. In addition, the Group has policies in place to ensure timely payments are made when due and has no past experience of defaults.

The following table illustrates the maturities for financial liabilities for 2015 - Consolidated

	On demand	Within 1 year	1 to 5 years	> 5 years	Total
	$'000	$'000	$'000	$'000	$'000
Finance lease liabilities (gross)	-	7,217	24,768	28,033	60,018
Trade creditors	-	111,505	-	-	111,505
Research revenue received in advance	-	99,089	-	-	99,089
Deposits	5,559	-	-	-	5,559
Other creditors	-	47,788	-	-	47,788
Total	5,559	265,599	24,768	28,033	323,959

The following table illustrates the maturities for financial liabilities for 2014 - Consolidated

	On demand	Within 1 year	1 to 5 years	> 5 years	Total
	$'000	$'000	$'000	$'000	$'000
Finance lease liabilities (gross)	-	8,400	25,020	33,909	67,329
Trade creditors	-	54,773	-	-	54,773
Research revenue received in advance	-	96,791	-	-	96,791
Deposits	4,567	-	-	-	4,567
Other creditors	-	84,306	-	-	84,306
Total	4,567	244,270	25,020	33,909	307,766

(f) Liquidity risk (cont)

The following table illustrates the maturities for financial liabilities for 2015 - CSIRO

	On demand	Within 1 year	1 to 5 years	> 5 years	Total
	$'000	**$'000**	**$'000**	**$'000**	**$'000**
Finance lease liabilities (gross)	**-**	**7,217**	**24,768**	**28,033**	**60,018**
Trade creditors	**-**	**110,539**	**-**	**-**	**110,539**
Research revenue received in advance	**-**	**99,089**	**-**	**-**	**99,089**
Deposits	**6,609**	**-**	**-**	**-**	**6,609**
Other creditors	**-**	**41,186**	**-**	**-**	**41,186**
Total	**6,609**	**258,031**	**24,768**	**28,033**	**317,441**

The following table illustrates the maturities for financial liabilities for 2014 - CSIRO

	On demand	Within 1 year	1 to 5 years	> 5 years	Total
	$'000	$'000	$'000	$'000	$'000
Finance lease liabilities (gross)	**-**	8,400	25,020	33,909	67,329
Trade creditors	-	54,347	-	-	54,347
Research revenue received in advance	-	97,691	-	-	97,691
Deposits	4,567	-	-	-	4,567
Other creditors	-	80,254	-	-	80,254
Total	4,567	240,692	25,020	33,909	304,188

(g) Market risk

The Group holds basic financial instruments that do not expose the Group to certain market risks except for equity price risk for its 'available for sale' equity investments. See Note 9.

Interest rate risk

The only interest-bearing items on the Statement of Financial Position are finance leases. They all bear interest at a fixed interest rate and will not fluctuate due to changes in the market interest rate.

Equity price risk

Equity price risk arises from changes in market prices of listed equity investments that the Group has designated as 'available for sale' financial instruments. See Note 9.

Sensitivity analysis

The Group's listed equity investments are listed on the Australian Stock Exchange (ASX). For such instruments classified as 'available for sale', a 10% increase in the ASX All Ordinary Index at the reporting date would have increased equity by $ 0.4 million (2014: $0.4 million). An equal change in the opposite direction would have decreased equity by $0.4 million (2014: $0.4 million). The analysis is performed on the same basis for 2014.

Currency risk

In accordance with Australian Government policy, the Group is prohibited from entering into foreign currency hedges.

The Group's exposure to foreign exchange risk on sales and purchases that are denominated in currencies other than the Australian dollar is not considered material. At any point in time the Group's foreign currency risk exposure is not material.

Note 32: Financial assets and liabilities reconciliation

	Notes	Consolidated		CSIRO	
		2015	2014	**2015**	2014
		$'000	$'000	**$'000**	$'000
(a) Financial assets					
Total financial assets as per Statement of Financial Position		**353,222**	484,430	**264,395**	378,067
Add: non-financial instrument components					
Impairment allowance for goods and services	7	**276**	644	**276**	644
Less: non-financial instrument components					
GST receivable from ATO		**(9,826)**	(4,358)	**(9,175)**	(3,765)
Investments accounted for using equity method	8	**(10)**	(309)	**(10)**	(309)
Total financial instrument components		**(9,560)**	(4,023)	**(8,909)**	(3,430)
Total financial assets as per financial instrument note	31(a)	**343,662**	480,407	**255,486**	374,637
(b) Financial liabilities					
Total financial liabilities as per Statement of Financial Position		**513,851**	553,250	**507,243**	549,672
Less: non-financial instrument components					
Employee provisions	21	**(201,185)**	(259,338)	**(201,095)**	(259,338)
Total non-financial instrument components		**(201,185)**	(259,338)	**(201,095)**	(259,338)
Total financial liabilities as per financial instrument note	31(a)	**312,666**	293,912	**306,148**	290,334

Note 33: Reporting of outcome

CSIRO's outputs contribute to a single outcome (Note 1.1).

Total expenses[1]	**1,262,475**	1,283,291	**1,245,312**	1,270,662
Total other own-source income	**482,388**	461,311	**485,497**	466,767
Net cost of outcome delivery	**780,087**	821,980	**759,815**	803,895

[1] Total expenses adjusted for movement in equity investment.

Note 34: Budgetary Reports and Explanations of Major Variances

Statement of Comprehensive Income

for the period ended 30 June 2015

	Consolidated		
	Actual	Budget Estimate	
		Original	Variance
	2015	**2015**	2015
	$'001	**$'000**	$'000
NET COST OF SERVICES			
Expenses			
Employee benefits	**664,584**	**716,679**	(52,095)
Suppliers	**433,012**	**403,727**	29,285
Depreciation and amortisation	**146,094**	**160,042**	(13,948)
Finance costs	**2,535**	**2,414**	121
Write-down and impairment of assets	**14,791**	**-**	14,791
Foreign exchange losses	**254**	**-**	254
Losses from asset sales	**905**	**-**	905
Total expenses	**1,262,175**	**1,282,862**	(20,687)
Own-Source Income			
Own-source revenue			
Sale of goods and rendering of services	**370,648**	**436,023**	(65,375)
Interest	**12,946**	**10,124**	2,822
Rental income	**8,633**	**4,148**	4,485
Royalties and licence fees	**60,809**	**-**	60,809
Other revenues	**22,630**	**19,224**	3,406
Total own-source revenue	**475,666**	**469,519**	6,147
Gains			
Net gain from sales of assets	**6,722**	**2,000**	4,722
Foreign exchange gains	**-**	**-**	-
Realisation of fair value gain reserve	**-**	**-**	-
Total gains	**6,722**	**2,000**	4,722
Total own-source income	**482,388**	**471,519**	10,869
Net cost of services	**(779,787)**	**(811,343)**	31,556
Revenue from Government	**745,268**	**745,268**	-
Share of net operating surplus/(deficit) of joint venture accounted for using equity method	**(300)**	**-**	(300)
Surplus on continuing operation	**744,968**	**745,268**	(300)
Surplus/(Deficit) attributable to the Australian Government	**(34,819)**	**(66,075)**	31,256
OTHER COMPREHENSIVE INCOME			
Items not subject to subsequent reclassification to net cost of services			
Increase/(decrease) in asset revaluation reserves	**42,078**	**-**	42,078
Items subject to subsequent reclassification to net cost of services			
Increase/(decrease) in other reserves	**(2,246)**	**-**	(2,246)
Total comprehensive income	**39,832**	**-**	39,832
Total comprehensive income/(loss) attributable to the Australian Government	**5,013**	**(66,075)**	71,088

Statement of Financial Position

as at 30 June 2015

	Consolidated		
	Actual	Budget Estimate	
		Original	Variance
	2015	2015	2015
	$'000	$'000	$'000
ASSETS			
Financial Assets			
Cash and cash equivalents	**267,129**	**154,810**	112,319
Trade and other receivables	**73,482**	**64,663**	8,819
Investments accounted for using the equity method	**10**	**346**	(336)
Other investments	**12,601**	**10,520**	2,081
Total financial assets	**353,222**	**230,339**	122,883
Non-Financial Assets			
Land and buildings	**1,604,300**	**1,615,817**	(11,517)
Plant and equipment	**597,147**	**580,608**	16,539
Heritage and cultural	**4,206**	**-**	4,206
Intangibles	**21,377**	**15,920**	5,457
Investment properties	**49,292**	**52,150**	(2,858)
Inventories	**1,235**	**1,162**	73
Other non-financial assets	**115,810**	**54,601**	61,209
Total non-financial assets	**2,393,367**	**2,320,258**	73,109
Properties held for sale	**5,200**	**46,583**	(41,383)
Total assets	**2,751,789**	**2,597,180**	154,609
LIABILITIES			
Payables			
Suppliers	**111,505**	**42,178**	69,327
Other payables	**146,877**	**126,294**	20,583
Total payables	**258,382**	**168,472**	89,910
Interest Bearing Liabilities			
Leases	**48,725**	**48,056**	669
Deposits	**5,559**	**6,337**	(778)
Total Interest bearing liabilities	**54,284**	**54,393**	(109)
Provisions			
Employee provisions	**201,185**	**255,874**	(54,689)
Total provisions	**201,185**	**255,874**	(54,689)
Total liabilities	**513,851**	**478,739**	35,112
Net assets	**2,237,938**	**2,118,441**	119,497
EQUITY			
Contributed equity	**270,954**	**272,520**	(1,566)
Asset revaluation reserves	**1,389,396**	**1,326,735**	62,661
Other reserves	**(745)**	**-**	(745)
Retained surplus	**578,333**	**519,186**	59,147
Total equity	**2,237,938**	**2,118,441**	119,497

Statement of Changes in Equity

for the period ended 30 June 2015

	Retained earnings			Asset revaluation reserve			Other reserves			Contributed equity/capital			Total equity		
	Actual	Budget Estimate		Actual	Budget Estimate		Actual	Budget Estimate		Actual	Budget Estimate		Actual	Budget Estimate	
		Original	Variance		Original	Variance		Original	Variance		Original	Variance		Original	Variance
	2015	**2015**	2015	**2015**	**2015**	2015	**2015**	**2015**	2015	**2015**	**2015**	2015	**2015**	**2015**	2015
	$'000	**$'000**	$'000	**$'000**	**$'000**	$'000	**$'000**	**$'000**	$'000	**$'000**	**$'000**	$'000	**$'000**	**$'000**	$'000
Opening balance	**613,152**	**585,261**	27,891	**1,347,318**	**1,321,158**	26,160	**1,501**	**-**	1,501	**268,520**	**268,520**	-	**2,230,491**	**2,174,939**	55,552
Comprehensive income															
Other comprehensive income	**-**	**-**	-	**42,078**	**-**	42,078	**(2,246)**	**-**	(2,246)	**-**	**-**	-	**39,832**	**-**	39,832
Surplus/(deficit) for the period	**(34,819)**	**(66,075)**	31,256	**-**	**-**	-	**-**	**-**	-	**-**	**-**	-	**(34,819)**	**(66,075)**	31,256
Total comprehensive income	**(34,819)**	**(66,075)**	31,256	**42,078**	**-**	42,078	**(2,246)**	**-**	(2,246)	**-**	**-**	-	**5,013**	**(66,075)**	71,088
Transactions with owners															
Distributions to owners															
Distributions to owners – other	**-**	**-**	-	**-**	**5,577**	(5,577)	**-**	**-**	-	**-**	**4,000**	(4,000)	**-**	**9,577**	(9,577)
Contributions by owners			-	**-**											
Equity injection	**-**	**-**	-	**-**	**-**	-	**-**	**-**	-	**2,326**	**-**	2,326	**2,326**	**9,577**	(7,251)
Payment to the Commonwealth	**-**	**-**	-	**-**	**-**	-	**-**	**-**	-	**-**	**-**	-	**-**	**-**	-
Contributions by owners – other	**-**	**-**	-	**-**	**-**	-	**-**	**-**	-	**108**	**-**	108	**108**	**-**	108
Closing balance	**578,333**	**519,186**	59,147	**1,389,396**	**1,326,735**	62,661	**(745)**	**-**	(745)	**270,954**	**272,520**	(1,566)	**2,237,938**	**2,128,018**	109,920

Cash Flow Statement

for the period ended 30 June 2015

	Consolidated		
	Actual	Budget Estimate	
		Original	Variance
	2015	**2015**	2015
	$'000	**$'000**	$'000
OPERATING ACTIVITIES			
Cash received			
Receipts from Government	**745,268**	**745,268**	-
Goods and services	**500,703**	**444,916**	55,787
Interest	**12,140**	**11,075**	1,065
Net GST received	**8,913**	**54,487**	(45,574)
Other	**-**	**12,438**	(12,438)
Total cash received	**1,267,024**	**1,268,184**	(1,160)
Cash used			
Employees	**724,123**	**754,982**	(30,859)
Suppliers	**468,036**	**423,308**	44,728
Finance costs	**2,535**	**2,414**	121
Deposits	**7,989**	**-**	7,989
Net GST paid	**-**	**55,028**	(55,028)
Total cash used	**1,202,683**	**1,235,732**	(33,049)
Net cash from operating activities	**64,341**	**32,452**	31,889
INVESTING ACTIVITIES			
Cash received			
Proceeds from sales of property, plant and equipment	**3,294**	**2,000**	1,294
Proceeds from sales of equity investments and intellectual property	**1,108**	**-**	1,108
Total cash received	**4,402**	**2,000**	2,402
Cash used			
Purchase of property, plant and equipment	**167,647**	**202,669**	(35,022)
Equity investments	**1,343**	**-**	1,343
Other selling costs	**477**	**-**	477
Total cash used	**169,467**	**202,669**	(33,202)
Net cash from (used by) investing activities	**(165,065)**	**(200,669)**	35,604
FINANCING ACTIVITIES			
Cash received			
Contributed equity	**2,326**	**-**	2,326
Other	**-**	**4,000**	(4,000)
Total cash received	**2,326**	**4,000**	(1,674)
Cash used			
Payment to the Commonwealth	**27,896**	**-**	27,896
Other cash used	**4,750**	**4,732**	18
Total cash used	**32,646**	**4,732**	27,914
Net cash from financing activities	**(30,320)**	**(732)**	(29,588)
Net increase (decrease) in cash held	**(131,044)**	**(168,949)**	37,905
Cash and cash equivalents at the beginning of the reporting period	**398,173**	**323,759**	74,414
Cash and cash equivalents at the end of the reporting period	**267,129**	**154,810**	112,319

34.2 Major Budget Variances for 2015

CSIRO prepared the 2014-15 Budget on the basis of proposed allocation of resources determined at that time. The full year outcome resulted in lower than budgeted revenue for the year and reduced employee expenditure. In addition, there are a number of revenue and expenditure items that could not be foreseen in the Budget which are reflected in the 30 June 2015 actual results namely: (a) some budgeted redundancy costs were provisioned in 2013-14 and reduced the reported employee benefits; (b) the impact of the actuarial revaluation of employee provisions increased employee expenses; and (c) an independent revaluation of land and buildings resulted in movements within the Income Statement, as well as impacts to the non-financial assets and asset revaluation reserves on the balance sheet. The budget is not audited.

Explanations of major variances	Affected line items (and statement)
The number of exits through redundancy and the average cost of actual redundancies were lower than the budget estimates. Underlying employee salary/contractor costs were lower than budget reflecting differences arising in the actual phasing of staff exits (through attrition and redundancy) and a revised average salary cost across the organisation as compared with the historical profile on which the budget was based. Slightly offsetting these reductions was expenditure incurred due to movements in the long-term bond rate impacting leave entitlements which could not be foreseen at the time of the budget.	Employee benefits
There was no budget attributed to *Write-down and impairment of assets* as this could not be foreseen when developing the budget. Costs incurred relate to assets that have been withdrawn due to not meeting the asset recognition criteria.	Write-down and impairment of assets
IP revenues were budgeted within *Sale of goods and rendering of services* revenue but were reported separately in *Royalties and licence fees*. Actual *Royalties and licence fees* were higher than expected due to additional licensing not foreseen in the budget offset by *Sale of goods and rendering of services revenue* which were below budget.	Sale of goods and rendering of services, Royalties and Licence fees
The cash balance at 30 June 2015 was higher than budget due in part to variances arising during the year including lower employee cash payments and an underspend in the purchase of property plant and equipment, offset by The *Payment to the Commonwealth* which was included in the 2013-14 budget but paid in 2014-15. This delayed payment, along with delayed capital expenditure and a high deferred revenue balance, caused the Cash and Cash equivalents opening balance to be $74m above budget.	Cash and cash equivalents
In line with commercial objectives in its 2015-20 Strategy, CSIRO has provided funds of $10m to Uniseed Management Pty Ltd for the purpose of establishing a new pre-seed and seed fund that is expected to invest in early stage technology development. This, as well as a prepayment for ACT site consolidation, were not forecast in the budget.	Other non-financial assets
CSIRO's budget reflected that the land at it's Highett site would be held for sale. However, although CSIRO is proceeding with appropriate preparation, the criteria for recognising Highett as an asset held-for-sale at 30 June 2015 were not met and it was instead categorised as *Land and buildings*.	Properties held for sale
The increase above budget in *Suppliers payable* as at 30 June 2015 reflects in part, decisions to start implementing specific initiatives supporting CSIRO's 2015-20 Strategy that were not foreseen at the time of the Budget. CSIRO also reported a higher value of contracts being confirmed towards the end of the financial year with payment terms due in early 2015-16 than had been budgeted based on historical trends.	Payables - Suppliers
The salary accrual was budgeted in *Employee provisions* but reported in *Other payables*. The other contributing factors to the variance in *Employee provisions* are the lower end of year staff numbers than previously anticipated, the impact of the delayed Enterprise Bargaining Agreement, and the changing leave profile of the organisation as compared with the historical profile on which the budget was based.	Employee provisions, Other payables

Part 5 | Appendices

CSIRO Energy Centre roof top wind turbine.

Appendix 1: Service Charter

CSIRO's Service Charter describes the standards of service we aim to deliver to our customers and our commitment to ensuring that these standards are maintained.

In summary:

- we believe our customers and partners are essential to our success
- we maintain relevance in our work through input from the public, government, industry and the research community
- we communicate with our customers in a courteous, helpful and professional manner
- we respect our customers' confidentiality
- we evaluate our services to ensure the highest standards.

Our full Service Charter is available on our website: www.csiro.au/Service-Charter

CSIRO welcomes your feedback on our performance. Please contact the CSIRO officer with whom you have been dealing or CSIRO Enquiries who can direct your feedback to the relevant person.

CSIRO Enquiries
Bag 10, Clayton South, VIC 3169
t 1300 363 400
+61 3 9545 2176
e csiroenquiries@csiro.au

Appendix 2: Administrative law

FREEDOM OF INFORMATION

The *Freedom of Information Act 1982* (FOI Act) provides the public with a general right of access to documents held by Australian Government agencies including CSIRO. The general right is limited by exceptions to protect essential public interests or the privacy or business affairs of those who give information to the agency. In the reporting year to 30 June 2015, CSIRO received 25 requests for information under the FOI Act.

The following information is provided in compliance with section 8 of the FOI Act:

- the functions and powers of CSIRO are set out on page 82.
- information about CSIRO's procedures for external consultation can be found at www.csiro.au/Consultation-Arrangements
- CSIRO holds the following categories of documents:
  - corporate records including documents relating to government, policy, finance, personnel, business development, commercialisation, communication, real property, intellectual property and education
  - business unit records including documents relating to scientific research and technology transfer
- members of the public may obtain access to scientific and technical publications from CSIRO PUBLISHING (www.publish.csiro.au) and the ePublish repository (https://publications.csiro.au). CSIRO administrative manuals are available from the FOI Officer.

Part V of the FOI Act confers a right to request CSIRO to amend a document to which lawful access has been granted, where the applicant claims that information in the document:

- relates to his or her personal affairs
- is incomplete, incorrect, out-of-date or misleading
- has been used, is being used, or is available for use by the agency or Minister for an administrative purpose.

In the reporting year to 30 June 2015, CSIRO received no requests for amendments of personal information under the FOI Act.

INFORMATION PUBLICATION SCHEME

CSIRO is required to publish information to the public as part of the Information Publication Scheme (IPS). This requirement is in Part II of the FOI Act and has replaced the former requirement to publish a section 8 statement in an annual report. CSIRO displays on its website a plan showing what information it publishes in accordance with the IPS requirements.

ARCHIVES, PRIVACY AND ADMINISTRATIVE DECISIONS

CSIRO maintains an archives collection which includes records dating from the establishment in 1926 of the Council for Science and Industrial Research, the predecessor of CSIRO. Certain CSIRO records are held by Australian Archives. Disposal arrangements for CSIRO records are made in accordance with the provisions of the *Archives Act 1983*. Access to records over 20 years old is provided in accordance with that Act.

The *Privacy Act 1988* provides for Information Privacy Principles and National Privacy Principles. During 2014–2015, the Office of the Australian Information Commissioner undertook one investigation under section 36 of the *Privacy Act 1988* in relation to CSIRO.

The *Administrative Decisions (Judicial Review) Act 1977* (ADJR Act) enables a person aggrieved by certain classes of administrative decisions made by Australian Government agencies, including CSIRO, to obtain reasons for or to challenge those decisions. During 2014–15, CSIRO received no challenges or requests for statements of reasons under the ADJR Act.

CONTACT

All enquiries under the above legislation (including FOI requests) should be directed to:

FOI and Privacy Officer
CSIRO, PO Box 225
Campbell ACT 2602

t +61 2 6276 6123
f +61 2 6276 6437
e beth.maloney@csiro.au

PUBLIC INTEREST DISCLOSURE

The *Public Interest Disclosure Act 2013* (PID Act) came into effect on 15 January 2014. Internal procedures have been developed and implemented to enable compliance through a Public Interest Disclosure (PID) Scheme. The PID Scheme promotes integrity and accountability by encouraging the disclosure of information about suspected wrongdoing, protecting people who make disclosures and ensuring CSIRO takes appropriate action. CSIRO has contributed to the Commonwealth Ombudsman's Annual Report on the PID, as required in Section 76(3) of the PID Act. In 2015 CSIRO reported three new disclosures.

Appendix 3: Consultancy services

CSIRO engages consultants where it lacks specialist expertise or when independent research, review or assessment is required. Consultants are typically engaged to investigate or diagnose a defined issue or problem, carry out defined reviews or evaluations, or provide independent advice, information or creative solutions to assist in the CSIRO's decision-making.

Prior to engaging consultants, CSIRO takes into account the skills and resources required for the task, the skills available internally and the cost-effectiveness of engaging external expertise. The decision to engage a consultant is made in accordance with the Commonwealth Procurement Rules (CPRs), CSIRO's procurement policy and other relevant internal policies.

CSIRO's policy on selection and engagement of consultants is based on the principles of:

- value for money
- open and effective competition
- ethics and fair dealing
- accountability and reporting
- national competitiveness and industry development
- support for other Australian Government policies.

These principles are included within CSIRO's Procurement Policy and Procedures.

Tables 5.1, 5.2 and 5.3 summarise the consultancies let and the annual spend, the reason for the consultancy and the procurement method. All values include goods and services tax.

TABLE 5.1: ANNUAL SPEND ON CONSULTANCIES

YEAR	SPENT $	LET $ (ESTIMATED WHOLE OF LIFE)
2014–15	630,870	737,617
2013–14	5,294,552	5,796,633
2012–13	1,104,000	1,417,754
2011–12	1,621,697	1,096,277
2010–11	1,845,670	1,917,497
TOTAL	**10,496,789**	**10,965,778**

TABLE 5.2: SUMMARY BY REASON CODE

CATEGORY CODE	REASON FOR CONSULTANCY	NUMBER OF CONSULTANCIES	VALUE $
IS	Need for independent study/evaluation	12	495,847
PA	Need for professional assistance to manage and facilitate change and its consequence	2	161,000
SS	Specialist skills were not otherwise available	3	80,770
TOTAL		**17**	**737,617**

TABLE 5.3: SUMMARY BY PROCUREMENT METHOD CODE

CATEGORY CODE	PROCUREMENT METHOD	NUMBER OF CONSULTANCIES	VALUE $
OT	Tenders sought from the market place through Open Approach (Request for Proposal, Request for Tender, Expressions of Interest).	0	0
PM	An existing panel member – this category includes standing offers, common use arrangements and approved supplier panels.	8	301,851
ST	Tenders being sought from suppliers who have pre-qualified through some form of previous competitive process.	0	0
RQ	Purchasing was undertaken in accordance with Division 1 of the CPRs and procurement did not require application of Division 2 of the CPRs.	4	435,766
EX	Exemption applied that saw CSIRO undertake the procurement as a Limited Tender as defined in Division 2 of the CPRs.	5	0
TOTAL		**17**	**737,617**

Appendix 4: Science and Industry Endowment Fund Annual Report 2014–15

TRUSTEE'S REPORT

Having recently started as the Trustee to SIEF, I have been very impressed with the array of research in which the fund has invested since the fund was rejuvenated by a Gift from CSIRO, as a result of the fast WLAN patent litigation in 2009. The range and depth of research the fund is supporting is extraordinary and exciting for the future of Australian innovation.

Over the last year, SIEF-funded programs have included research into sustainable resource use, research that fast-tracks solutions to national challenges and scholarships that create and sustain young researchers to solve our country's greatest challenges. Research on these national challenges is aimed at assisting Australian industry, furthering the interests of the Australian community or contributing to the achievement of Australian national objectives. Collaboration with organisations capable of working together on solutions for national challenges is also a key objective, which leads me to share some of this year's highlights from the Fund.

Supporting research infrastructure collaborations

Funding through SIEF has supported Australian research partners to develop purpose-built facilities to both engage with industry with an innovation focus, and foster integrative and collaborative work by sharing joint access.

Both the Canberra-based National Agriculture and Environmental Sciences Precinct (NAESP) and the Clayton-based Biomedical Materials Translational Facility (BMTF) were launched in the last year.

A collaboration between Monash University and CSIRO, the Clayton-based BMTF will develop as a biomedical manufacturing centre for Australia. This is a major partnership, which will build on Australia's global competitiveness. The innovation led by the BMTF will foster rapid progress in materials and biomedical sciences and assist in commercialising the next generation of medical devices diagnostics and cell therapies.

The BMTF will be a focal point to draw in, engage and stimulate industry, with 20 emerging industry players involved. Within Australia's med-tech sector there are a range of highly innovative companies with high growth potential. The BMTF's focus on translating biomedical materials research provides these companies with a means to proactively engage earlier in the research and design process.

The NAESP, a collaboration between CSIRO and ANU, will bring transformative changes leveraging a base to conduct outstanding research and innovation essential to food security and environmental stewardship in the face of climate change, population growth and land degradation. It will link with partners in the ACT and will continue to build on its already strong links with Australian and global life sciences companies.

(L-R) Anatomics CEO Andrew Batty, Minister Ian Macfarlane, Chief Executive Dr Megan Clark, Manufacturing Flagship Director Dr Keith McLean and Monash University Vice-Provost Professor Ian Smith at the SIEF funding announcement.

Supporting the next generation

I passionately support the creation of scientific capability in the next generation of Australian researchers, innovators and entrepreneurs to address national challenges. A focus of SIEF is to help advance our early career scientists by readying them for the changing global research environment. One of my first actions as Trustee was to ensure selection criteria for the current round of Postdoctoral Fellowship applications included whether the project challenges the boundaries of knowledge and/or has potential for disruptive innovation. This is important as the major emerging national and global challenges require radically new thinking.

In November 2014, SIEF supported the Australian Academy of Science to send 15 outstanding young Australian researchers to the Lindau Nobel Laureate meeting in Germany. With a focus on physiology and medicine, 37 Nobel Laureates met with 600 young scientists from across the international community to share their knowledge and establish new contacts. Discussion centred on topics such as global health, the latest findings in cancer and AIDS research, the challenges in immunology and future research approaches to medicine. This annual meeting is a unique and inspirational opportunity for Australian early career researchers to interact both with their international peers as well as the best of the global research community.

A big drawcard for Australia occurred this year when the Australian Academy of Science hosted an 'Australian International Day' highlighting Australian science, innovation, technology, education, food and wine. Australia's Minister for Trade and Investment opened the event followed by Australian produce and music, and presentations from Australian scientists.

Supporting world-leading innovation

An exciting research project has the potential to position Australia at the forefront of rapidly developing technology in the global market. The SIEF-funded AeroEngine Project takes a complex aero engine, made up of 23 different components, and aims to demonstrate that it is possible to fabricate all the components using additive manufacturing processes, for example 3D printing. These 'waste-free' technologies will also fast-track the sustainability of Australia's titanium mineral resource.

This project brings together Australia's leading materials, additive manufacturing research and design capabilities, alongside industries across the materials and aerospace supply chain. This activity is strongly supported by end-users, so the outcome of the research will be meaningful and add significant value to commercial products, while being educational and demonstrating the innovation that can be achieved. The outstanding research and technical capabilities from three research partner organisations – Monash University, CSIRO, and Deakin University – with end users MicroTurbo, span in-depth metallurgy knowledge, process modelling and a variety of additive manufacturing technologies. Recently, an additional Australian small manufacturing in the 3D printing domain (Amaero) formally joined the collaboration.

The success of this project will position Australia at the forefront of this new technology and make Australia one of the lead contenders in additive manufacturing in the global market. A demonstrator model has already been widely acclaimed at a number of international airshows, including the Avalon Airshow and the French Airshow.

3D print of a small jet engine. Image: Monash University

SIEF Advisory bodies

I have been astounded by the level of support provided to the Trustee by the Fund's advisory bodies. Without the invaluable insight and recommendations provided by these esteemed members, on a *pro bono* basis, my role as SIEF Trustee would be truly challenging.

Advisory Council

Prof Alan Robson (Chair)
Prof Tom Spurling
Dr Ezio Rizzardo
Prof Margaret Sheil
Mr Nigel Poole

Expert Panel

Prof Tom Spurling (Chair)
Dr Ezio Rizzardo
Dr Oliver Mayo
Prof Elaine Sadler
Dr Trevor Powell

Undergraduate Degree Panel

Prof Margaret Sheil (Chair)
Prof David Symington
Dr Terry Lyons

In addition to the advisory bodies, a large number of reviewers have generously contributed their time and expertise, for which I am very grateful.

SIEF's measure of success comes from the success of others, and in that regard, with the world-leading science that is being conducted and continues to be supported under this Fund; I can say that it is a privilege to be the SIEF Trustee overseeing the innovative research leading the way in tackling the nation's challenges.

Dr Larry Marshall
Trustee SIEF

Australian National
Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Trustee of the Science and Industry Endowment Fund

I have audited the accompanying annual financial statements of the Science and Industry Endowment Fund for the year ended 30 June 2015, which comprises:

- Statement by the Trustee and Chief Finance Officer of CSIRO as Service Provider to the Science and Industry Endowment Fund;
- Statement of Comprehensive Income;
- Statement of Financial Position;
- Statement of Changes in Equity;
- Cash Flow Statement; and
- Notes to and forming part of the financial report including a Summary of Significant Accounting Policies.

Trustee's Responsibility for the Financial Statements

The Trustee of the Science and Industry Endowment Fund is responsible for the preparation and fair presentation of annual financial statements that comply with Australian Accounting Standards (including Australian Accounting Interpretations). The Trustee is also responsible for such internal control as is necessary to enable the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. I have conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These auditing standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and the

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reasonableness of accounting estimates made by the Trustee of the entity, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting my audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

Opinion

In my opinion, the financial statements of the Science and Industry Endowment Fund:

(a) comply with Australian Accounting Standards, including the Australian Accounting Interpretations; and

(b) present fairly the financial position of the Science and Industry Endowment Fund as at 30 June 2015 and its financial performance and cash flows for the year then ended.

Australian National Audit Office

Brandon Jarrett
Executive Director

Delegate of the Auditor-General

Canberra
17 August 2015

SCIENCE AND INDUSTRY ENDOWMENT FUND

STATEMENT BY TRUSTEE AND CHIEF FINANCE OFFICER OF CSIRO AS SERVICE PROVIDER TO THE SCIENCE AND INDUSTRY ENDOWMENT FUND

In our opinion, the attached financial report for the year ended 30 June 2015 has been prepared based on properly maintained financial records and in accordance with Australian Accounting Standards and other mandatory financial reporting requirements in Australia, and give a true and fair view of the financial position of the Science and Industry Endowment Fund as at 30 June 2015 and of its performance for the year then ended.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Science and Industry Endowment Fund will be able to pay its debts as and when they become due and payable.

Larry Marshall

Trustee of the Science and Industry Endowment Fund

17 August 2015

Hazel Bennett

Chief Finance Officer of CSIRO as service provider to the Science and Industry Endowment Fund

17 August 2015

SCIENCE AND INDUSTRY ENDOWMENT FUND
STATEMENT OF COMPREHENSIVE INCOME
For the period ended 30 June 2015

	Notes	2015 $	2014 $
EXPENSES			
Scientific research grants	5	23,771,122	23,162,983
Service fee under Services Agreement with CSIRO		309,047	474,318
Audit fees		9,600	7,900
Advertising and approval fees	6	5,400	5,226
Other fees		63	64
Total expenses		**24,095,232**	**23,650,491**
LESS:			
REVENUE			
Scientific grant program refunds		3,732	22 963
Interest		3,239,016	4,442,879
Resources received free of charge	6	5,400	5,226
Total revenue		**3,248,148**	**4,471,068**
Net deficit		**(20,847,084)**	**(19,179,423)**
Other comprehensive income		-	-
Total comprehensive loss		**(20,847,084)**	**(19,179,423)**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
STATEMENT OF FINANCIAL POSITION
For the period ended 30 June 2015

	Notes	2015	2014
		$	$
ASSETS			
Cash	7	80,624,791	102,505,972
Interest receivable	8	747,456	742,562
GST receivable		601,407	576,643
Other receivables	8	-	19 184
TOTAL ASSETS		**81,973,654**	**103,844,361**
LIABILITIES			
Payables			
Grants payable		939,796	1,947,492
Other creditors		103,641	-
Accrued expenses	9	36,315	155,883
Total payables		**1,079,752**	**2,103,375**
TOTAL LIABILITIES		**1,079,752**	**2,103,375**
NET ASSETS		**80,893,902**	**101,740,986**
EQUITY			
Contributed equity		200,000	200,000
Retained surplus		80,693,902	101,540,986
TOTAL EQUITY		**80,893,902**	**101,740,986**

SCIENCE AND INDUSTRY ENDOWMENT FUND

STATEMENT OF CHANGES IN EQUITY

For the period ended 30 June 2015

	Retained Surplus		Contributed Equity		Total Equity	
	2015	**2014**	**2015**	**2014**	**2015**	**2014**
	$	**$**	**$**	**$**	**$**	**$**
Balance as at 1 July	**101,540,986**	120,720,409	**200,000**	200,000	**101,740,986**	120,920,409
Net deficit	**(20,847,084)**	(19,179,423)	-	-	**(20,847,084)**	(19,179,423)
Closing Balance as at 30 June	**80,693,902**	101,540,986	**200 000**	200,000	**80,893,902**	101,740,986

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
CASH FLOW STATEMENT
For the period ended 30 June 2015

	Notes	2015 $	2014 $
OPERATING ACTIVITIES			
Cash received			
Scientific research grant refunds		22,915	3 780
Interest received		3,234,122	5,138,553
Net GST received		2,379,153	3,165,145
Total cash received		**5,636,190**	**8,307,478**
Cash used			
Payments to grantees		27,048,088	26,872,028
Other payments		469,220	541,845
Bank fees paid		63	62
Total cash used		**27,517,371**	**27,413,935**
Net cash provided/(used) by operating activities	10	**(21,881,181)**	**(19,106,457)**
Net increase/(decrease) in cash held		(21,881,181)	(19,106,457)
Cash at the beginning of the reporting period		102,505,972	102,505,972
Cash at the end of the reporting period		**80,624,791**	**102,505,972**

SCIENCE AND INDUSTRY ENDOWMENT FUND
NOTES TO AND FORMING PART OF THE FINANCIAL REPORT
For the period ended 30 June 2015

Note 1 Summary of Significant Accounting Policies

1.1 Principal Activity

The Science and Industry Endowment Fund (referred to as the Fund) was established under the *Science and Industry Endowment Act 1926* with the Trustee of the Fund being the CSIRO Chief Executive and is a not-for-profit entity. An appropriation of 100 000 pounds was received at the time the Fund was established. The principal activity of the Fund is to provide assistance to persons engaged in scientific research and in the training of students in scientific research.

Gift made in October 2009
In October 2009, Senator Kim Carr as Minister for Innovation, Industry, Science and Research announced a gift of $150 million to be donated by CSIRO to the Fund. The gift is intended to be used for scientific research for the purposes of assisting Australian industry, furthering the interests of the Australian community or contributing to the achievement of Australian national objectives. The gift was made subject to the terms of a Deed of Gift between the Trustee and CSIRO dated 15 October 2009. The maximum amount to be disbursed from the Gift Fund in any one financial year does not exceed $25 million (GST exclusive). The total cash payments made in 2014-15 under the Deed of Gift was $24,993,040.

1.2 Basis of Preparation of the Financial Statements

The financial statements for the Fund are general purpose financial statements and are required by section 10 of the *Science and Industry Endowment Act 1926* and has been prepared in accordance with Australian Accounting Standards, Australian Accounting Interpretations, and other authoritative pronouncements of the Australian Accounting Standards Board.

The financial statements have been prepared on an accrual basis and is in accordance with the historical cost convention. No allowance is made for the effect of changing prices on the results or the financial position.

Assets and liabilities are recognised in the Statement of Financial Position when, and only when, it is probable that future economic benefits will flow and the amounts of the assets or liabilities can be reliably measured.

Revenues and expenses are recognised in the Statement of Comprehensive Income when, and only when, the flow or consumption or loss of economic benefits has occurred and can be reliably measured.

The financial report is presented in Australian Dollars and values are rounded to the nearest dollar unless otherwise specified.

1.3 Significant Accounting Judgements and Estimates and New Accounting Standards

No accounting assumptions or estimates have been identified that have a significant impact on the amounts recorded in the financial statements.

The Fund has reviewed new standards, revised standards and interpretations/amending standards issued prior to the signing of the financial statements and considers that none of these have had a material impact. There are no new or revised pronouncements issued by the Australian Accounting Standards Board prior to the finalisation of financial statements that are expected to have a material financial impact on the Fund in future reporting periods.

1.4 Cash

Cash and cash equivalents includes cash on hand and demand deposits in bank accounts with an original maturity of six months or less that are readily convertible to known amounts of cash and subject to insignificant risk of change in value. Cash is recognised at its nominal amount.

1.5 Revenue

Interest revenue is recognised using the effective interest method as set out in AASB 139 *Financial Instruments: Recognition and Measurement.*

1.6 Resources Received Free of Charge

Services received free of charge are recognised as gains when and only when a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

1.7 Financial Instruments

Accounting policies for financial instruments are stated in Note 11.

1.8 **Taxation**

The Fund is exempted from all forms of taxation except the GST.

1.9 **Grant Payments**

Scientific research grants are normally paid inclusive of the GST.

Note 2 Events After the Reporting Period

At the time of completion of this note, the Trustee is not aware of any significant events occurring after the reporting date that could impact on the financial report.

Note 3 Schedule of Commitments

	2015	2014
	$	$
BY TYPE		
Grants Payable	47,313,739	44,712,930
GST Receivable	(4,281,613)	(4,024,812)
Total net commitments by type	**43,032,126**	**40,688,118**
BY MATURITY		
Grant Commitments Payable		
One year or less	18,529,980	20,635,383
From one to five years	28,783,759	23,994,167
More than five years	-	83,380
Total grants payable	**47,313,739**	**44,712,930**
GST Commitments Receivable		
One year to less	(1,673,635)	(1,862,126)
From one to five years	(2,607,978)	(2,155,106)
More than five years	-	(7,580)
Total Commitments receivable	**(4,281,613)**	**(4,024,812)**
Net Commitments by maturity	**43,032,126**	**40,688,118**

Note: Commitments payable are GST inclusive. Last year they were reported as GST exclusive. The comparative figures have been restated to show GST inclusive figures.

Note 4 Contingent Assets and Liabilities

No contingent assets and liabilities existed as at 30 June 2015 (2014: nil).

Note 5 Scientific research grants

	2015	2014
	$	$
CREST Program awards	26,515	38,366
Macquarie University joint chair in Wireless Communication	266,593	256,339
Scholarships and Fellowships	2,501,755	1,657,800
Research Infrastructure Investment	5,885,000	200,000
Special Research Program	3,600,000	6,400,000
Research Project Grants	11,491,259	14,610,478
Total	**23,771,122**	**23,162,983**

The Fund is a subsidiary entity of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). For the 2014-15 financial year, the Fund has recognised $9.0m in grant expenses as transferred directly to CSIRO to support scientific research and infrastructure projects within CSIRO and/or collaborative projects with external organisations (2013-14: $13.0m).

Note 6 Estimated value of resources provided free of charge by CSIRO are as follows:

Advertising and approval fees	5,400	5,226
Total	**5,400**	**5,226**

Note 7 Cash

Cash at bank	1,893,620	3,026,514
Deposits – at call	78,731,171	99,479,458
Total	**80,624,791**	**102,505,972**

Note 8 Receivables

Interest receivable	747,456	742,562
Other receivables	-	19,184
Total	**747,456**	**761,746**
Gross receivables are aged as follows:		
Not overdue	747,456	761,079
Overdue by:		
0 to 30 days	-	667
Total receivables (gross)	**747,456**	**761,746**

Note 9 Accrued Expenses

Service fee under Services Agreement with CSIRO	-	109,617
CREST Program awards	26,715	38,366
Audit fee	9,600	7,900
Total	**36,315**	**155,883**

Note 10	Cash Flow Reconciliation	2015	2014
		$	$
	Reconciliation of operating surplus to net cash from/(used by) operating activities:		
	Operating surplus/(deficit)	(20,847,084)	(19,179,423)
	Changes in assets and liabilities		
	(Increase)/decrease in receivables	(10,474)	1,450,115
	Increase/(decrease) in payables	(1,023,623)	(1,377,149)
	Net cash from/(used by) operating activities	**(21,881,181)**	**(19,106,457)**

Note 11 Financial Instruments

The Fund's financial assets are cash and interest receivable on cash. The net value is equivalent to the carrying amount. Financial liabilities are supplier and grant payables. Due to the nature of SIEFs operations and its large cash holdings it is not exposed to credit risk, liquidity risk or market risk.

Interest rate risk

The Fund maintains an operating bank account and short term deposits which are subject to short term interest rates. Funds are maintained in term deposits for short periods. In 2014–15 the average return on cash and short term deposits was 3.43% (2014: 3.98%).

Appendix 5: Full list of CSIRO locations

At 30 June 2015, CSIRO had 55 locations across Australia and overseas.

AUSTRALIAN CAPITAL TERRITORY

- Acton
- Black Mountain
- Campbell
- Crace
- Ginninderra
- Tidbinbilla
- Yarralumla

QUEENSLAND

- Atherton
- Bribie Island
- Brisbane
  - Coopers Plains
  - Dutton Park
  - Herston
  - Pullenvale
  - St Lucia
- Cairns
- Gatton
- Toowoomba
- Townsville
  - Townsville Australian Tropical Science and Innovation Precinct
  - Woodstock

NEW SOUTH WALES

- Armidale Chiswick
- Griffith
- Mopra
- Myall Vale
- Narrabri
- Newcastle
- Parkes
- Sydney
  - Lindfield
  - Lucas Heights
  - Marsfield
  - North Ryde

NORTHERN TERRITORY

- Alice Springs
- Darwin

SOUTH AUSTRALIA

- Adelaide
  - Kintore Avenue
  - South Australian Health and Medical Research Institute
  - Waite Campus

TASMANIA

- Hobart
- Sandy Bay

VICTORIA

- Geelong
  - Australian Animal Health Laboratory
  - Belmont
  - Waurn Ponds
- Irymple
- Melbourne
  - Aspendale
  - Clayton
  - Highett
  - Parkville
- Werribee
  - Sneydes Road
  - South Road
- Wodonga

WESTERN AUSTRALIA

- Geraldton
- Murchison
- Perth
  - Floreat
  - Kensington
  - Waterford

INTERNATIONAL

- France
  - Montpellier
- Chile
  - Santiago

Part 6 | Indexes

CSIRO's Opticool interface displayed within a building's plant room. The system intelligently alters the operation of a building's HVAC control system according to settings for cost savings, occupant comfort and energy efficiency.

Acronyms

AAHL	Australian Animal Health Laboratory
AAMC	Australian Advanced Manufacturing Council
ADJR Act	*Administrative Decisions (Judicial Review) Act 1977*
AGP	Australian Growth Partnership
ALA	Atlas of Living Australia
ANACC	Australian National Algae Culture Collection
ANFC	Australian National Fish Collection
ANH	Australian National Herbarium
ANIC	Australian National Insect Collection
ANU	Australian National University
ANWC	Australian National Wildlife Collection
APS	Australian Public Service
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASKAP	Australian Square Kilometre Array Pathfinder
ATNF	Australia Telescope National Facility
ATSC	Australian Tree Seed Centre
AWRA	Australian Water Resources Assessment
BETA	Boolardy Engineering Test Array
BMTF	Biomedical Materials Translational Facility
CAC Act	*Commonwealth Authorities and Companies Act 1997*
CALD	Culturally and Linguistically Diverse
CAP	Care Assessment Platform
CCAM	Cubic Conformal Atmospheric Model
CDSCC	Canberra Deep Space Communication Complex
CO_2	Carbon dioxide
CPRs	Commonwealth Procurement Rules
CPU	Central Processing Unit
CRC	Cooperative Research Centre
CREST	Creativity in Science and Technology
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DFAT	Department of Foreign Affairs and Trade
DSG	Dry Slag Granulation
EBA	Enterprise Bargaining Agreement
ESM	Enterprise Strategy Measure
FIAL	Food Innovation Australia Ltd
FOI Act	*Freedom of Information Act 1982*
FTE	Full-Time Equivalent
GMR	Guardian Mentor Remote
HACC	Home and Community Care
HSE	Health, Safety and Environment
ICT	Information and Communication Technology
IMCRC	Innovative Manufacturing CRC
IP	Intellectual Property
KEA	Key Executive Action
KPIs	Key Performance Indicators
LoB	Lines of Business
LTIFR	Lost Time Injury Frequency Rate
MDI	Medical Developments International
MNF	Marine National Facility
MOF	Metal Organic Framework
MRV	Marine Research Vessel
MTFIR	Medical Treatment Injury Frequency Rate

MWA	Murchison Wideband Array
NAESP	National Agricultural & Environmental Sciences Precinct
NCMAS	National Computational Merit Allocation Scheme
NRCA	National Research Collections Australia
NCRIS	National Collaborative Research Infrastructure Strategy
NGL	National Geosequestration Laboratory
NPC	Northern Project Contracting
PBS	Portfolio Budget Statements
PCT	Patent Cooperation Treaty
PGPA Act	*Public Governance, Performance and Accountability Act 2013*
PID Act	*Public Interest Disclosure Act 2013*
R&D	Research and development
RITM	Research Institute of Tropical Medicine
SIEF	Science and Industry Endowment Fund
SICOM	Science, Strategy, Investment and Impact Committee
SIR Act	*Science and Industry Research Act 1949*
SOC	Science Operations Centre
SLAM	Simultaneous Localisation and Mapping
SMEs	Small-to-medium enterprises
SMiS	Scientists and Mathematicians in Schools
SROM	Supporting the Research Operating Model
STEM	Science, Engineering, Technology & Mathematics
TAPPAS	Tool for Assessing Pest and Pathogen Aerial Spread
TERN	Terrestrial Ecosystem Research Network
WHO	World Health Organisation
WHS Act	*Work Health and Safety Act 2011*
WLAN	Wireless Local Area Networks
YHV	Yellowhead virus

Glossary

Books and chapters: Includes monographs, complete or individual chapters, usually published by a commercial publisher.

Conference papers: Includes published conference papers and edited proceedings.

Enterprise Strategy Measures: ESMs are designed to provide evidence of our performance in four dimensions that are critical to the success of CSIRO's Strategy 2011–15.

Granted patents: Once a patent application has been examined and satisfies various patentability criteria it becomes a granted patent. It remains a granted patent until the end of the patent period (normally 20 years) provided renewal fees are paid.

Inventions: This is the number of inventions where one or more patent/applications are current. Accordingly an invention might include a granted patent that is near the end of its life (for example, 20 years), or it might include a provisional patent application that has only recently been filed. Furthermore, one invention might relate to a patent application in one country only, or it might relate to over 20 patents/applications in different countries covering the one invention.

Journal articles: Includes journal articles and other items published as part of a journal (for example, an editorial or book review).

Key Executive Actions: KEAs are designed to focus the Board and the Executive Team's attention on the most important priorities of the Organisation.

Live patent cases: A live patent case is where either a patent application or a granted patent exists. It does not include cases that have lapsed, expired or been withdrawn. Applications may include provisional applications, Patent Cooperation Treaty (PCT) applications and applications pending in Australia or foreign jurisdictions.

New inventions: This is the number of new inventions where an application (normally an Australian provisional application) is filed for the first time to protect that invention. A major implication of filing that provisional application is that it provides the applicant with an internationally recognised priority date. A small percentage of CSIRO's new inventions are filed as US provisional applications.

PCT applications: International PCT applications are a 'temporary' phase in any international patenting process and these have a life span of 18 months. This type of application is very common in major international corporations and is used by CSIRO when it considers its invention may have wide commercial application. In view of the 18-month time span, it is reasonable to approximate that two-thirds of the reported number were filed in the previous 12-month period.

Science excellence: An assessment of the competitiveness of CSIRO's research capabilities. It recognises CSIRO's science (for example, total citations) and excellence (for example, citation rates). It tends to be output orientated and includes lagging metrics relating to research publication performance (bibliometrics), esteem measures, such as awards and expert-peer reviews.

Science health: An assessment of the sustainability and vitality of research capabilities. It is a useful analysis in addition to 'excellence', in that it enables a focus on the likely future performance of capabilities. The set of metrics used to assess health is broader and more input focused than those used to assess excellence. It includes research staff mix, funding and connections with other institutions, including collaborations with other research organisations, as well as the broader innovation system.

Sponsored students: Students are deemed to be sponsored if they receive a full or partial scholarship paid from CSIRO funds to pursue a research project leading to a PhD or Honours/Masters degree. This excludes CSIRO employees, whose study expenses are considered to be 'training and development'.

Supervised students: Students are deemed to be supervised if they have a CSIRO staff member appointed officially by the University as the supervisor for their research project. Normally, CSIRO staff are joint supervisors in conjunction with a university academic.

Technical reports: Includes individually authored chapters as well as whole reports that are subject to peer review and usually publicly released.

Technological output: An assessment of the Organisation's excellence in delivering relevant research results to its users. This involves working on the right problems, doing projects well and excellence in transferring our research results. One metric for this, given this context, is CSIRO's patenting activity, as this provides an understanding of its technological output and potential impact.

Twenty (20) global peers: Applied science research organisations from around the world that are comparable to CSIRO include:

ABBREVIATION	NAME	COUNTRY
A*STAR	Agency for Science, Technology and Research ***	Singapore
Battelle	Battelle Memorial Institute	United States
BNL	Brookhaven National Laboratory (commercialisation activity through Brookhaven Science Associates)	United States
CAS	Chinese Academy of Sciences (formerly Academia Sinica)	China
CSIR India	Council for Scientific and Industrial Research (India)	India
CSIR SA	Council for Scientific and Industrial Research (South Africa)**	South Africa
DTI	Danish Technological Institute (Teknologisk Institut er Danmarks)**	Denmark
TNO	Dutch Organization for Applied Scientific Research (Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek)	Netherland
ETRI	Electronics and Telecommunications Research Institute	Korea
Fraunhofer	Fraunhofer-Gesellschaft	Germany
CNRS	French National Centre for Scientific Research (Centre National de la Recherche Scientifique)	France
Helmholtz	Helmholtz Germany	Germany
ITRI	Industrial Technology Research Institute	Taiwan
INRA	Institut National de la Recherche Agronomique	France
JST	Japan Science and Technology Agency ***	Japan
NRC	National Research Council	Canada
AIST	National Institute of Advanced Industrial Science and Technology	Japan
SIRIM	SIRIM Berhad (formerly Standards and Industrial Research Institute of Malaysia)**	Malaysia
SP	SP Technical Research Institute of Sweden (SP Sveriges Tekniska Forskningsinstitut)**	Sweden
VTT	VTT Technical Research Centre of Finland (Teknologian Tutkimuskeskus VTT)	Finland

Note: Due to data limitations some agencies could not be included in the analysis for different measures. Please refer to the following notes for more information:

* indicates that the organisations were not included in the impact citation analysis
** indicates that the organisations were not included in the intellectual property analysis
*** indicates that the organisation was not included in both the impact citation and intellectual property analyses

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Compliance index: statutory reporting requirements

The index below shows compliance with information requirements contained in section 46 of the *Public Governance and Accountability Act 2013* (PGPA Act) and *the Public Governance, Performance and Accountability (Consequential and Transitional Provisions) Rule 2014.* These requirements reflect those in the now-repealed *Commonwealth Authorities (Annual Reporting) Orders 2011* and in the *Science and Industry Research Act 1949* (SIR Act).

This annual report complies with Parliamentary standards of presentation and printing, and uses plain English and clear design.

	SOURCE	PAGE
Public Governance, Performance and Accountability Act 2013		
The accountable authority of the entity must prepare and give an annual report to the entity's responsible Minister, for presentation to the Parliament, on the entity's activities during the period, by 15 October; or the end of any further period granted under subsection 34C(5) of the Acts Interpretation Act 1901. The annual report must comply with any requirements prescribed by the PGPA Rule.	Section 46	1–192
Includes a copy of the annual performance statements in the entity's annual report that is tabled in the Parliament The annual performance statements must: a. provide information about the entity's performance in achieving its purposes; and b. comply with any requirements prescribed by the rules	Section 39 (1) and (2)	13–97
Includes a copy of the annual financial statements and the Auditor-General's report must be included in the Commonwealth entity's annual report that is tabled in the Parliament. The annual financial statements and the audit report must comply, and must state whether, in the accountable authority's and the Auditor-General's opinion respectively, whether, they: a. comply with the accounting standards and any other requirements prescribed by the rules; and b. present fairly the entity's financial position, financial performance and cash flows. If the financial statements do not comply, the accountable authority of the entity must add the information and explanations required to present fairly those matters. Similarly for the audit report, the Auditor-General must state the reasons, quantify the financial effect and state the amount if possible.	Section 42 and 43	99–192
Finance Minister's Commonwealth Authorities (Annual Reporting) Orders 2011		
The annual report of Operations is approved by a resolution of directors, is signed by a director and includes details of how and when approval was given. The annual report states that directors are responsible for the preparation and contents of the Annual Report of Operations (as required in Section 9 of the CAC Act and in accordance with the Finance Minister's Orders).	Clause 6	iv
The annual report complies with Parliamentary standards of presentation and printing.	Clause 8	193
The annual report uses plain English and clear design.	Clause 9	193

	SOURCE	PAGE
Enabling legislation is specified, including a summary of its objectives and functions, as specified in its legislation.	Clause 10	82
The responsible Minister is specified.	Clause 11	82
The annual report provides details of any Ministerial directions, etc issued and requirements of other relevant legislation, including the:	Clause 12	
• *Environment Protection and Biodiversity Conservation Act 1999*		90–92
• *Freedom of Information Act 1982*		160
• *Equal Employment Opportunity (Commonwealth Authorities) Act 1997*		93
• *Workplace Health and Safety Act 2011*		89
• *Privacy Act 1988*		161
• *Public Interest Disclosure Act 2013*		161
Information about directors is provided, including names, qualifications, experience, attendance at Board meetings and whether the director is an executive or non-executive member.	Clause 13	87, 144–146
The annual report provides an outline of:	Clause 14	
a. the organisational structure (including subsidiaries)		10–11
b. the location of major activities and facilities and provides a statement on governance practices, including details on:		9, 178
– board committees and their responsibilities		82–83
– education and performance review processes for directors		82–83
– ethics and risk management policies.		84–86
The annual report discloses the decision-making process undertaken by the Board in relation to transactions with other entities.	Clause 15	83
The annual report details any key activities and changes that affected the operations or structure, which may include:	Clause 16	
a. significant events, such as forming or participating in the formation of a company, partnership etc.		82
b. operational and financial results		15
c. key changes to its status of affairs or principal activities		iv
d. amendments to enabling legislation or any other legislation directly relevant to its operation.		82
The annual report includes particulars of:	Clause 17	
a. judicial reviews and decisions of tribunals that have had or may have a significant effect on its operations		86
b. reports about the authority made by the Auditor-General, a Parliamentary committee, the Commonwealth Ombudsman, or the Office of the Australian Information Commissioner.		86, 161
The annual report includes an explanation if information is missing from a subsidiary that is required to be included in the annual report.	Clause 18	n/a
The annual report includes details of any indemnity given to an officer against a liability, including premiums paid, or agreed to be paid, for insurance against the officer's liability for legal costs.	Clause 19	85
The annual report satisfies disclosure requirements for Government Business Enterprises.	Clause 20	n/a
The annual report provides an index of annual report requirements identifying where relevant information can be found in the annual report.	Clause 21	184

	SOURCE	PAGE
SIR Act		
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FEEDBACK

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ISSN 1030-4215
Printed in Australia by New Millennium Print.

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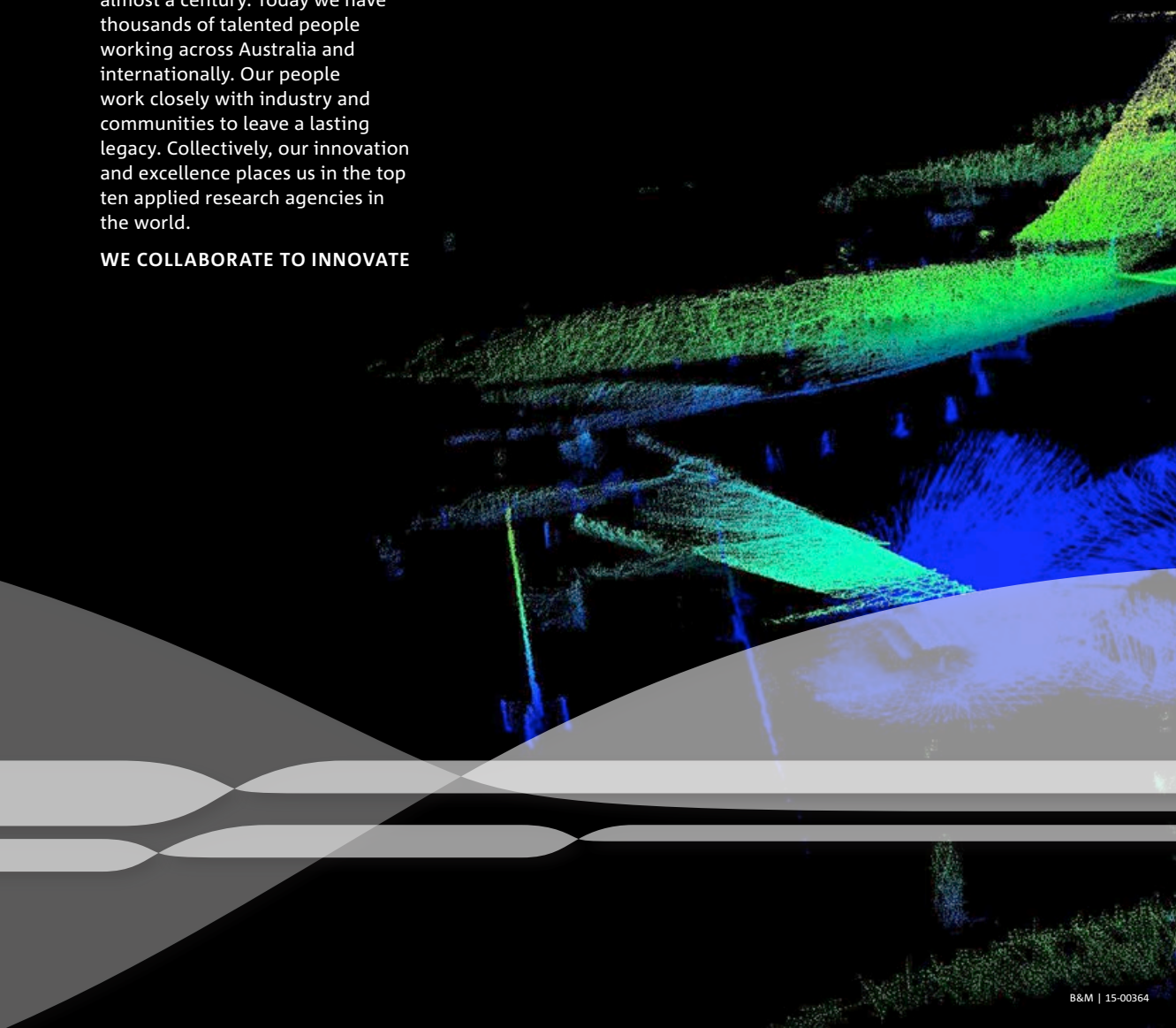
AT CSIRO WE INVENT THE FUTURE

We do this by using science and technology to solve real issues. Our solutions make a difference to industry, people and the planet.

As Australia's national innovation agency we've been pushing the edge of what's possible for almost a century. Today we have thousands of talented people working across Australia and internationally. Our people work closely with industry and communities to leave a lasting legacy. Collectively, our innovation and excellence places us in the top ten applied research agencies in the world.

WE COLLABORATE TO INNOVATE



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