www.csiro.au

CSIRO

Annual Report

2011–12

CSIRO

CSIRO – the Commonwealth Scientific and Industrial Research Organisation – is one of the largest and most diverse scientific organisations in the world. It has over 6,400 staff located across 57 sites throughout Australia and one overseas.

Our purpose

CSIRO's 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.

Our mission

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

Our vision

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

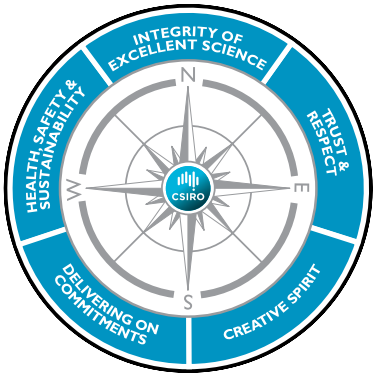
Responsible Minister

Senator the Hon Christopher Evans
Minister for Tertiary Education, Skills, Science and Research.

CSIRO's Values Compass

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.



Cover: Positive impact. Whatever we do, whatever we touch, we aim to leave a positive and lasting impact for future generations. A positive impact on the air that we breathe, on the food that we eat, on the land that we walk on, in the communities we live in and the lives that we lead.

www.csiro.au

CSIRO Head Office
Limestone Ave, Campbell, ACT 2612
PO Box 225, Dickson, ACT 2602, Australia
T (02) 6276 6000 • ABN 41 687 119 230

18 September 2012

Senator the Hon Christopher Evans
Minister for Tertiary Education, Skills, Science and Research
Parliament House
CANBERRA ACT 2600

We have pleasure in submitting to you, for presentation to Parliament, the sixty-fourth Annual Report of the Commonwealth Scientific and Industrial Research Organisation (CSIRO). This report has been prepared in accordance with the requirements of the *Science and Industry Research Act 1949* and in accordance with section 9 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act).

Under section 9 of the CAC Act, CSIRO Board members are responsible for producing an Annual Report in accordance with the rules laid down in Schedule 1 of this Act, including a 'Report of Operations' prepared in accordance with the Finance Minister's Orders.

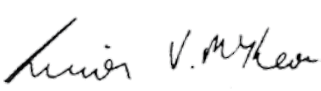
This report presents fairly the information required by the Minister for Finance and Deregulation as set out in the *Commonwealth Authorities and Companies (Report of Operations) Orders 2011*.

The report has been approved for presentation to you, signed this 23rd day of August 2012 in accordance with a resolution of the Board members.

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.

The CAC Act requires CSIRO to report developments since the end of the financial year, giving particulars of any matter or circumstance that has arisen and has significantly affected or may significantly affect CSIRO's operations or state of affairs. On 1 July 2012, two new National Research Flagships were formed, the Biosecurity Flagship and the Digital Productivity and Services Flagship.

We commend the Organisation's achievements to you.



Simon McKeon AO
Chairman of the Board

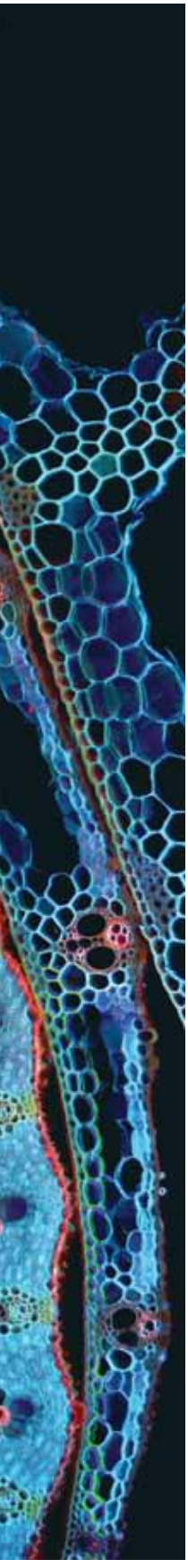
Megan Clark
Chief Executive

Our history

The Council for Scientific and Industrial Research (CSIR) was established in 1926 with its primary research devoted towards agriculture. In the late 1930s this was extended to include industrial research.

In 1949, the CSIR was reconstituted as CSIRO, and gradually expanded its activities so that its research was related to almost every field of primary, secondary and tertiary industry in Australia.

Today, CSIRO is a trusted source of creative ideas and practical technologies to deliver impact for the nation.



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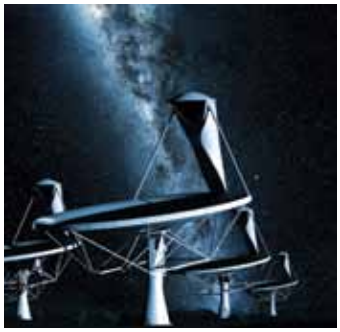
Part one
overview

Highlights of 2011–12

This report highlights a wide array of our recent science and its applications. Here are just a few examples of the impact science has on our lives, our industries and our environment.

CSIRO invented and patented wireless networking technology in the 1990s – a technology that has given us the freedom to work wirelessly in our homes, classrooms and offices, using devices such as laptops and smart phones. In April 2012, the Minister for Tertiary Education, Skills, Science and Research, Senator the Hon Chris Evans, announced that a major part of CSIRO's most recent US litigation involving its wireless local area network (WLAN) patent had been settled prior to trial. The WLAN team also won the European Patent Office Non-European Inventor Award for 2012 (more on page 53).

Image: iStockPhoto



In May 2012, the Square Kilometre Array (SKA) Organisation announced that the $2.5 billion Square Kilometre Array radio telescope would be deployed in Australia, New Zealand and South Africa. The SKA will be the world's largest and most sensitive radio telescope and will help address unanswered questions about our universe, including how the first stars and galaxies were formed (more on page 52).

Image: SKA Organisation/ Swinburne Astronomy

The *State of the Climate 2012* report is the second produced by CSIRO and the Australian Bureau of Meteorology. It provides a summary of observations of Australia's climate and analysis of the factors that influence it. The report confirms that, in Australia, each decade has been warmer than the previous decade since the 1950s (more on page 49).

The Energy Transformed Flagship installed Australia's first commercial-scale solar cooling system at the Hunter Institute of Technology, New South Wales. The system provides cool air in summer and heating in winter, and is projected to save 5,000 tonnes of greenhouse gas over the next decade (more on page 25).

CSIRO teamed up with defence research partners and developed a new manufacturing process and infrastructure for cost-effective armour production in Australia. In 2012, Australian Defence Apparel was awarded a $4 million grant from the Australian Government to establish an advanced armour processing plant in Bendigo, Victoria, based on this technology. This is expected to create more than 40 new jobs (more on page 28).

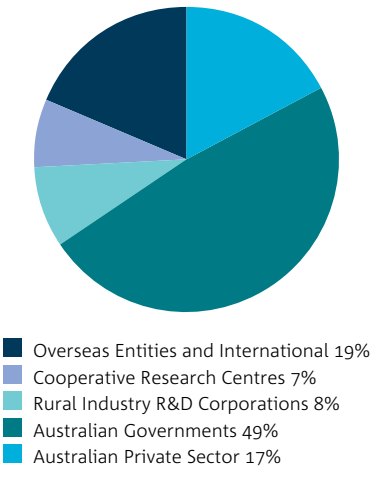
Lubrizol Corporation in the USA has created advanced highly-viscose polymers, known as Asteric™ Viscosity Modifiers, using CSIRO's RAFT (Reversible Addition Fragmentation chain Transfer) technology. This first RAFT-based product was launched in August 2011 at the American Chemical Society Conference and is now commercially available. Dr Ezio Rizzardo and Professor David Solomon received the Prime Minister's Science Prize for 2011 for their work on polymers. (more on page 55).

Image: Bearcage

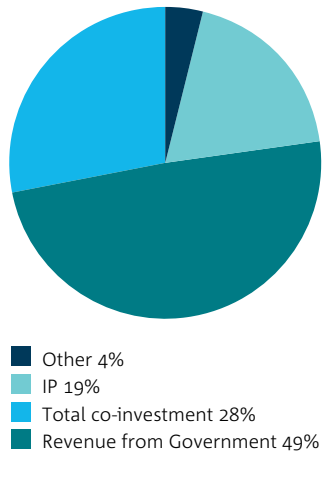
Financial performance 2011–12

CSIRO's financial result for 2011–12 was a surplus of $200.5 million, which includes net income of $228.6 million attributable to the wireless networking technology patent (WLAN) licensing agreements. Total revenue for the year was $1,476.0 million and total expenses were $1,275.5 million. CSIRO's financial performance for 2011–12 is summarised in Table 2.1 on page 3.

SOURCES OF CSIRO REVENUE IN 2011–12



SOURCES OF CO-INVESTMENT, CONSULTING AND SERVICES REVENUE 2011–12



Foreword by the Chairman

During 2011–12, Dr Megan Clark, Chief Executive CSIRO, and I had the privilege of travelling around our fabulous nation to launch the CSIRO 2011–15 Strategy. This strategy is founded on our passion for making a positive impact on the most significant challenges and opportunities facing Australia and humanity.

CSIRO seeks to play a central role in the world of applied science – science with purpose, science in use – by leading and connecting people, organisations and ideas in the areas in which we are strong. The consistent feedback that we received was that our strategy was the right one to help us tackle, with our partners, the key challenges facing the nation.

In this Annual Report we present a wonderful list of scientific achievement that, through application, is making a significant contribution to industry, society and the community. It illustrates how CSIRO and its partners are making a difference in areas such as climate change, renewable energy, human health, manufacturing and food security.

On my travels, I have sought to promote the important role science is playing in delivering benefits to our community and to our industries. CSIRO is providing scientific data and knowledge to our leaders to help them make the big decisions that we, as a nation, need to make to secure our future health and prosperity.

In this time of instant communication through social media, it is important that CSIRO maximises the use of this technology. To this end, we have been making a real effort to make our stories heard and meet our ambitious goal of more Australians being able to name an impact CSIRO has had on their lives. I congratulate these new communication efforts.

On behalf of the CSIRO Board, I would like to congratulate the CSIRO individuals and teams that received recognition through an impressive array of awards and honours throughout the year. There were two memorable moments for me in 2011–12. It was my great honour to attend the Prime Minister's Science Prize ceremony at Parliament House and to see Dr Ezio Rizzardo and Professor David Solomon recognised for their long and distinguished research careers that led to a revolution in polymer science, which has so profoundly impacted the level of control we have over polymer structure and function. I also had the pleasure of awarding the CSIRO Chairman's Medal to Dr Greg Constable and the Cotton Breeding and Biotechnology Team for their work on a new variety of cotton.

And, of course, there have been numerous other achievements and I congratulate the management and staff of CSIRO for a very strong performance in 2011–12.

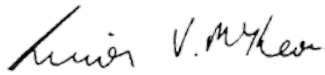
On behalf of the Board of CSIRO, I would also like to acknowledge, with appreciation, the continued support of the Australian Government and our many research and commercial partners, as well as the members of our advisory committees.

Simon McKeon (CSIRO Chairman)

During the year, we welcomed Dr Don Russell, Professor Peter Høj and Ms Shirley In't Veld to the CSIRO Board. We also farewelled the Honourable John Kerin AM and Professor Ian Chubb AC, who is focusing on his important role as the nation's Chief Scientist. I sincerely thank them for their valuable contribution to the governance of CSIRO.

CSIRO is committed to the health and safety of its staff, visitors and the communities in which we work and recognises the importance of positive interventions to enhance this. As the year has progressed, securing an even healthier and safer workplace has become a primary focus of the CSIRO Board and we continue to support Dr Clark and the Organisation in this endeavour.

I am pleased to say CSIRO continues to conduct great science and deliver innovative solutions and a positive impact for Australia.



Simon McKeon AO
Chairman of the CSIRO Board

Chief Executive's report 2011–12 – Year in review and looking ahead

Year in review

Over the past year we launched our new 2011–15 Strategy. This strategy will see us fully embrace our distinct role as the nation's leading, large-scale, multidisciplinary, mission-directed science and technology organisation. It also builds roles that will differentiate us over time – our role in providing deep connections across the innovation system and our role in providing trusted scientific advice to the nation.

CSIRO hit new benchmarks in its engagement with industry and had a record number of active licences for its technology. We set new benchmarks for our national and global collaborations and had a record performance in the depth and breadth of our science excellence and journal publications.

Our financial performance has strengthened with a solid operating result and a stronger balance sheet. Another successful round of licences for our wireless local area network (WLAN) technology delivered an additional $228.6 million. This was on top of a record $518 million of external revenue, which demonstrates the value placed on innovation by our external partners in difficult global financial conditions. The Federal Government confirmed CSIRO's appropriation of $736.7 million for 2012–13. This represents an increase of $11.9 million or 1.6 per cent over 2011–12 and is consistent with our Quadrennium Funding Agreement.

Our people and our values

Our people are at the heart of our achievements and goals. Every day I am humbled by the talent and creative spirit at CSIRO. We work in diverse teams with each person bringing something special. Innovation and science are global and more and more of our achievements come from national and global collaborations bringing the very best together to deliver profound impact.

I sincerely thank all our people and our partners for their extraordinary effort and commitment in what has been a record year for CSIRO. It is through your commitment and contributions that we are building a proud track record.

We continue to improve our health, safety and environmental reporting, train our leaders and review and improve our areas that have proved high risk in the past. While some parts of our Organisation achieved zero lost time injuries this year, we still have yet to achieve this across all our activities. We are raising the importance of the health and wellbeing of our staff, including mental health. It is not enough to go home safely. We will not be successful until we work in an environment of trust and respect and everyone also goes home with a sense of pride about their contribution to CSIRO.

This year we worked with our staff to complete a detailed survey of our culture and where we can improve *how* we work not just *what* we do. I believe that if we are clear about how we work together what we do will surprise and inspire.

Our performance

We welcomed the announcement that South Africa, Australia and New Zealand are to share the Square Kilometre Array (SKA) – a giant radio telescope that will consist of thousands of separate radio dishes and other antennae spread across an area the size of a continent. This €1.5 billion project will address fundamental questions about the Universe, including the formation of black holes, the origins of the first stars and the generation of magnetic fields. It will incorporate CSIRO's receiver technology and grow our presence in radio astronomy.

We continued to focus on our **National Research Flagship Programs**, putting the very best of our science to work on some of the most significant challenges facing the nation and the world. The **Energy Transformed Flagship** installed the

Dr Megan Clark (CSIRO Chief Executive) and Sembawang Shipyard's Managing Director Mr P K Ong, look on as the first two sections of the keel of CSIRO's new state-of-the art research vessel, *Investigator*, are brought together at a keel laying ceremony in Singapore. Image: Chris Dickinson

first commercial-scale solar cooling system at the Hunter Institute of Technology.

Our **Wealth from Oceans Flagship** is working with industry to improve Australia's response to marine oil spills.

Our **Future Manufacturing Flagship** is working with Australian Defence Apparel to manufacture, from Bendigo, advanced armour for our soldiers.

The **Minerals Down Under Flagship** worked with the States and Territories, Geoscience Australia, NASA and the Japanese space agencies to produce the world's first suite of mineralogical maps of the Australian continent.

Our **Food Futures Flagship,** with co-funding from the Grains Research and Development Corporation, developed up to 30 per cent yield increases in glasshouse trials in wheat by switching off a gene involved in carbohydrate metabolism.

Our Divisions and portfolios provide multidisciplinary support to our Flagships, but also lay the foundations for future breakthroughs. An example of this science is the polymer technique called RAFT. This year the first RAFT-based product became available to improve performance in car transmission fluids.

Dr Ezio Rizzardo and Professor David Solomon received the Prime Minister's Science Prize for 2011 for their work on polymers.

This year saw record engagement with industry with CSIRO working with over 1,500 Australian companies of all sizes and more than 350 multinational companies from 50 countries. We also had a record 247 active licences of our technologies with our partners.

This year we provided scientific advice on national and global issues. This included the *State of the Climate 2012* with the Bureau of Meteorology, the global Commission on Sustainable Agriculture and Climate Change, the Marine Climate Report Card, the Murray-Darling Basin plan, the Northern Australian Sustainable Yields Project, the Prime Minister's Taskforce on Manufacturing and advice to the community on nutrition for diabetes and heart disease.

Internationally, we have partnerships in 97 countries. Highlights were opening the Northern Node of the CSIRO-Chile International Centre of Excellence in Mining and Minerals Processing in Antofagasta, a deeper research partnership with the Brazilian Enterprise for Agricultural Research, Embrapa and delivering the first scientific breakthroughs from our partnership with the Chinese Academy of Sciences.

Our five major capital projects, with over $490 million investment, all progressed well. *The Atlas of Living Australia* was delivered on time, ahead of scope and under budget. The Atlas is a collaboration between Australia's natural history collections and custodians of biological data. It is Australia's first virtual national facility that reaches out to researchers, scientists and the community with over 32 million biodiversity records online. The Australian SKA Pathfinder project installed all 36 dishes and the first of the advanced CSIRO receiver technology. It is on track to be operational next year. The Marine National Facility – *RV Investigator* is on track for delivery next year; the Pawsey Supercomputer, for iVEC, is on track and we progressed renewable energy investment in solar and geothermal for the SKA project.

We will continue to work with others to build global precincts, and national and regional centres, making it a priority to develop plans and actions for these centres. We deepened our partnership with the University of Tasmania, and the Institute of Marine and Atmospheric Science in Hobart is under construction alongside CSIRO and will bring some 800 researchers and students together, creating a scientific powerhouse in the southern hemisphere.

The year ahead

We will continue to embed our 2011–15 Strategy, review our priorities and work to position CSIRO and Australia's innovation capacity beyond 2016. We will continue to grow our strategic partnerships and work with others to build global precincts and national and regional centres of excellence.

Our shared commitment to CSIRO values will provide confidence to our investors, our research partners and importantly to the Australian people.

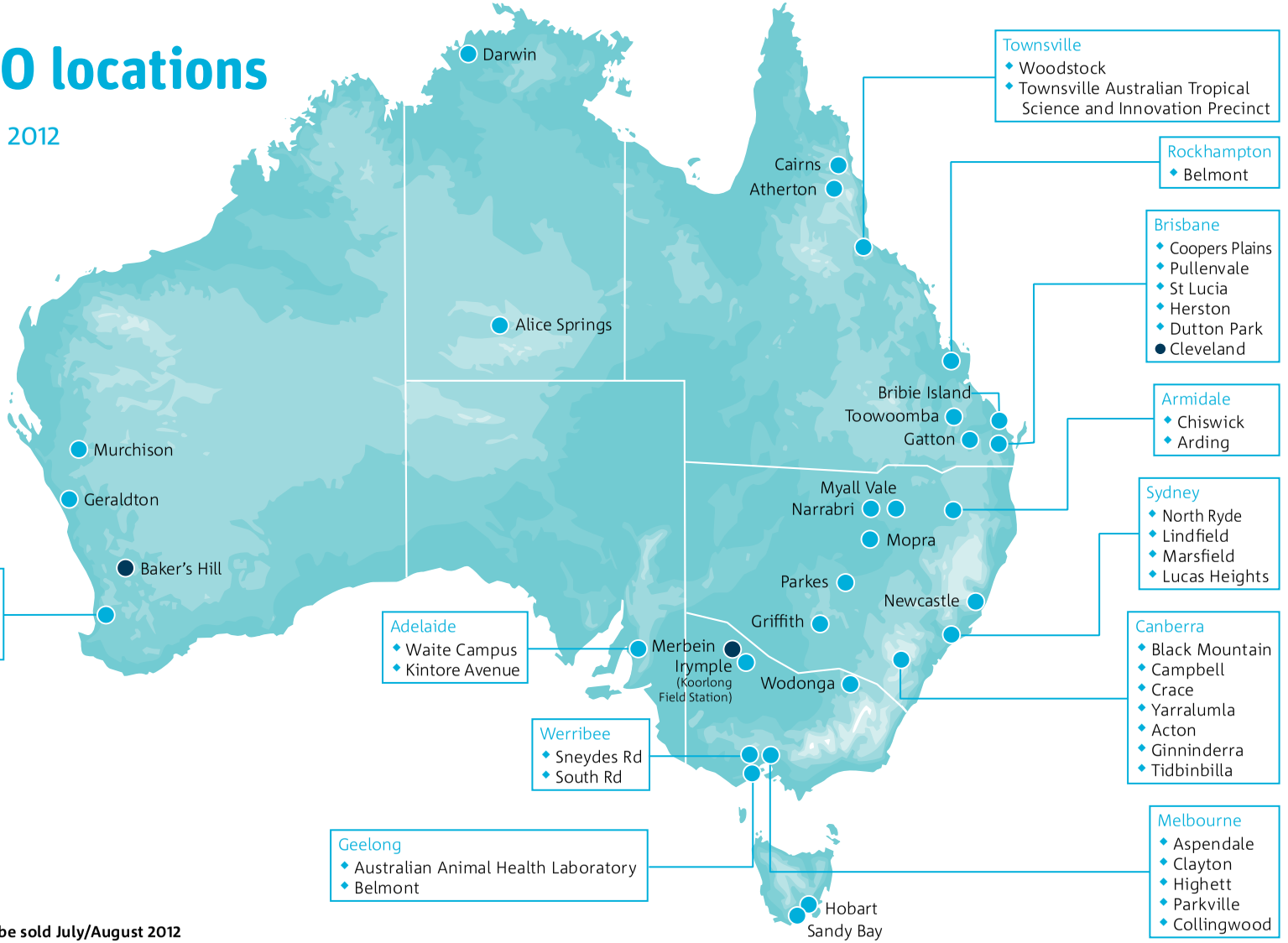
I would like to thank everyone in CSIRO for their dedication and hard work this year, as well as the members of the CSIRO Board and Executive Team for their insights, enthusiasm and support. I look forward to the opportunities and challenges in the year ahead.

Megan Clark
Chief Executive

September 2012

CSIRO locations

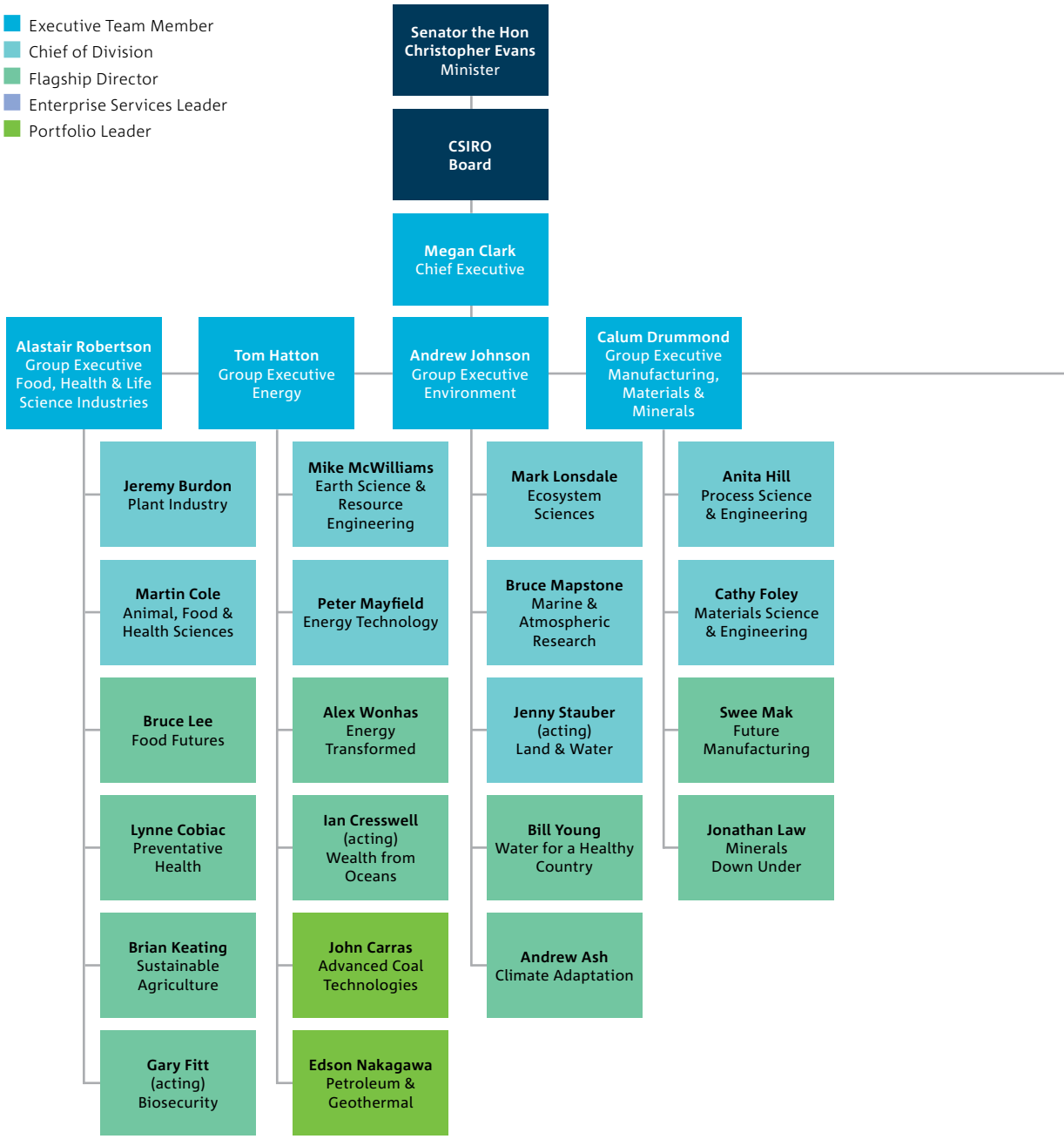
As at June 2012

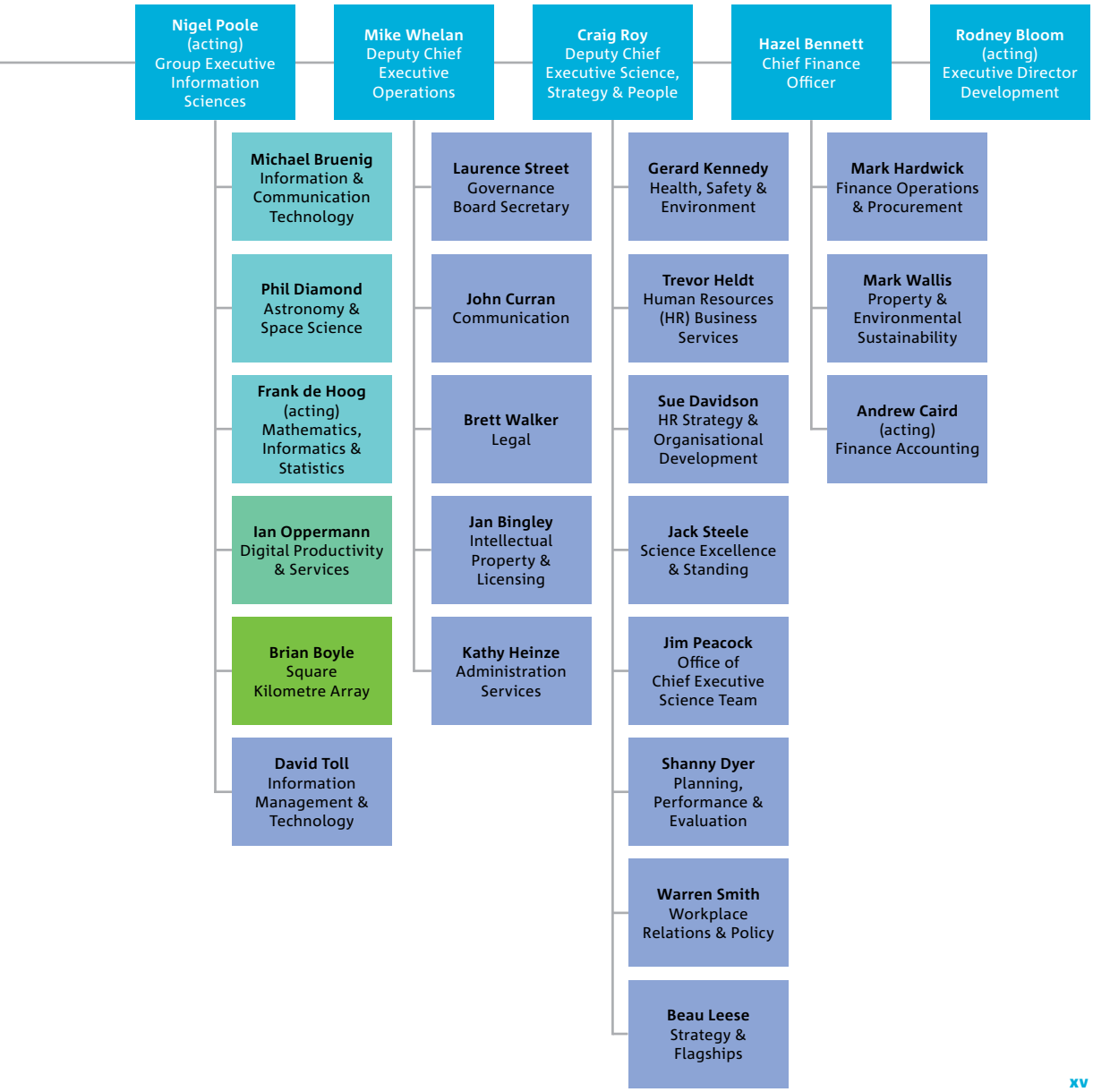


● **Property to be sold July/August 2012**

CSIRO Organisational Chart

as at August 2012




Nigel Poole (acting) Group Executive Information Sciences
Mike Whelan Deputy Chief Executive Operations
Craig Roy Deputy Chief Executive Science, Strategy & People
Hazel Bennett Chief Finance Officer
Rodney Bloom (acting) Executive Director Development
Michael Bruenig Information & Communication Technology
Phil Diamond Astronomy & Space Science
Frank de Hoog (acting) Mathematics, Informatics & Statistics
Ian Oppermann Digital Productivity & Services
Brian Boyle Square Kilometre Array
David Toll Information Management & Technology
Laurence Street Governance Board Secretary
John Curran Communication
Brett Walker Legal
Jan Bingley Intellectual Property & Licensing
Kathy Heinze Administration Services
Gerard Kennedy Health, Safety & Environment
Trevor Heldt Human Resources (HR) Business Services
Sue Davidson HR Strategy & Organisational Development
Jack Steele Science Excellence & Standing
Jim Peacock Office of Chief Executive Science Team
Shanny Dyer Planning, Performance & Evaluation
Warren Smith Workplace Relations & Policy
Beau Leese Strategy & Flagships
Mark Hardwick Finance Operations & Procurement
Mark Wallis Property & Environmental Sustainability
Andrew Caird (acting) Finance Accounting