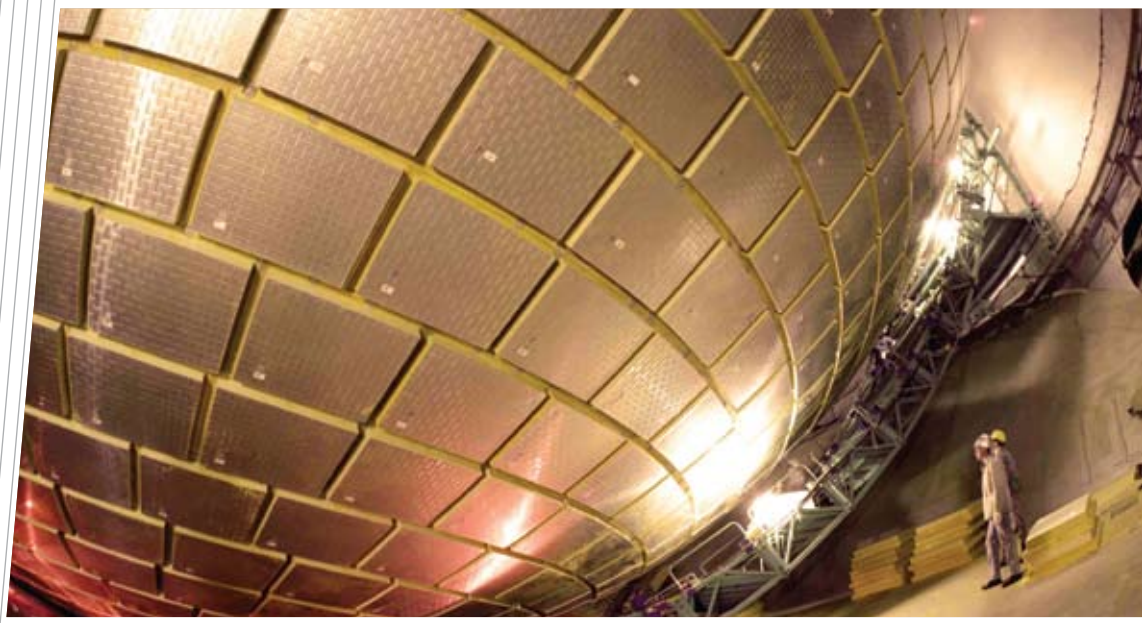
CSIRO



www.csiro.au

CSIRO Annual Report 2007–08

CSIRO – the Commonwealth Scientific and Industrial Research Organisation – is one of the largest and most diverse scientific organisations in the world. It has over 6400 staff located across 54 sites throughout Australia and overseas.

CSIRO is an independent statutory authority constituted and operating under the provisions of the *Science and Industry Research Act 1949* and the *Commonwealth Authorities and Companies Act 1997.*

Our purpose states:

By igniting the creative spirit of our people, we deliver great science and innovative solutions for industry, society and the environment.

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Cover images: Top – CSIRO is at the forefront of research developing remote deepwater gas, coal seam gas exploration and production, and gas processing such as gas-to-liquids and liquefied natural gas production. The spherical gas storage tank is on an LNG tanker and the copper coloured plates are the tank's insulation. Photo: Woodside Energy Ltd Bottom left – CSIRO scientists Dr Phei Lok and Dr Anthony O'Mullane are working on a probe station used for testing new organic semiconductor materials. Photo: Mark Fergus Bottom centre – The risks and impacts of climate change on Indigenous communities in Australia's tropical north are the focus of a new Department of Climate Change scoping study, to be undertaken by CSIRO in collaboration with the University of New South Wales and the North Australian Indigenous Land and Sea Management Alliance. The study will assess the vulnerability of Indigenous communities to climate change. Photo: David Hancock/SkyScans Bottom right – Ms Zongli Xie, a Chemical Engineer at CSIRO, with a membrane testing facility for purification of industrial water. Photo: David McClenaghan

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About CSIRO

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.

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

Our purpose

By igniting the creative spirit of our people, we deliver great science and innovative solutions for industry, society and the environment.

CSIRO is a research enterprise dedicated to delivering benefit to industry and the community through world-class science. It seeks to be a valuable partner with strong international relationships.

What we do

CSIRO carries out scientific research in areas including energy, the environment, information technology, health, mining, manufacturing, agriculture, and natural resources. We seek to make a difference and generate impact by focusing on the nation's big challenges and opportunities. Our research delivers:

- integrated solutions to help address major national challenges
- technologies to transform or create new markets for Australian industry
- innovative technologies to improve the competitiveness of existing industries
- advice, information and research to meet specific community needs
- knowledge-based services to governments and businesses.

How we deliver

We strive to deliver value to our clients at all stages of research, development and commercialisation. We conduct our research through Divisions, National Research Flagships, Joint Ventures and other entities. Some facts:

- CSIRO currently leads nine National Research Flagships that bring focus and scale to research addressing some of Australia's most important and complex challenges and opportunities
- CSIRO transfers know-how through secondments, industry workshops, seminars and specialist publications and produced nearly 5000 scientific publications, over 11 000 client reports and around 260 media releases in 2007
- CSIRO is the largest single participant in the Cooperative Research Centre (CRC) Program (participating in 38 of the 58 centres, during 2007–08)
- CSIRO typically has over 3000 active research contracts each year serving small, medium and large businesses in Australia and overseas, as well as public sector agencies, national and state governments, and other research organisations
- CSIRO hosts three major National Research Facilities (the Australian Animal Health Laboratory, the Australia Telescope, the Marine National Facility – Research Vessel *Southern Surveyor*) and over 30 other research facilities such as the Riverside Life Sciences Centre in Sydney and the Australian Resources Research Centre in Perth
- CSIRO manages 11 national reference collections including: the Australian National Fish Collection, the Australian National Insect Collection, the Australian National Herbarium, the Australian National Wildlife Collection, the CSIRO Collection of Living Microalgae, the Australian Tree Seed Collection and the Scientific Marine Data Collection

- CSIRO offers more than 50 specialised technical and analytical services. These include analyses for air pollutants and satellite imaging of natural resources through to fire testing of materials and diagnosis of exotic animal diseases
- CSIRO's Small and Medium Enterprise (SME) Engagement Centre helps Australian SMEs source scientific and technical support from CSIRO and others in the National Innovation System
- 87 per cent of CSIRO's total expenditure is directed towards the priority goals associated with Australia's National Research Priorities
- CSIRO PUBLISHING publishes 25 peer reviewed research journals, in partnerships with the Australian Academy of Science and other scientific societies, about 50 new books each year for international markets and *ECOS* CSIRO's towards sustainable development magazine. In addition, it produces videos, multimedia and eLearning products both for CSIRO and partners such as The Learning Federation
- internationally, CSIRO is involved in around 700 current or recently completed research activities, working with leading scientific organisations and firms in the United States, Japan and Europe, and with developing countries, especially in Asia
- CSIRO is Australia's leading patent filing enterprise, holding around 4000 granted or pending patents
- more than 150 spin-out companies are based on CSIRO generated intellectual property and expertise.

Education and outreach

- in collaboration with university colleagues, our staff supervise, co-supervise and/or sponsor approximately 650 postgraduate research students
- through this sponsorship and supervision of MSc and PhD students, our extensive postdoctoral programs, our Distinguished Visiting Scientists Scheme, the CEO's Science Leader Scheme and other initiatives we are continuing to build and foster a world-class team of scientists and helping to develop the science leadership Australia needs to meet future challenges
- stories involving CSIRO science are reported in around 12 000 news or feature items every year in print, radio and television and there are approximately 30 000 articles relating to CSIRO on Australian and international web pages each year
- CSIRO media releases posted on Eurekalert (an online, global news service operated by the American Association for the Advancement of Science) are viewed by about 60 000 subscribers each year
- the number of CSIROpod podcast listeners continues to grow rapidly, with now over 400 000 downloads of CSIROpod a year
- CSIRO's nine Science Education Centres engage over 380 000 students, parents and teachers each year, including school visits in metropolitan and regional areas with the 'Lab on Legs' program
- CSIRO's Double Helix Science Club has over 25 000 members, with its two magazines *The Helix* and *Scientriffic* and hundreds of club events. Our weekly e-newsletter, 'Science by Email' has 27 000 subscribers, one third being teachers
- CSIRO jointly produces SCOPE, a science TV program, with a viewing audience of over 400 000 each week
- The Scientists in Schools program, funded by the Australian Government, created over 700 scientist-teacher partnerships

- the Discovery Centre in Canberra is CSIRO's showcase, featuring an interactive exhibition, modern events facilities and an education program that gives children a chance to explore real research issues in a scientific setting complete with working laboratories. The centre had over 60 000 visitors during the past year. CSIRO's radio telescope in Parkes had over 100 000 visitors in 2007–08 who learnt about the telescope, radio astronomy and CSIRO

- CSIRO Enquiries serves a diverse range of general public, industry, education and internal clients with a one-stop service for information about CSIRO research and activities. The contact centre handles over 35 000 inbound enquiries a year and also regularly supports CSIRO's business units with a variety of contact-related activities (1300 363 400, enquiries@csiro.au).

Letter of transmittal

Senator the Hon Kim Carr
Minister for Innovation, Industry, Science and Research
Parliament House
CANBERRA ACT 2600

We have pleasure in submitting to you, for presentation to Parliament, the sixtieth Annual Report of the Commonwealth Scientific and Industrial Research Organisation. 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.

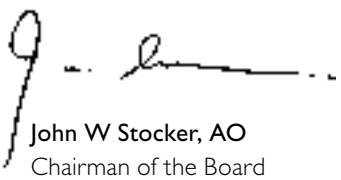
This report presents fairly the information required by the Minister for Finance and Administration as set out in the *Commonwealth Authorities and Companies (Report of Operations) Orders 2008.*

The report has been approved for presentation to you, signed this 20th day of August 2008 in accordance with a resolution of the Board members.

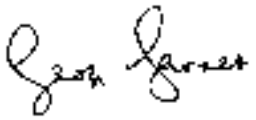
The report includes an appendix comprising a report from the Chief Executive of CSIRO, as trustee of the Science and Industry Endowment Fund established under the *Science and Industry Endowment Act 1926*, on the operations of the Fund together with a report by the Auditor-General on the accounts of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

Since 30 June 2008, no developments have arisen that have significantly affected or may significantly affect CSIRO's operations or state of affairs.

We commend the Organisation's achievements to you.



John W Stocker, AO
Chairman of the Board



Geoff Garrett, AO
Chief Executive

October 2008

Foreword by the Chairman

Australian Science Australia's Future

Governments in Australia and around the world are looking to science and technology to better understand and address global challenges like climate change, energy, food security and environmental sustainability. These challenges also bring opportunities and potential markets for our technological innovation.

Some years ago CSIRO recognised the emergence of these major issues and the importance of focused scientific investment to achieving results and to capturing economic, social and environmental benefits. In response, CSIRO has successfully implemented a strategy which focuses on the development and application of multidisciplinary research capabilities at the scale required to achieve results. Our National Research Flagships and other research programs facilitate national and international collaboration with other researchers and with industries and policy makers to directly address these challenges and to create opportunities.

An outstanding example of the importance of this strategy has been the Murray-Darling Basin Yield Assessment conducted by the Water for a Healthy Country Flagship. This assessment provides the first comprehensive analysis of Australia's largest agricultural region and a firm scientific basis for policy formulation. Other examples are provided in this report in areas as diverse as energy, information and communication technologies, light metals and health.

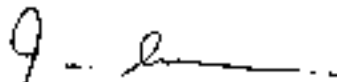
CSIRO supports the strategic development of the National Innovation System. Australia needs a system based on a supportive and efficient policy framework with clarity of roles and consistent principles for sustained public investment. For our part we will continue to play a leadership role in the management of large-scale research programs with a clear path to impact, encourage research collaboration to share people, ideas and infrastructure and build national skills and capability.

This Annual Report demonstrates CSIRO's commitment to scientific excellence, to operating efficiently and effectively with sound governance practices, and to securing a strong return on Australia's investment in the Organisation.

During the year we needed to make some difficult decisions due to budgetary constraints resulting in the closure of some research sites and programs but, at the same time, we welcomed new Government initiatives in water and energy. These decisions were based on a careful and considered analysis of our science investment portfolio.

The coming year will be a period of leadership transition in CSIRO and we are looking forward to continued Government and community support. We acknowledge the tremendous leadership Dr Geoff Garrett has provided the Organisation as Chief Executive over the past eight years. I would also like to thank Mr Brian Keane and Professor Alan Robson for their valuable contributions to the CSIRO Board.

On behalf of the Board of CSIRO, I would like to congratulate and thank the management and staff of CSIRO for their contribution to the Organisation and to Australia's future.



Dr John W Stocker AO
Chairman of the CSIRO Board

The year in summary – and looking ahead

This year we embarked on the next stage of our 15 year vision with the launch of CSIRO's 2007–2011 Strategic Plan 'Building Momentum and Increasing Impact'. The strategy seeks to grow our impact by delivering great science and innovative solutions for industry, society and the environment through three major elements:

- addressing national challenges and opportunities, faster and better
- focusing and strengthening our core science capability and delivery
- strengthening our enterprise and enhancing operational excellence.

Throughout this strategic journey we have focused on creating an outward looking organisation whose staff work in multidisciplinary teams that seamlessly collaborate across boundaries – inside, and to the outside, of our enterprise – to deliver great impact through quality science. We are seeing the benefits of this approach as we deliver quality research in large-scale activities.

We recognise that CSIRO's overall success will be judged on its delivery of results with relevance and **impact** based on high-quality **science**, strong **relationships** and effective **resourcing**. Indeed, these are the four key dimensions upon which we judge our performance and the following paragraphs provide some examples in each of these for the year under review. More detailed information is provided in the body of this Report.

Impact

CSIRO's core purpose is about delivering economic, social and environmental benefits in areas of importance for Australia.

- The Murray-Darling Basin Sustainable Yields project has provided a complete assessment of all available water across 18 catchment areas within the Basin, and across one million square kilometres, one seventh of our continent. It includes an examination of assumptions about water availability in light of likely changes in climate and other factors through to 2030. Operating under the leadership of the Water for a Healthy Country Flagship, this has involved more than 170 people intensively over the past 16 months, with 60 CSIRO staff across four divisions, with 12 partners, locally and internationally. The results provide an unprecedented level of surface and groundwater information to guide resource policy and planning, management and investment for the whole Murray-Darling Basin and the methodology is now being applied in other regions across Australia.

- CSIRO scientists at the Australian Animal Health Laboratory played a central role in eradicating the highly contagious horse disease, equine influenza, from the nation. This was the largest exotic animal disease event in Australian history. Australia was officially declared free of equine influenza in June 2008, ten months after the first cases were detected.

- During the year, the Energy Transformed Flagship collaborated with 18 leading representatives from Australia's community, industry and government, to share ideas and develop a range of options for our nation's transport fuel future. Known as the Future Fuels Forum, our efforts culminated in July 2008 with the release of the report, *Fuel for thought – The future of transport fuels: challenges and opportunities.* The Forum and its report will continue to advance the debate on

Australia's transport fuel needs by providing strategic input to decision-makers in industry and government.

- At the national level, CSIRO and the Bureau of Meteorology collaborated to produce the most comprehensive assessment to date of Australia's future climate, through to 2030, entitled *Climate Change in Australia*. This report, delivered in October 2007, details projections of changes in temperature, rainfall and other aspects of climate that can be expected over coming decades as a result of continuing global emissions of greenhouse gases.

- At the local level, working closely with the Sydney Coastal Councils Group, CSIRO completed a climate assessment to help Sydneysiders understand their vulnerability to climate change, and prepare for the potential impacts. This project brought together some of the nation's leading climate adaptation experts to design and implement an integrated research effort. The report, *Mapping Climate Change Vulnerability in the Sydney Coastal Councils Region*, was publicly released on 29 April 2008. Its insights on the Sydney region are already inspiring other Councils throughout Australia to begin similar preparations.

- A team from the Light Metals Flagship has developed a special barrier coating for use in aluminium smelters to significantly improve efficiency and the environmental impact of smelting. The coating acts as a barrier to protect the carbon anodes used in high-temperature electrolyte cells as part of the smelting process. The barrier stops burning and reduces heat damage as well as reducing the amount of CO_2 generated. Trials have already demonstrated savings of over US$1 million per year for one smelter alone. Worldwide there are over 200 aluminium smelters currently in operation.

- CSIRO scientists and engineers have developed ways to use waste heat and slag from iron production to make deep cuts to greenhouse gas emissions. Currently, the Australian industry produces over two million tonnes of slag each year that is usually air-cooled and sent to landfills, or used as road base. The CSIRO process produces granulated slag which can substitute for up to 70 per cent of the Portland cement leading to significant energy and greenhouse gas reductions. Conservative assessments of CSIRO's new integrated process identified potential annual savings in fuel costs of about $20 million for the Australian industry and over $3 billion for the global steel industry.

- The Preventative Health Flagship's Collaboration Cluster, the Australian Imaging, Biomarker and Lifestyle Flagship Study of Ageing, has found a way to bring forward the detection of Alzheimer's disease by up to 18 months using a brain imaging technique. Dementia, most of which is caused by Alzheimer's disease, affects over 200 000 Australians, with the number expected to rise to over 700 000 by 2050. Delaying the onset of Alzehemers' disease by just five years ahs been calculated to reduce new cases by 50 per cent, with cumultive Australian health cost savings of up to $13.5 billion by 2020.

- CSIRO is continuing to enhance its impact through the National Research Flagships Program which address major national challenges and opportunities through large-scale multidisciplinary research partnerships. Adding to the six already established Flagships, CSIRO successfully launched two new Flagships in 2007–08 – *Minerals Down Under* and *Climate Adaptation*. Planning for a third new Flagship – *Niche Manufacturing* – is well underway.

  - The Minerals Down Under Flagship aims to assist the Australian minerals industry to exploit new resources with an in-situ value of $1 trillion by the year 2030, and more than double the size of the associated services and technology sector to $10 billion per year by 2015.

  - The Climate Adaptation Flagship aims to equip Australia with practical and effective adaptation options to climate change and variability and in doing so create $3 billion per annum in net benefits by 2030.

Science

The quality of CSIRO's science is critical to the Organisation's reputation and impact. We therefore continue to develop our high-quality science capabilities and produce world-class outputs.

- CSIRO scientists, with their partners, have continued to deliver quality science outputs at the highest level in areas as diverse as: the discovery of a toxin that leads to necrotic enteritis, a disease that costs the poultry industry $2 billion annually; analysing 'the oceans' carbon flux via the chronically understudied carbon particulates in the deep sea 'twilight zone' (up to 1000 metres); and numerical analysis and modelling of the missing mass in the debris of massive galaxies.

- From 2003 to 2008 the average rate at which CSIRO's scientific papers were cited increased from 9.18 citations per paper (cpp) to the current rate of 12.17 cpp. This rate of increase is considerably greater than the average rate of increase for both Australia and for the world. Amongst Australian institutions that publish across a broad range of research fields, and ranked by citations per paper, CSIRO (12.17 cpp) and the ANU (12.13 cpp) lead in Australia.[1]

- Averaging two each month, in 2007 CSIRO scientists published a record 23 articles in the prestigious journals *Nature* (and its affiliates), *Science* and the *Proceedings of the National Academy of Sciences* in the USA.

- Worldwide, CSIRO is in the top one per cent of scientific institutions in 13 research fields based on the total number of citations to papers published in these fields.[1] These range from agricultural sciences, biology and biochemistry, through to chemistry, computer science and space science. Over the past three years there has been a notable increase in CSIRO's worldwide position in the computer science field, as well as an increase in biology and biochemistry and chemistry.[1] Based on total citations, CSIRO is in the world's top ten institutions in plant and animal sciences, agricultural sciences and environment and ecology.[1]

- The exceptional quality of CSIRO's scientists and engineers is well demonstrated by the many awards and honours bestowed on them in the year under review, led by three CSIRO scientists receiving the nation's highest prizes for science excellence in November 2007: Drs Peter Waterhouse and Ming-Bo Wang won the Prime Minister's Prize for Science for their discovery and development of a gene silencing mechanism which is causing a revolution in crop, medical and livestock research worldwide; and Dr Beth Fulton was awarded the Science Minister's Prize for Life Scientist of the year in recognition of her outstanding achievements in marine ecosystem modelling and its impact on understanding climate change and managing the impact of fishing.

- A major focus in this past year's Science Investment Process has been to support the development of four Transformational Capability Platforms that will enable CSIRO to remain at the forefront of international science in the critical areas of transformational biology, advanced materials, computational and simulation sciences, and sensors and sensor network technologies.

Relationships

Building and maintaining strong relationships with customers, partners, staff and other stakeholders is critical to CSIRO's success.

- The National Research Flagships Program, through the Collaboration Fund, now has over 400 partners with Australian universities and publicly funded research institutions, the private sector and selected international organisations. The Collaboration Fund helps facilitate the involvement of the wider research

[1] *Essential Science Indicators, ISI, Thomson Reuters – Scientific, for the period ending 30 June 2008*

community in achieving the ambitious goals set by the Flagships. The funds available are spent outside of CSIRO and, in addition to the ten large research clusters presently operating, a third round was funded in 2007–08 addressing areas from intelligent grid modelling for electricity distribution to longitudinal studies of dementia, cancer and cardiovascular disease in the elderly. The first half of 2008 also resulted in submissions being sought for the fourth round of clusters seeking expertise including alignment with the goals of the three new Flagships.

- More generally, CSIRO continues to be involved in many collaborative activities with universities and other research organisations. More than 2600 of CSIRO's 6400 staff are currently located on, or directly adjacent to, University campuses. This provides the means of sharing research infrastructure and improves opportunities for increased collaboration. For example (and more detail can be found later in this Report):

  - Using high-speed data networks, scientists from the Australia Telescope National Facility have connected radio telescopes in several countries and streamed their data back to Australia for instant processing. This has slashed the time needed for multi-telescope experiments from weeks to hours. The technique uses several widely separated telescopes to simulate a much bigger one, up to thousands of kilometres in size. CSIRO's pioneering efforts were recognised by an award from the US-based Internet2 consortium, which represents more than 300 universities, companies and government research institutions.

  - As part of a *Southern Surveyor* voyage (the Marine National Facility Research Vessel, owned and managed by CSIRO with operations funded by the Australian Government), a multidisciplinary research team from CSIRO and the Australian National University, while investigating the activity of subsea volcanoes to the north of Papua New Guinea, discovered the world's first upper mantle xenolith. This discovery will have fundamental impacts on the scientific understanding of explosive volcanism, mineralisation, and formation of the continental crust.

- It is imperative for CSIRO to ensure strong relationships with our key stakeholders and seek feedback on our efforts. During 2007–08, CSIRO executives completed 50 detailed key client interviews around our strengths as well as our shortcomings, particularly in the execution of our business strategy. The feedback from clients has been most positive about the process and the willingness of CSIRO to listen and engage.

- During the year, CSIRO implemented two carefully focused initiatives to assist Australian industry, and in particular Australian Small and Medium Enterprises (SMEs), to more easily locate and apply the most appropriate science and technology to grow their business. Our SME Engagement Centre provides an entry point to help SMEs effectively navigate and engage with CSIRO and others in the National Innovation System. Australian Growth Partnerships is a new, competitive, merit-based pilot funding program managed by CSIRO to assist Australian SME companies to improve their industry competitiveness.

- To further strengthen our relationships with Indigenous Australians, CSIRO initiated an Indigenous Engagement Strategy in July 2007 and, under the guidance of a Steering Committee, we have made solid progress. We recently hosted the Broome Roundtable where CSIRO executives met with influential Indigenous leaders from across Australia to develop a strategic response and commit to an action plan around the four key areas of enhancing scientific opportunities, Indigenous employment, education and outreach and cultural learning and development.

- Feedback from our staff is critical for CSIRO's

success. During the year, we obtained valuable staff input using a range of polls including a full Insight Survey as well as face-to-face meetings and workshops. This extensive and direct engagement of staff has been used to enhance the communication and implementation of our strategy, and to highlight key areas for further building positive staff engagement, for example, through simplifying organisational processes. The Insight Survey revealed a strong staff commitment to our strategy and overall staff satisfaction remains largely unchanged despite considerable changes in CSIRO's operating environment.

- In support of the Organisation's commitment to a safe and healthy work environment and systems of work, a new 2007–11 Health, Safety and Environment (HSE) Strategy has been developed with input from a wide range of staff. It has the aspirational vision '*Striving for Zero Harm*' – encompassing zero injuries, zero illnesses, zero environmental harm, and zero tolerance of unsafe behaviours. The strategy has delivered very pleasing progress in HSE outcomes including more than a 70 per cent improvement in the lost time injury frequency rate and close to a 40 per cent improvement in the medical treatment frequency rate. These positive developments in the health and safety of our staff are also reflected in our Workers Compensation premium rate, which at 0.53 per cent of payroll, is one of the lowest amongst all Australian Government agencies, the average for which is 1.36 per cent.

Resources

Efficient and effective resourcing is essential to CSIRO's capacity to deliver the innovative solutions required to address Australia's economic, social and environmental challenges.

- CSIRO's Science Investment Process (SIP), developed in 2004–05 as a systematic approach to prioritising research investments across CSIRO for maximum benefit to Australia, was further refined this year. Integration with other planning and reporting processes was improved and more substantive consideration given to developing research capability, including investment in scientific facilities and equipment. The investment decisions made in this year's SIP are summarised further in this Report and include:

  - additional investments in the domains of clean energy, water, and climate adaptation

  - generating funds for redeployment in high priority areas by driving consolidation/ efficiencies in areas such as biodiversity, food, oceans and security

  - redirection of appropriation funding from near-market and incremental research to address, more systematically, issues affecting the long-term viability of Australian agriculture.

- CSIRO makes a substantial contribution to developing Australia's research and innovation capability. In response to the increasingly competitive labour market for leading-edge researchers CSIRO has developed an integrated 'career ladder'. This involves an expanded Postgraduate Scholarship and Postdoctoral Fellowship Scheme and the provision of targeted development to our early career scientists, for example:

  - During 2007–08, CSIRO introduced the (Ruby) Payne-Scott Award, named after CSIRO's distinguished female Australian pioneer in radiophysics and radio astronomy, which offers support to researchers who have taken career breaks to care for family, to re-establish themselves and re-connect with the research underway in their field.

  - We provided recognition through enhanced support (particularly via fast tracking development and support for international secondments at world leading

research laboratories) for 12 high achieving early to mid-career scientists through the Julius Career Awards, named after the former Chairman of CSIRO, Sir George Julius.

- We continue to attract world-class scientists to CSIRO though our CEO's Science Leader Scheme which to date has attracted 15 leading mid-career researchers (with five new appointments in 2007–08) located in a number of Divisions where they contribute to our culture of scientific excellence.

- In addition, CSIRO plans to recognise ten of our best senior researchers through the recently announced (Helen) Newton Turner Award, named after one of CSIRO's and Australia's foremost geneticists, offering professional development to ensure they maintain their outstanding record of achievement.

- We also recognised an additional two (contributing to a total of 12) of our most eminent scientists through the CSIRO Fellows program.

- In 2007–08, revenues from CSIRO's intellectual property (IP) increased significantly to a record $81.7 million, compared to $30.6 million in 2006–07 (and $9.3 million in 2000–01). This budget-exceeding result was driven primarily by a single, large transaction where CSIRO sold 50 per cent of its shareholding in its spin-out company in underground coal gasification, Carbon Energy Pty Ltd.

- For the first time, CSIRO's revenue exceeded $1 billion. In addition and over the financial year, based on a total revenue of $1 091 million ($4.7 million above budget), CSIRO delivered a positive operating surplus of $47.7 million, against a budgeted break-even result, primarily arising from the abovementioned increase in IP revenue.

- Like many agencies, the May 2008 Federal Budget resulted in a reduction of appropriation funds through the efficiency dividend. For CSIRO, the reduction of approximately $15 million per annum over the next four years was applied across the Organisation's total budget. This required intervention and a reduction in the number of operating Divisions (by two) and some site closures. Offset against these reductions, funding was earmarked for substantially further increasing CSIRO's activity in clean coal technology and renewable energy.

- CSIRO's combined electricity and natural gas usage in 2006–07 (the latest year for which data are available) was the lowest in five years, and greenhouse gas emissions are now the lowest in ten years. To guide further improvement in our environmental performance, CSIRO has developed an enhanced Environmental Sustainability Strategy that identifies ambitious headline targets for carbon (carbon neutral by 2015), water (cut mains water consumption in half by 2015) and waste (cut generation in half by 2015).

Looking ahead

In summary, 2007–08 presented a solid year of performance. It represents the first year of implementing the 2007–2011 Strategic Plan, and as part of an ongoing journey to 2015.

Over the past year, in the spirit of aligning our organisational systems and processes with the strategic imperative of 'One-CSIRO', we implemented an enterprise-wide information system and processes based on the SAP platform and have now formally moved to matrix operations management. Both these changes are significant, presenting considerable challenges requiring substantial effort across the Organisation. The next 12 months will see the bedding down of these systems and processes as CSIRO staff transition to new ways of working.

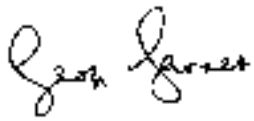
Looking ahead, we will continue the implementation of our 2007–2011 Strategic Plan through: addressing national challenges and opportunities, faster and better; further focusing and strengthening our core science capability and delivery across the diverse array of CSIRO's science and technology impacting domains; and strengthening our enterprise and enhancing our operational excellence. In so doing, in 2008–09 specifically we will focus attention on a small number of strategically significant activities, namely:

- Further clarification, focus and enhancement of CSIRO's **external engagement** processes and activities to achieve greater impact from, and increased resources for, CSIRO research.
- Continued development of CSIRO's **capability** management framework, aligning and integrating capability related activities around people, infrastructure and organisation.
- Improved effectiveness and efficiency of CSIRO through appropriate **simplification** and integration of business processes, practices, procedures, governance arrangements and structures.

During the year ahead, the outcomes of the Review of the National Innovation System will be delivered, and CSIRO will undoubtedly respond appropriately, timeously and effectively to the opportunities and responsibilities this will present.

The 2008–09 year will also see the appointment of a new Chief Executive for CSIRO who, with the support of the CSIRO Board, will continue the implementation of our strategic journey.

Finally, it is with great pride (and some sadness) that I present the 2007–08 CSIRO Annual Report, my last of eight years as Chief Executive. The huge achievements that CSIRO continues to deliver, further nurturing the iconic label so well deserved, are entirely the result of the talents, passion and efforts of CSIRO staff, whose creative and innovative input, and ability to focus and partner, continues to translate into the delivery of great science and practical solutions for the benefit of Australia.



Geoff Garrett AO
Chief Executive
September 2008

Section 1 – Strategy
CSIRO's roles, strategy and performance framework

CSIRO's roles, strategy and performance framework

Section 1 of this Annual Report sets the context for the performance reported in Sections 2–5 by:

- summarising the roles that CSIRO plays in contributing to the National Innovation System (NIS)
- introducing the key elements of the Organisation's strategy for the 2007–11 period – including its measures of success
- introducing the formal 'Outcome-Outputs' framework that provides the basis for funding of the Organisation by the Australian Government.

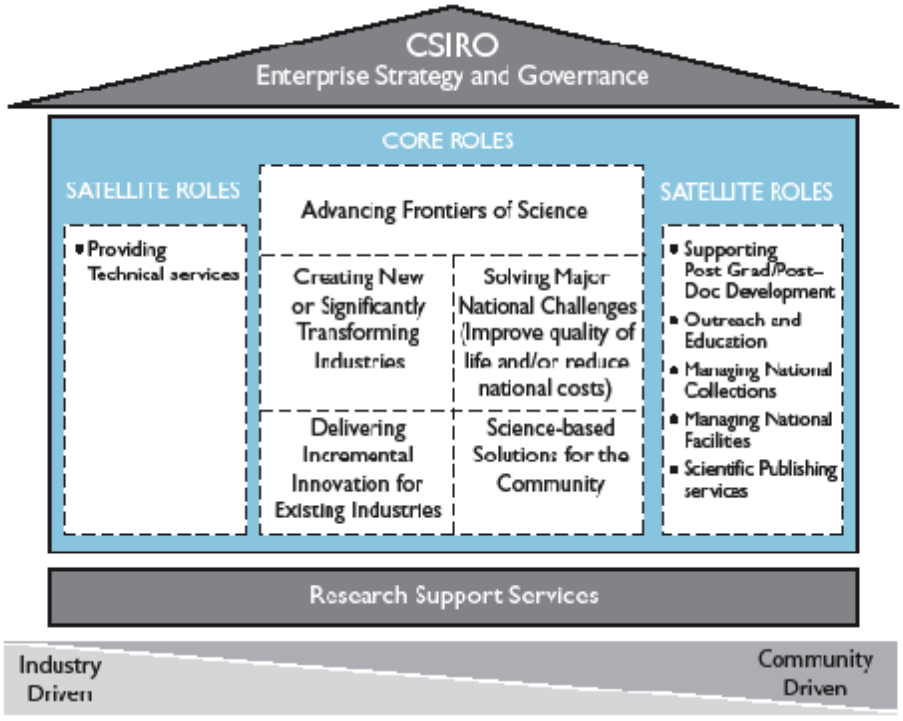
Our roles in the National Innovation System

CSIRO has a clear sense of the roles it plays in the NIS. This helps the Organisation focus its activities to deliver greater impact. Clear articulation of our differentiated roles is also critical so that others can partner with us for maximum benefit to Australia. Figure 1.1 provides a simple representation of our roles via a model of a house.

The 'role house' illustrates CSIRO's core roles as the central rooms of the house. These are the principal means by which CSIRO delivers impact for Australia. They are areas in which CSIRO is, or has the potential to be, distinctive and can deliver high-value for Australia. Satellite roles – six ancillary roles that complement our core science activities and enhance their impact – are shown to either side of the core roles. The core and satellite roles are underpinned by effective research support services (the 'floor') and directed by a clear organisational strategy and good governance (the 'roof').

Whilst the role house defines the type of activities undertaken by CSIRO, these activities have impact across a range of broad industry, community and environmental areas – or

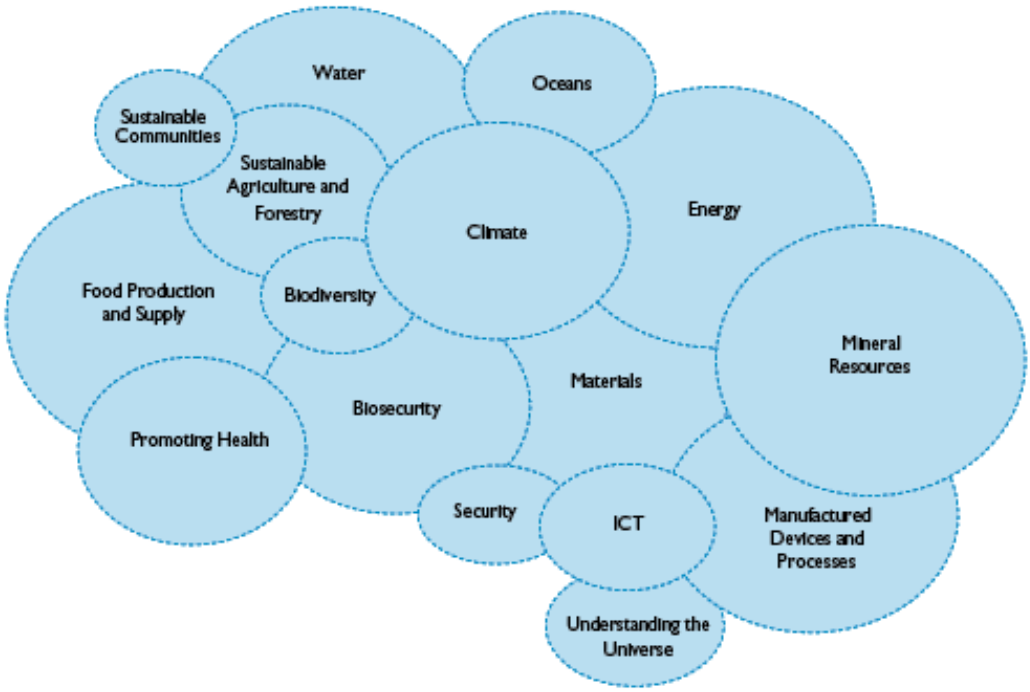
Figure 1.1: CSIRO's role house



'Outcome Domains' – in which our science will deliver important and tangible benefits for Australia (see Figure 1.2). These 'outcome domains' are all areas where CSIRO has a strong position nationally, and where we expect to see continuing breakthroughs and discoveries in the coming years.

The diagram provides an overview of our current focus and the connections across the areas. The sizes of the ellipses are related to approximate investment in each area. Section 2 of this report contains illustrative examples of CSIRO science delivering into each of these outcome domains.

Figure 1.2: Outcome domains: broad areas in which CSIRO science delivers benefits



A strategic roadmap

To better fulfil our roles in a changing national and global context, at the start of the 21st century CSIRO embarked upon a new long-term strategy. A vision was set to grow CSIRO's impact and to make our work more relevant and of greater benefit to Australian society. To this end, a strategy was devised that sequenced four coordinated plans extending 15 years. Each plan represents a different step towards achieving CSIRO's vision as a research enterprise with global reach:

- 2000–03 was characterised by CSIRO's commitment to being more relevant and delivering greater value to our stakeholders and clients
- 2003–07 was spent refocusing on delivery and execution; building scale, flexibility and multidisciplinary approaches. This required some tough decisions as CSIRO concentrated on strategy implementation
- 2007–11 will see a build-up of momentum as the most successful paths for growing our impact become more clear
- 2011–15 will be a period of increasing impact and accelerating the delivery of national benefits.

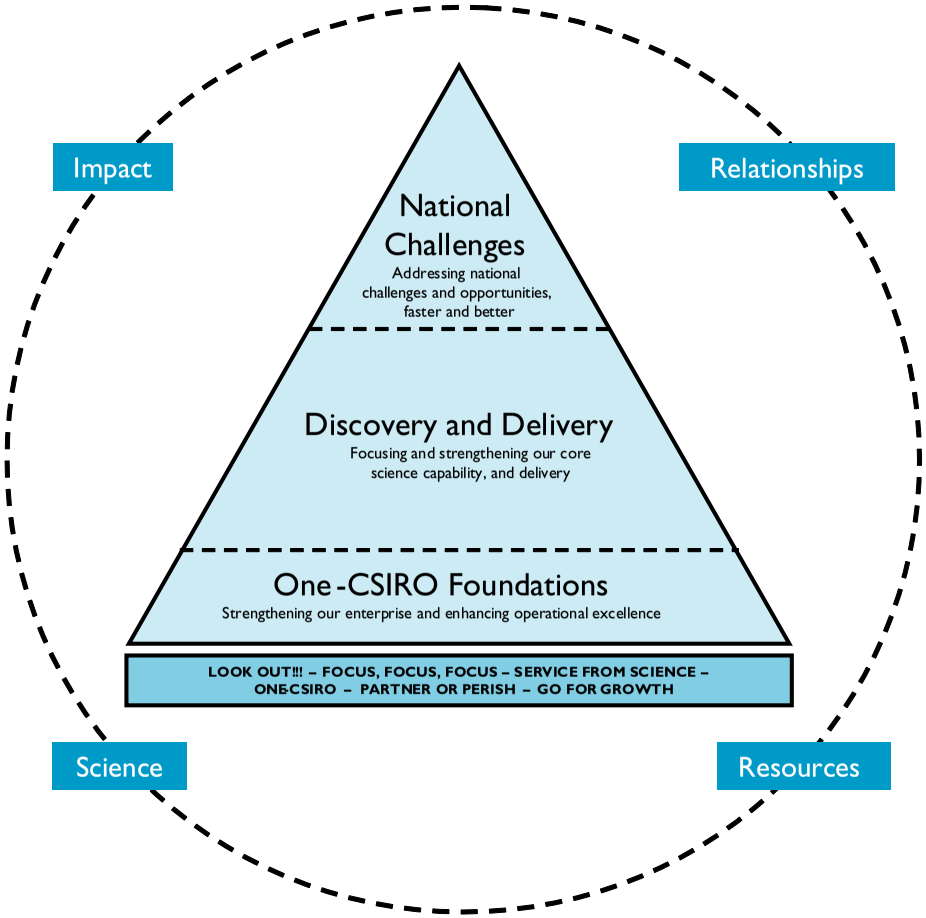
Figure 1.3: Strategic Plan 2007–2011: Strategic elements and success measures

Delivering results with relevance and impact in areas of importance for Australia:

- Economic, social and environmental benefits such as new products and services
- Significant progress towards achieving National Research Flagship goals
- Increasing commercial use of CSIRO intellectual property assets and delivery of client reporting.

Performing high-quality science:

- Scientific output is high, eg. as indicated by the number of peer reviewed publications and citations
- Independent assessment of our science capability and quality
- Sustainable and accessible infrastructure; and delivering quality school (student, teacher) and postgraduate education and training support.



Building and maintaining strong relationships with customers, partners, staff and other stakeholders:

- Continuously improving CSIRO customer and partner feedback
- CSIRO staff satisfaction continuing to exceed international benchmarks
- Superior Health, Safety and Environmental performance.

Effective resourcing of activities:

- Optimal revenue per researcher in real terms
- Our workforce profile continues to be aligned with strategic initiatives
- Continue priority investments in science.

To mark the beginning of the third episode in CSIRO's 15-year strategic journey, CSIRO has developed a new Strategic Plan for the period 2007–2011 titled 'Building Momentum and Increasing Impact'. It consists of three strategic elements (see Figure 1.3):

- addressing national challenges and opportunities, faster and better
- focusing and strengthening our core science capability and delivery
- strengthening our enterprise and enhancing operational excellence.

As illustrated in Figure 1.3, the Strategy continues to embed the six key messages on which the previous strategic plan was built: *greater focus* on major scientific challenges and opportunities for Australia with a strong *outward-looking* emphasis, *stronger partnerships* with universities, other science agencies and industry with a *'service from science'* culture, a *unified One-CSIRO*, maximising our collective strengths and *growing our impact and relevance* in service to the nation.

The Strategy makes it clear that CSIRO's success is primarily dependent on delivering results with relevance and impact for Australia. Demonstrated **impact** is therefore the ultimate measure of CSIRO's success but performing high-quality **science**, building and maintaining strong **relationships**, and effective **resourcing** of activities are the necessary drivers (and lead indicators) of future impact. Taken together, indicators of performance over time in these four crucial dimensions will provide a snapshot of the overall effectiveness of CSIRO's strategy. Based on the availability and reliability of data, potential behavioural effects and the needs of a variety of stakeholders, we have selected a number of key indicators in each of these dimensions (see Figure 1.3). Sections 2–5 of this Annual Report are structured around each of these four success measures in turn.

Outcome–Outputs Framework 2007–08

All Australian Government agencies that receive appropriations from Parliament are required to develop an 'outcomes and outputs' framework that provides the context for their corporate governance, management and reporting systems. With Government agreement, CSIRO developed a new outcome statement and a new output framework which took effect at the commencement of the strategic planning period in July 2007 (see Table 1.1).

Outcome statements define the purpose for which appropriations are provided in terms of the impact government is seeking to achieve from the application of those funds. CSIRO delivers many different types of research products and services (outputs) which complement and interact with each other. For management and reporting purposes these are usefully gathered in the four output groups described below.

- **Output 1: National Research Flagships** – CSIRO initiated the National Research Flagships Program in 2002 to bring focus and scale to research addressing some of Australia's most important and complex challenges and opportunities. In 2007–08, CSIRO created three new Flagships (Climate Adaptation; Minerals Down Under; and Niche Manufacturing) in addition to the existing six Flagships (Energy Transformed; Food Futures; Light Metals; Preventative Health; Water for a Healthy Country; and Wealth from Oceans).
- **Output 2: Core research** – CSIRO contributes across the breadth and depth of the National Innovation System by delivering new and improved technologies; management systems; intermediate and final products; catalyst services for business; advice relevant to policy development; and new knowledge and skills.

- **Output 3: Science outreach: education and scientific publishing** – As indicated in the opening section to this report (see page 3), CSIRO conducts a range of science education programs for primary and secondary school students and their teachers, and hosts the CSIRO Discovery Centre in Canberra. CSIRO also operates CSIRO PUBLISHING as an independent science and technology publisher with a global reputation for quality products and services covering a wide range of scientific disciplines, including agriculture, the plant and animal sciences, and environmental management.
- **Output 4: National research infrastructure: national facilities and collections** – CSIRO hosts three major national research facilities (the Australian Animal Health Laboratory, the Australia Telescope, the Marine National Facility – Research Vessel *Southern Surveyor*). CSIRO also manages the Australian National Fish Collection, the Australian National Insect Collection, the Australian National Herbarium the Australian National Wildlife Collection and several other national reference collections. These facilities and collections are managed by CSIRO on behalf of the broader Australian research community.

Section 2 reports on the relevance and impact of CSIRO's achievements in each of these four output groups.

Table 1.1: CSIRO's outcome–outputs framework

Outcome			
Australia has a strong capability in scientific research and development that delivers ongoing economic, social and environmental benefits and provides science and technology solutions relevant to current and emerging national challenges and opportunities.			
Output groups			
National Research Flagships	Core research	Science outreach: education and scientific publishing	National research infrastructure: national facilities and collections

Strategy implementation

2007–08 marked the first year of implementation of CSIRO's new four-year Strategic Plan 'Building Momentum and Increasing Impact'. Our Strategy for 2007–2011 seeks to grow our impact by delivering great science and innovative solutions for industry, society and the environment through three major elements:

- addressing national challenges and opportunities, faster and better
- focusing and strengthening our core science capability and delivery
- strengthening our enterprise and enhancing operational excellence.

The strategy is delivered through the integration, coordination and delivery of a number of strategic activities. While each activity is important to the enterprise in its own right, it is the combination of those initiatives that delivers substantial and sustained value.

Table 1.2 provides a summary and relevant examples of our achievements against each of our 12 strategic objectives over the 12 month period, with Section 2 of this Annual Report providing more detailed case studies and examples of significant progress.

Table 1.2: Performance against strategic objectives

National Challenges	*Summary of progress*
Accelerating and expanding Flagships	• Two new Flagships (*Climate Adaptation* and *Minerals Down Under*) successfully established and launched. • Planning for a third new Flagship (*Niche Manufacturing*) well advanced. • Advisory Committees have been established for all new Flagships. • Activity has commenced for significant expansion of investments in alternative transport fuels (*Energy Transformed Flagship*); *inter alia*, this facilitated the Future Fuels Forum process, the report from which was finalised and delivered.

Growing Flagship collaborations	• The scope of the Flagship Collaboration Fund was expanded to involve international partners. • The number of partners (over 400) and level of activity supported by the Fund continued to grow strongly throughout the year. • The quality and quantity of science capability delivered to the Flagships through particularly the Collaboration Clusters, Flagship Fellows and Collaboration Projects has been accelerated rapidly. • The major Murray-Darling Basin Sustainable Yields Project report series (for example) was delivered as part of a multi-partnership.
Building major partnerships	• Establishment with the Bureau of Meteorology of the Centre for Australian Weather and Climate Research – a partnership between Australia's leading atmospheric and oceanographic research agencies, with a staff of approximately 250. • In a further partnership with the Bureau of Meteorology, the Water Information Research and Development Alliance has produced the most comprehensive assessment to date of Australia's future climate. • Expanded the partnership with the Australian Institute of Sport, with the Defence Science and Technology Organisation and NICTA to build and capitalise on Australia's international reputation in sports performance.
Developing science hubs through co-locations	• Development of the Boggo Road Ecosciences precinct in Queensland has been substantially progressed, in partnership with the Queensland government. • Development of the Tropical Science Eco Precinct in collaboration with James Cook University in Townsville. • Integration with industry has been substantially enhanced at the Australian Resources Research Centre in Perth through co-location with major energy industry players. • Further development of the Australian Minerals Research Centre at Waterford (in WA) as part of an ongoing collaboration between CSIRO and Curtin University of Technology.

Discovery and delivery	
Progressing science direction setting	• CSIRO's Science Investment Process (SIP) was further integrated with other planning and reporting processes. • Broader consideration of complementary needs for investment in research capability (encompassing people, facilities and equipment). • Increased the proportion of resources allocation to the priority areas of climate, clean energy and water. • Prioritised CSIRO science investments and re-allocated decisions in response to Federal Budget funding adjustments.
Building Transformational Capability Platforms	• Established an internal Capability Development Fund to provide for additional investment in the development of scientific capability. • Provided funding for the four Transformational Capability Platforms being transformational biology, computational and simulation sciences, advanced materials, and sensors and sensor network technologies. • Attracted and awarded a number of CEO Science Leader Fellowships to attract the best mid-career scientists from across the globe to build additional capability in priority areas.
Ensuring sustainable national facilities and collections	• Additional funding provided for the Australian Animal Health Laboratory and the Australia Telescope National Facility. • The four national biological collections (the Australian National Herbarium, the National Fish Collection, the National Wildlife Collection and the National Insect Collection), will be further strengthened by their integration into a single research theme together with the CSIRO Collection of Living Microalgae for 2008–09. • Made strong progress in establishing the $100 million radio telescope project, the Australian SKA Pathfinder (ASKAP), that will help shape the design of the full Square Kilometre Array (SKA).

Developing our business	• Senior CSIRO executives conducted 50 key client interviews to gain an understanding from the client's perspective of the CSIRO experience – follow-up actions are on-going and relationship plans have been developed for key stakeholders. • We produced over 11 000 client reports to assist industry and government clients deliver benefit for Australia, and our customer value survey results indicated a moderate improvement on each of the three previous years. • Enhanced integration between science and business through the identification of partnership opportunities as part of the Science Investment Process, and engagement annual performance goals are explicitly set and performance measured.
Accelerating science and technology transfer	• A common set of principles has been identified for successful delivery and uptake of science and technology (drawing on a 'best practice' case studies review). • Greater emphasis towards fully integrating 'pathways to impact' for our research endeavours. • CSIRO citations per paper and the journal articles published by CSIRO scientists continued to grow.
Enhancing communications	• A more pro-active approach to communications has achieved, with more consistent messaging, an increasingly positive media profile. • A revised communications and accountabilities framework has been implemented. • A One-CSIRO publishing pipeline process is under development to improve information flow, effective management of the publishing pipeline, timely advice to stakeholders and enhanced 'science into policy' outcomes. • National and international website mentions and media mentions have increased year on year.

One-CSIRO foundations	
Nurturing our innovative culture	• A program to articulate what we value at CSIRO, and the behaviours and performance required to successfully deliver CSIRO's strategy, has been completed and implementation has commenced. • A program to drive step-change improvements in our Health and Safety (HSE) culture and performance has been finalised and implementation commenced – the HSE performance indicators for 2007–08 show that pleasing progress has been made. • A program to aggressively reduce our environmental footprint has been finalised and implementation will commence in 2008–09. • A new Employee Induction Program has been implemented across the Organisation.
Working effectively and efficiently in our enterprise	• Phase I of the Business Enabling Technologies Replacement program (BETR) has been launched leading to the replacement of a number of legacy systems and the establishment of standardised business processes for those activities within the SAP implementation. The implementation included a substantial training and change management emphasis in order to appropriately prepare the business for the transition. • Planning has commenced, and the Organisation has committed to, a focus on simplification of our operations to ensure effective integration across our various change initiatives and streamlined business processes at both enterprise and local levels – CSIRO staff have responded enthusiastically to this initiative.

Section 2 – Impact
Delivering results with relevance and impact

Delivering results with relevance and impact

This section focuses on CSIRO's 'impact' success measure and indicators. It highlights the relevance and impact of CSIRO's research in each of our four output groups and across the breadth of outcome domains introduced in Section 1. Impact primarily refers to the economic, social and environmental benefits that accrue from the application of CSIRO's research via technology transfer or the uptake of scientific advice. Also included are the benefits of having the capability and preparedness to address national challenges that require a sound scientific response (such as CSIRO's response to the equine influenza epidemic (see page 70–71).

National Research Flagships

The National Research Flagships continued to develop during 2007–08, while accelerating delivery of research outcomes linked to their ambitious goals. Most significantly, the three new Flagships announced in the 2007 Federal Budget made substantial progress towards formulating their research agendas.

The Climate Adaptation Flagship was launched by the Minister for Innovation, Industry, Science and Research on 9 July 2008. The Flagship has as its goal 'to equip Australia with practical and effective adaptation options to climate change and variability and in doing so create $3 billion per annum in net benefits by 2030'. The Flagship will focus in particular on adaptation responses for cities, coasts and regions, for primary industries, and for natural ecosystems.

The Minerals Down Under Flagship was launched by the Minister for Innovation, Industry, Science and Research on 27 May 2008. The Flagship aims 'to assist the Australian minerals industry to exploit new resources with an in-situ value of $1 trillion by the year 2030, and more than double the size of the associated services and technology sector to $10 billion per year by 2015'. The Flagship's research agenda includes mineral discovery, future mining technologies, processing technologies for lower grade ores, and industry sustainability.

The Niche Manufacturing Flagship will 'support the development of niche manufacturing businesses based on nanotechnology worth in excess of $3 billion per year by 2020'. While work is continuing on developing the Flagship's research portfolio, it is likely to include research on carbon nanotube technology, medical polymers, advanced sensors and conductive polymers. The Flagship will also take a lead role in assessing and developing responses to the health, safety and environmental impacts of nanotechnology.

In addition, a significant expansion of activity is underway in the Energy Transformed Flagship. CSIRO has been allocated $59.6 million over four years to enable the Flagship to increase research into renewable and non-renewable natural resources that can produce low-emission transport fuels.

The Flagships have also continued to develop and strengthen their industry engagements. Over 400 industry partners and research collaborators have been involved with Flagships to date and nearly 100 patents have been lodged. Research and scientific reports to clients and publication of Flagship research outcomes in journals now total more than 1400.

Flagships external revenue for 2007–08 was $94.4 million (up 264 per cent from $35.7 million in 2006–07). External engagement is a critical success measure for the path to adoption of Flagship research outputs and the external revenue associated with the overall program is projected to grow further in coming years. In addition, in-kind support such as use of a partner's facilities and research expertise, remains very important and signifies continuing strong support for the Flagship Programs.

Flagship funding grew from 29 to 41 per cent of CSIRO appropriation (inclusive of corporate overheads), meaning that CSIRO has achieved its early goal of devoting 40 per cent of its resources to Flagships.

The following pages feature some recent achievements and ongoing work of relevance

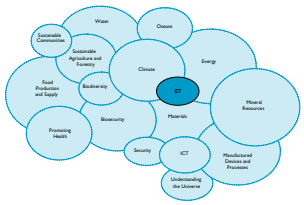
and impact from each of the nine Flagships. These achievements focus on some of the major challenges and opportunities facing Australia today. Further examples and case studies for each of these Flagships can be found on the CSIRO web site at: www.csiro.au/flagships.

The small diagram located with each feature story illustrates only the area of impact of the Flagship in relation to the outcome domains shown in Figure 1.2 (see page 17), and is not related to the size of Flagship investment.

Energy Transformed Flagship

The **Energy Transformed Flagship** aims to halve greenhouse gas emissions and double the efficiency of the nation's new energy generation, supply and end use, and to position Australia for a future hydrogen economy.

Future Fuels Forum delivers benefits to Australia



Against the backdrop of awareness about the environmental impacts of fossil fuel use, peak oil, fuel security and climate change, the Energy Transformed Flagship (ETF) convened the Future Fuels Forum to identify scenarios that could drive Australia to 2050.

The ETF-led initiative brought together 18 leading representatives from Australia's community, industry and government to share ideas and develop a range of options for our nation's transport fuel future.

The Future Fuels Forum began in November 2007 and culminated in July 2008 with the release of the report, *Fuel for thought – The future of transport fuels: challenges and opportunities*.

The report addresses two serious issues – the need to reduce the transport sector's greenhouse gas emissions and how to deal with the economic risks associated with increasingly costly oil supplies.

The Forum sought to present a rational and cohesive view of the challenges and opportunities to be considered for assessment of Australia's future fuel options.

Dr John Wright launched the Future Fuels Forum report with some of the 18 partners involved in the initiative. Photo: Fineprint Productions

The Forum and its report will continue to advance the debate on Australia's transport fuel needs by providing strategic input to decision-makers in industry and government on the options that will need their careful consideration and further research.

The outcomes of this initiative will also inform the ETF's future research into low-emission transport as it works towards its goal of significantly reducing greenhouse gas emissions from the energy sector.

Forum partners included GM Holden, the Australian Conservation Foundation, Biofuels Association of Australia, Australian Association for the Study of Peak Oil and Gas, the South Australian and Victorian Governments, Engineers Australia, Caltex, National Transport Commission and Woolworths.

Other key achievements of the Energy Transformed Flagship include:

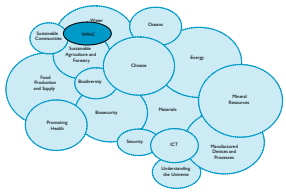
- the UltraBattery – a unique combination of a supercapacitor and lead-acid battery – surpassed a 100 000 miles test in the UK in a low-emission hybrid electric vehicle
- the launch of Victoria's first commercial sustainable energy initiative, called the Maine's Power project, involving partnerships with local business and major energy users in the Castlemaine district to develop a roadmap to collectively reduce greenhouse gas emissions levels by 30 per cent of 2006 levels by 2010
- in collaboration with the Rural Industries Research and Development Corporation, provision of a thorough assessment of Australia's current biofuels sector and recommendations for further research to determine the industry's viability in our nation's energy future.

(See page 46 for further Energy achievements)

Water for a Healthy Country Flagship

The **Water for a Healthy Country Flagship** aims to achieve a tenfold increase in the economic, social and environmental benefits from water by 2025.

Improved water management in the Murray-Darling Basin



The Water for a Healthy Country Flagship and partners have completed what has become the most comprehensive and technically challenging water modelling project ever undertaken in Australia and possibly the world.

For the past five years Australia's Murray-Darling Basin, which generates 70 per cent of Australia's irrigated produce, has been gripped by one of the most severe droughts in a century, resulting in a loss of water security for communities and the environment.

The Murray-Darling Basin Sustainable Yields project has provided a complete assessment of all available water within the Basin, including an examination of assumptions about water availability in light of likely changes in climate and other factors to 2030.

By linking 70 existing and newly developed surface and groundwater models the team has generated a single Basin-wide water model that allows the flows and fate of water to be assessed from one end of the Basin to the other. Estimates for 2030 were provided for a range of possible future climate scenarios, ranging from dry, mid to wet. Reports covering the Basin's

18 regions were released throughout 2007–08, providing governments and industry with an unprecedented level of water information to guide resource planning, management and investment to support future decisions around water resources.

The Murray–Darling Basin covers one-seventh of the Australian continent. Its waters sustain nearly two million people, as well as the 1.4 million residents of Adelaide for whom it also supplies water. The results provide a critical foundation to support the establishment of a new sustainable diversion limit for surface and groundwater for the Murray-Darling Basin.

As testament to the contribution the research makes to understanding and managing Australia's water resources, the Council of Australian Governments has directed that the approaches and methods developed for the project be extended to all major river systems across the country to increase our understanding of current and future water availability.

Led by CSIRO, the project involved over 170 professionals from government, industry, the Murray-Darling Basin Commission and private industry.

Other key achievements of the Water for a Healthy Country Flagship include:

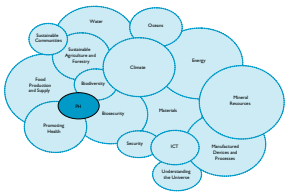
- the establishment of a research Alliance to deliver sustainable water supplies to south-east Queensland
- developing accurate measurements of the sediment and nutrient loads from Great Barrier Reef catchments
- helping drought management through the development of a website with historical and current data on water availability in Australian soils
- improving our ability to track the interaction of groundwater and surface water.

The River Murray: CSIRO has provided the most comprehensive assessment of water availability in the Murray-Darling Basin. Photo: Bill Bachman

Preventative Health Flagship

The **Preventative Health Flagship** aims to improve the health and wellbeing of Australians and save $2 billion in annual direct health costs by 2020 through the prevention and early detection of disease.

Detecting Alzheimer's disease early



The Preventative Health Flagship's inaugural Collaboration Cluster, the Australian Imaging, Biomarker and Lifestyle (AIBL) Flagship Study of Ageing, has found a way to bring forward the detection of Alzheimer's disease by up to 18 months using a brain imaging technique.

Dementia, most of which is caused by Alzheimer's disease, affects over 200 000 Australians, with the number expected to rise to over 700 000 by 2050. Alzheimer's was estimated to have cost $5.6 billion in 2002. Delaying the onset of Alzheimer's disease by just five years has been calculated to reduce new cases by 50 per cent, with cumulative Australian health cost savings of up to $13.5 billion by 2020.

Alzheimer's disease is characterised by very high-levels of a molecule called beta-amyloid in the brain. PiB PET can show the beta-amyloid in the brain. AIBL researchers have shown that this scan can be used as a diagnostic tool to potentially distinguish patients with early Alzheimer's disease from others without the disease, even before clear signs of memory loss are present.

AIBL is a collaborative, multidisciplinary research activity between the University of Melbourne, Edith Cowan University, Neurosciences Australia, the Mental Health Research Institute of Victoria, the National Ageing Research Institute and the Preventative Health Flagship, with involvement of the Australian e-Health Research Centre.

Amyloid beta plaque in the brain follows specific patterns as detected by CSIRO's analysis technique from PiB PET scans, here an AIBL volunteer is receiving a PiB PET scan. Photo: Nick Pitsas

AIBL's main purpose is to bring together a team of leading stakeholders in the area of Alzheimer's disease and to build one of the most comprehensive studies in the world. AIBL was initiated to make a significant impact into the projected Alzheimer's disease epidemic by discovering ways to diagnose patients earlier, intervene with diet and lifestyle factors to delay the onset of the disease, and ultimately find ways to prevent the onset of the disease.

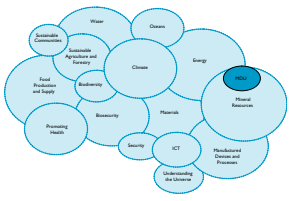
Other key achievements of the Preventative Health Flagship include:

- demonstrating that CSIRO's Starplus™ reduces cholera symptoms more effectively than the best currently available treatments in an animal model
- creating and delivering the 'Get set 4 Life – habits for healthy kids' guide book which the Commonwealth Department of Health and Ageing is distributing to parents of four-year-olds as part of the newly introduced health check
- working with our partners to increase participation rates in the National Bowel Cancer Screening program (NBCSP) we have shown that a prenotification letter sent prior to the formal invitation to take part in the program, could increase screening participation rates by as much as 25 per cent. A prenotification letter is now included in the NBCSP process.

Minerals Down Under Flagship

The **Minerals Down Under Flagship** aims to assist the Australian minerals industry to exploit new resources with an in-situ value of $1 trillion by the year 2030, and more than double the size of the associated services and technology sector to $10 billion per year by 2015.

Economic and environmental savings for the iron and steel industry



Turning waste into an economic resource is one of the holy grails of sustainability research. The Minerals Down Under Flagship plans to use waste heat and slag from iron production to make deep cuts to greenhouse gas emissions.

Iron and steel production create slag, a residue from the smelting process. The Australian industry produces over two million tonnes of slag each year that is usually air-cooled and sent to landfills, or used as road base. Some blast furnace operations water-granulate slag to produce glassy granules, that can be used in cement.

CSIRO's process feeds molten slag on to a rotating disc. This breaks the slag into small droplets for heat recovery and solidification into glassy granules. The granules can be used in Portland cement, a key constituent of concrete. Globally, about 2.3 billion tonnes of cement is produced each year. Producing Portland cement consumes electrical and thermal energy and emits large amounts of carbon dioxide. Granulated slag can substitute for up to 70 per cent of the Portland cement leading to significant energy and greenhouse gas reductions.

Conventional wet granulation involves high capital costs, consumes water and does not recover valuable heat. Dry granulation is an attractive alternative with lower capital cost and benefits in heat recovery and reduced pollution.

An economic assessment of CSIRO's new integrated process identified potential annual savings in fuel costs of about $20 million for the Australian industry and over $3 billion for the global steel industry. But this is only a fraction of the benefits. If the value of slag as cement and the reduction in carbon taxes are included, estimates suggest savings of about $300 million for Australian operations, and about $30 billion worldwide.

Successful development and commercialisation of the technology in Australia will reduce greenhouse gas emissions by millions of tonnes, reduce water consumption by thousands of millions of litres and convert millions of tonnes of slag into cement.

Other key achievements of the Minerals Down Under Flagship include:

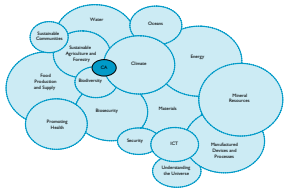
- a successful test using microseismics to track and control a drill more than 300 metres below the surface
- the publication of a geochemical map of the north Yilgarn resulting in a quadrupling of monthly tenement uptake
- the initial testing of 'Sweetspot' – an automated drill controller designed to increase drilling production rates and longevity of the drill bit.

Dr Dongsheng Xie and Mr Bernie Washington with CSIRO's pilot-scale dry granulation rig. Photo: Mark Fergus

Climate Adaptation Flagship

The **Climate Adaptation Flagship** aims to equip Australia with practical and effective adaptation options to climate change and variability and in doing so create $3 billion per annum in net benefits by 2030.

Assessment prepares Sydney councils for climate change



A vulnerability assessment prepared by the Climate Adaptation Flagship and the Sydney Coastal Councils Group (SCCG) is helping Sydneysiders understand their vulnerability to climate change, and prepare for the potential impacts.

Sydney's future climate is likely to be both warmer and drier, while sea-level rise is projected to increase the risk of inundation and erosion along the coastline, and local governments are expected to play a key part in managing the implications of these changes.

This project brought together some of the nation's leading climate adaptation experts to design and implement an integrated research effort. The research addressed physical changes in climate, as well as the demographic, economic, landscape and infrastructure factors that dictate a region's capacity to respond to such change.

During the first part of this three phase project, climate change projections and socio-economic data were used to generate maps of vulnerability to five climate change impacts: extreme heat and health effects; sea-level rise and coastal management; extreme rainfall and stormwater management; bushfires; and ecosystems and natural resources.

These maps were then used in a second project phase consisting of workshops with all 15 SCCG member councils, between August and October 2007, to improve their understanding of the

The Sydney Coastal Councils Group's Mr Geoff Withycombe says working with CSIRO has given local governments in one area a head start in preparing for the impacts of climate change, such as improving on current practices of buffering Sydney's beaches against erosion with rock walls. Photo: David McClenaghan

causes and potential impacts of those changes and what will be needed for communities to respond.

Vulnerability assessments are an essential first step towards more effective climate adaption. The project's final phase will be a series of case studies to investigate councils' capacity to respond to climate change.

The insights obtained from the Sydney region are already inspiring other councils throughout Australia to begin similar preparations.

The report *Mapping Climate Change Vulnerability in the Sydney Coastal Councils Region*, publicly released on 29 April 2008, was produced by CSIRO and the SCCG in collaboration with the University of the Sunshine Coast, and funded by the Australian Government Department of Climate Change.

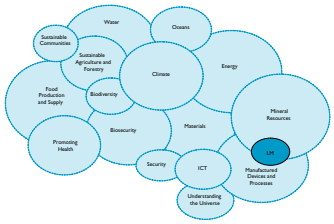
Other key achievements of the Climate Adaptation Flagship include:

- new, more accurate tools for predicting the behaviour of bushfires
- a report on likely future drought patterns, and their implications for drought policy
- a major national review of climate change adaptation options for primary industries.

Light Metals Flagship

The **Light Metals Flagship** aims to lead a global revolution in light metals, doubling export income and generating significant new industries for Australia by the 2020s while reducing environmental impact.

New barrier coating for anodes



The Light Metals Flagship has developed a low-cost barrier coating that protects the carbon anodes used in high-temperature electrolytic cells in aluminium smelting. The new coating extends the operational life of carbon anodes and will significantly improve efficiency at smelters leading to substantial cost and environmental savings.

Carbon anodes are made from high-quality petroleum coke. The aluminium industry is the major user of this commodity – about 0.5 tonnes of carbon is used to produce every tonne of aluminium, and as quality petroleum coke becomes less available world-wide, its price is rising.

The interior of aluminium electrolysis cells is very hot – smelter cells operate at about 950°C. At this high temperature the top and sides of the anode, which are exposed to air in the cells, are subject to oxidation by air burn. Air burn can spread to adjacent anodes, increasing the rate of consumption. This leads to more frequent anode replacement and disruption to the smelting process.

The CSIRO barrier coating protects the exposed anode surfaces, preventing the surface burning and reducing heat damage. It also offers environmental benefits, by reducing CO_2 generated by air burn, and energy savings, by preserving the effective surface area of the anodes during operation.

Trials in both Australian and overseas smelters have demonstrated the effectiveness of the barrier coating. The coating maintains its integrity

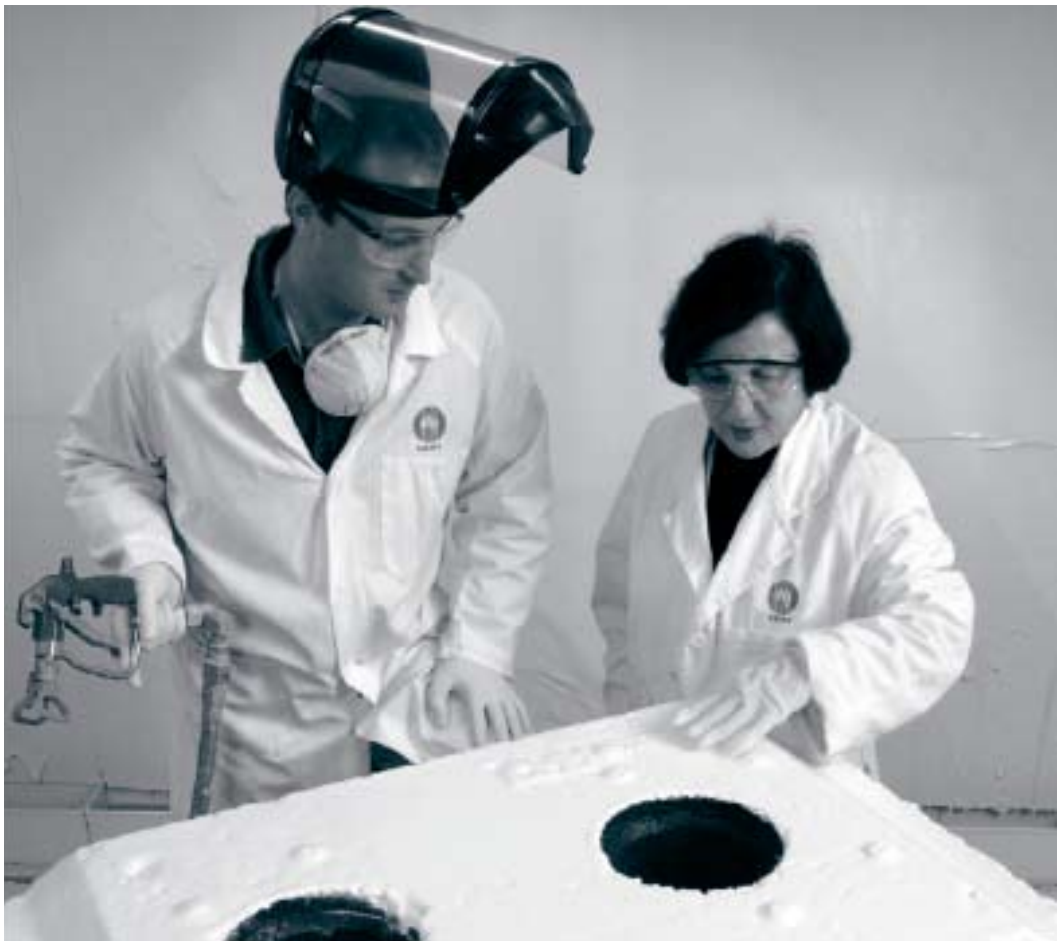
throughout the life of the anode, without cracking, and importantly, using coated anodes presents no safety problems. The anodes survived the rigours of transport via ship, truck and smelter conveyor without damage to the coating.

Management at the overseas smelter at which the trial was conducted gave the coating a glowing endorsement, calculating potential savings in reduction of consumption of petroleum coke alone at over US$1 million per year for that smelter.

CSIRO has received expressions of interest from other smelters to undertake large trials of several hundred coated anodes and expressions of interest in licensing the coating process.

Other key achievements of the Light Metals Flagship include:

- optimising design of the next-generation aluminium production pilot cell
- facilitating exploitation of Australian bauxite deposits through management and processing strategies
- doubling the strength of aluminium car parts through revolutionary heat treatment.

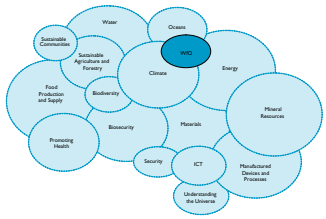


Project officer Mr Enzo Gulizia and Dr Mahnaz Jahedi inspect the surface of a freshly coated carbon anode, for trial use at an aluminium smelter. Photo: Mark Fergus

Wealth from Oceans Flagship

The **Wealth from Oceans Flagship** aims to position Australia by 2020 as an international benchmark in the delivery of economic, social and environmental wealth based on leadership in understanding ocean systems and processes.

Robots help track ocean warming



The global Argo project, in which the Wealth from Oceans Flagship is a partner, established a network of 3000 futuristic, 1.5-metre tall ocean robots operating simultaneously throughout the world's oceans.

This worldwide network has helped CSIRO and other Australian scientists closely track how fast and where the ocean is warming due to increased greenhouse gases.

The Argo project substantially boosts scientists' ability to grapple with some of the big climate questions. The data provided by Argo are vital in fathoming the influence of oceans on climate and the effects of ever-changing ocean weather on marine ecosystems and fisheries productivity.

Argo also provides key data to BLUElink – a system developed by the Flagship, the Bureau of Meteorology and the Royal Australian Navy to provide the first operational ocean forecasts with a focus on the Australian region.

Using a satellite-based data delivery system, the Argo robots provide ocean forecasters and climate scientists with a detailed sub-surface view of nearly all corners of the world's oceans every ten days. Vast regions of the Southern Hemisphere oceans, which were previously unmeasurable because of their remoteness and often stormy conditions, are now being systematically probed for the first time.

Argo Australia is part of the National Collaborative Research Infrastructure Strategy's Integrated Marine Observing System, supported by the Australian Department of Climate Change, the Wealth from Oceans Flagship, the Bureau of Meteorology, the Royal Australian

An Argo ocean monitoring float being prepared for deployment from the Japanese research vessel *Mirai* during a Southern Hemisphere circumnavigation voyage in which CSIRO scientists participated. Photo: Japanese Marine Science and Technology Centre

Navy and the Antarctic Climate and Ecosystem Cooperative Research Centre.

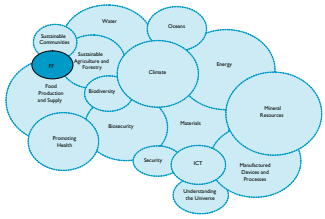
Other key achievements of the Wealth from Oceans Flagship include:

- BLUElink – which was one of several tools used in the successful search for the HMAS Sydney, helped trans-Tasman kayakers plan their voyage and is being rolled out operationally by the Royal Australian Navy
- working with collaborators to document and remove a significant bias in most of the historical ocean temperature database, discovering that the global ocean has warmed, expanded and risen at a rate 50 per cent faster than previously believed
- a field trial of prototype software that demonstrated multi-million dollar value in oil well design savings and increased oil recovery.

Food Futures Flagship

The **Food Futures Flagship** aims to transform the international competitiveness of the Australian agrifood sector by the application of frontier technologies to high-potential industries, adding $3 billion value annually.

Next step in gluten free foods



The Food Futures Flagship has been working with the Walter and Eliza Hall Institute, with support from the Grains Research and Development Corporation, to develop a barley-based beer designed for people with coeliac disease.

This is the first in a suite of products that will provide coeliac sufferers with foods their bodies can tolerate.

Coeliac disease is one of Australia's most common, yet most undiagnosed, chronic diseases. It is an auto-immune disease triggered by gluten, a protein found in wheat, rye, barley and oats.

Approximately one in 100 Australians is affected, with four out of five people unaware they have the disease. Left untreated, it can lead to severe consequences such as malnutrition, anaemia, osteoporosis and bowel cancer.

The driver for this project is that coeliacs are unable to eat foods containing gluten. By first working on barley, which has a much less complex genetic system than wheat, CSIRO researchers are learning the factors responsible for coeliac disease, enabling future research programs to work on transferring that knowledge to wheat.

This project involves a collection of barley lines known to be missing key proteins called hordeins (the barley equivalent of gluten) that trigger the immune response in coeliacs. The team has already developed a new barley which produces a coeliac friendly beer with an ultra-low gluten level, expected to be 20 times lower than the level recognised as safe for coeliacs. The hordein level is so low it cannot be measured accurately with existing technology, so a more sensitive detection method has been developed specifically for this project.

This coeliac friendly beer is still in the product development phase, but expert panels already rate it well. The team is pushing ahead, with strong industry interest, to create better lines with improved malting characteristics and agronomics, and ultimately breed an entirely gluten free barley suitable for production of high-quality malt and beer.

Dr Greg Tanner, Food Futures Flagship scientist, inspects a new barley variety that is missing the proteins that trigger an immune response in people with coeliac disease. Photo: Brad Collis, Coretext

If successful, the barley project could capture a high-value niche market for Australia, potentially doubling national production of barley for malting.

Having achieved a gluten free barley, researchers are now on track to tackle the more difficult task of developing wheat-based foods that are safe for coeliac sufferers.

Other key achievements of the Food Futures Flagship include:

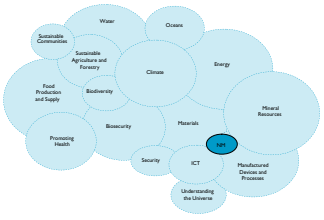
- boosting the growth, health and harvest-quality of Australia's farmed prawn and Atlantic salmon
- growing super-healthy cereals with high-levels of resistant starch to reduce bowel disease, diabetes and obesity
- developing technologies to extract natural bioactives that can be added to foods for enhanced health and wellbeing.

Niche Manufacturing Flagship

The **Niche Manufacturing Flagship** aims to support the development of niche manufacturing businesses based on nanotechnology worth in excess of $3 billion per year by 2020.

Creating the future with smart manufactured products

CSIRO has established a new National Research Flagship for Manufacturing. The Niche Manufacturing Flagship will assist the Australian manufacturing industry respond to an increasingly complex market environment.



The manufacturing sector is diverse, complex and critical to Australia's future – innovation is the key to its growth. Imagine a future where the plastic case of your portable electronic device is actually a solar cell – flat batteries will be a thing of the past, or where your wallpaper is actually your television. Imagine a visit to your doctor that includes a full suite of diagnostic tests – no more delays waiting for your tests to come back from the laboratory. Imagine textiles that can store and generate energy, and polymers engineered to deliver controlled doses of drugs to specific locations in the body.

The Flagship will address the key national research challenges facing the manufacturing industry, through its innovative approach to research in areas such as smart materials and biomedical nanotechnology, ensuring these developing industries use the best innovation tools and technologies available.

To achieve this, the Flagship has developed some new initiatives focusing on:

- creating flexible polymer electronics for new kinds of solar cells and lighting, flexible displays and smart textiles, based on printable electronics
- developing new tailored polymer platforms that will lead to the development of safer more effective therapeutics for disease detection and drug delivery
- developing new sensing technologies to support an Australian sensor industry based on real time on-site assessment of chemical and biological species
- establishing a new Australian business activity in the production and use of extremely light and strong fibres, with applications in aerospace, medicine, energy and more
- ensuring Australia captures the benefits of nanotechnology in a safe and socially responsible way.

Other key achievements of the Niche Manufacturing Flagship include:

- an industry analysis of Australian nanotechnology products and their health, safety and environment needs
- identifying and prioritising market opportunities in the carbon nanotube field
- a new automatic scale-up system for spinning carbon nanotube yarn which has been successfully developed and commissioned.

CSIRO is developing new polymers for use in a wide range of polymer electronic devices, such as displays, lighting panels and solar cells. This image illustrates a prototype plastic solar cell where the polymer is printed on to a flexible plastic surface, enabling large area devices to be fabricated at low cost, an outcome that will transform the way we use electronics. Photo: Mark Fergus

Core research

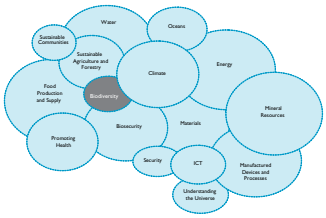
Complementing the work of the National Research Flagships reported above, CSIRO's core research activities contribute across the breadth and depth of the National Innovation System by delivering, inter alia new and improved technologies; management systems; intermediate and final products; catalyst services for business; advice relevant to policy development; and new knowledge and skills.

The following pages feature recent achievements and ongoing work of relevance and impact in each of the outcome domains shown in Figure 1.2 (page 17). The small diagram located with each feature story illustrates the outcome domain relevant to that achievement. As with Flagships, some of these achievements focus on major national challenges and opportunities, while others illustrate the successful provision of science-based innovations and solutions for local industries and communities.

Biodiversity

Describing, conserving and using our biodiversity is essential for national benefit. CSIRO is developing information systems to understand the consequences of changes in biodiversity in response to habitat loss, the spread of invasive species, and climate change. Through its web-based encyclopaedia, *Atlas of Living Australia*, CSIRO is building an accessible and reliable source of knowledge of Australia's biodiversity.

Protecting Australia's natural landscapes



As Australia experiences climate change, we face increasing challenges in the protection of our natural landscapes. Provision of water to wetlands, the arrival of new native and exotic species into local regions, and coping with more frequent and intense bushfires are just a few of these national challenges.

CSIRO research showing that climate change is likely to transform many of Australia's natural landscapes informed a $180 million investment aimed at boosting Australia's National Reserve System and providing biodiversity refuges.

The report *Implications of Climate Change for the National Reserve System* was prepared for the Australian Government and confirmed that a well planned system of protected areas – that builds on Australia's 9000 existing protected areas – will be a vital safety net for biodiversity in our changing climate.

The report explained that, to give native species a better chance to adapt and survive, we need to protect different types of habitat, larger areas of habitat, and locations that have historically provided a refuge for biodiversity during times of climate stress.

The research challenges Australians to rethink approaches to conservation, moving away from regarding all changes to species and ecosystems as a threat to be prevented, and towards the acceptance of continual change in biodiversity and managing the change to minimise loss of biodiversity.

The research showed the distribution and abundance of many animals and plants will change. It also found the look, sound and smell of many familiar Australian landscapes will gradually change over time.

Future challenges identified include managing new exotic weeds and pests that will benefit from changing climates, and responding to native

species as they move to new areas and, in doing so, threaten local species.

Other key achievements in the Biodiversity domain include:

- receiving the inaugural 2007 Eureka Prize for Innovative Solutions to Climate Change for research that demonstrated annual emissions of accountable greenhouse gases from the fuel burning process in West Arnhem Land (see page 84)
- research demonstrating that tropical cyclones and storms have a significant role in structuring tree populations at decadal and centennial time scales
- creating modelling that identifies the likely location of long-term climate refuges within the World Heritage listed Wet Tropics region
- research to develop a new model to explain the relationships between key factors influencing the spread of invasive weeds.

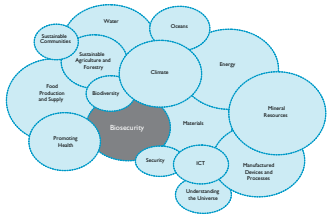
CSIRO's Dr Peter Brown and Dr Michael Dunlop, authors of the report 'Implications of Climate Change for the National Reserve System', with some examples of the types of species (fungi, legumes and weeds) that could transform ecosystems under climate change. Photo David McClenaghan

Biosecurity

In today's modern world, Australia faces critical and costly threats from invasive species. CSIRO is devising risk assessment tools and strategies to prevent the establishment of new invaders, and conducting research to deconstruct the pathways in the invasion process. We are working in collaboration with policy makers to devise a world-leading biosecurity system.

Pollination by honey bees under threat

CSIRO research is helping to manage the increasing biosecurity threat to pollination.



Worldwide, insect pollinated crops provide one third of the human diet. Around 80 per cent of this pollination is provided by the European honey bee. Honey bees are the most important pollinators of crops and their world decline is attributed to the spread of the varroa bee mite (*Varroa destructor*).

Australia remains the last major region where the varroa bee mite has not established itself. This has provided a significant pollination benefit that manifests itself in the production of over two billion dollars of agricultural output.

Through its ground-breaking research into pests and diseases of honey bees and pollinator ecosystem services, CSIRO has raised awareness of the biosecurity threats to Australia's pollination services and to the profitability and viability of key agricultural industries and the communities that depend on them.

Increased awareness of threats to food security led to the establishment of Pollination Australia, a major funding initiative within the Rural Industries Research and Development Corporation supported by Australian Government funding. This is a collaborative venture that integrates industry support via Horticulture Australia to form a national alliance of key pollination-dependent industries to help protect Australia's food security.

CSIRO's Dr Denis Anderson collecting bees from a hive at a cherry farm near Young, New South Wales. Photo: Nick Pitsas

A key element in generating support for Pollination Australia was provided by bioeconomic models developed by CSIRO that estimate the economic impact of *Varroa* before its arrival. This study has since been used extensively by the House of Representatives Primary Industries and Resources Standing Committee in their inquiry into the future of the Australian bee and pollination industries. The results of this inquiry were released in June 2008, and can be viewed at: www.aph.gov.au/house/committee/pir/honeybee/report.htm

This research received a 2007 CSIRO Medal for Research Achievement for raising awareness of the biosecurity threats to Australia's pollination services and to the viability of key agricultural industries (see page 91).

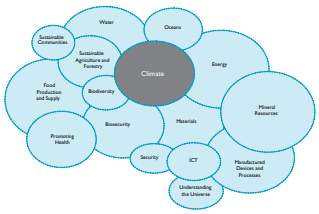
Other key achievements in the Biosecurity domain include:

- developing new treatment chemicals to eliminate transport of wood-boring pests in shipping containers
- development of an environmentally-friendly alternative to methyl bromide for fumigation treatments, enabling successful control of invasive nematodes inhabiting plant roots
- importation of a new rust fungus for biocontrol of bitou bush and boneseed weeds
- pre-border research to prevent the establishment and spread of avian influenza
- improving the effectiveness of the rabbit calicivirus system to manage rabbit populations.

Climate

Australia faces an urgent challenge in adapting to global and regional climate change. CSIRO is a leading contributor to the development and application of new technologies for predicting, understanding and attributing impacts of climate change. In partnership with government, industries and communities, we aim to create new knowledge and deliver applications for effective climate adaptation regionally and nationally.

New climate change projections for Australia



CSIRO and the Bureau of Meteorology have collaborated to produce the most comprehensive assessment to date of Australia's future climate.

Climate Change in Australia provides the latest information on observed climate change over Australia and its likely causes, as well as detailed projections of changes in temperature, rainfall and other aspects of climate that can be expected over coming decades as a result of continued global emissions of greenhouse gases.

By 2030, temperatures over Australia will rise by about 1°C compared with recent decades. The amount of warming later this century will depend on the rate of greenhouse gas emissions. If emissions are low, warming by around the year 2070 will be between 1°C and 2.5°C, with a best estimate of 1.8°C. However, with high emissions, the warming range will be 2.2°C to 5°C, with a best estimate of 3.4°C.

For the first time, the projections present probabilities of likely changes. For example, with high greenhouse emissions, the chance of warming greater than 4°C by 2070 is around ten per cent in most coastal areas and 20–50 per cent inland. Such warming would have significant consequences. Australian ecosystems, water

supply systems and coastal communities have a narrow coping range, becoming vulnerable for 1.5°C to 2.0°C of global warming. Energy security, food security, health (heat-related deaths), agriculture and tourism have a larger coping range and adaptive capacity, but become vulnerable if global warming exceeds 3.0°C.

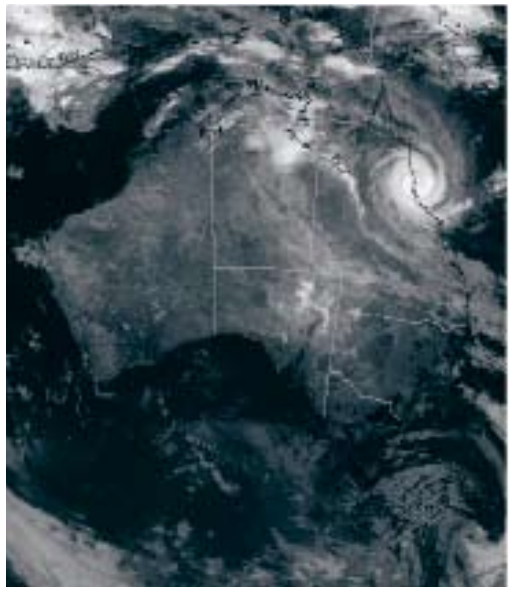
Future decreases in rainfall are likely in southern areas during winter, in southern and eastern areas during spring, and in south-west Western Australia during autumn, compared with conditions over the past century.

Droughts are likely to become more frequent, particularly in the south-west of Australia, high-fire-danger weather is likely to increase in the south-east, and sea levels will continue to rise.

There was extensive media interest in the new projections, with hundreds of newspaper, radio and TV references in the days following their release. The projections web site (www.climatechangeinaustralia.gov.au) has attracted more than 40 000 visitors, with government and industry making extensive use of the new information in planning for climate change.

Other key achievements in the Climate domain include:

- continuing developments of the Australian Community Climate and Earth System Simulator as a tool for improved climate change simulation
- the online launch of OzClim, a new and freely-available climate change tool developed by CSIRO for use in government policy and scientific research
- the coordination of Greenhouse 2007, the year's largest climate change science conference in Australia.

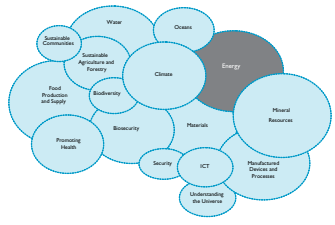


A composite image from the MTSAT-1R weather satellite, 20 March 2006, 7.30am (eastern summer time), showing Tropical Cyclone Larry over the Queensland coast, near Cairns and Innisfail. Photo: Japan Meteorological Agency and Bureau of Meteorology

Energy

Australia must reduce its greenhouse gas emissions, ensure energy security and create wealth from energy. CSIRO aims to develop coal, gas and solar technologies for low-emissions and near zero emissions over the next four to five years. We are developing new technologies for converting coal, gas and biomass to transport fuels, and are working to better identify new hydrocarbon resources and introduce technologies to enhance oil and gas recovery from reservoirs.

Carbon dioxide capture and storage



CSIRO, through its Energy Transformed Flagship, is conducting research into the capture and geological storage of carbon dioxide (CO_2). Capturing and storing CO_2 is one of a number of approaches to reduce greenhouse gas emissions. CSIRO is

a leader in Australia in this field and draws from a wide range of multidisciplinary research across the Organisation and with other Australian and international institutions.

Over 80 per cent of Australia's power supply is generated by coal, which is also the principal fuel for power generation worldwide. However, the use of coal results in high greenhouse gas emissions, placing questions on its long-term usage.

The past year has seen milestones in the development of clean coal technologies through the establishment of four post combustion capture (PCC) pilot plants and the commencement of the CO2CRC's Otway CO_2 storage trial.

PCC is a process that uses a liquid solvent to capture CO_2 from power station flue gases and could potentially reduce CO_2 emissions by more than 85 per cent. In May 2008, Australia's first capture of CO_2 from power station flue gases using CSIRO technology took place at Loy Yang Power Station in Victoria. Under the Asia Pacific Partnership for Clean Development and Climate (APP), three additional clean coal pilot plants have been developed, one in New South Wales and Queensland, and in collaboration with Chinese partners, the third in Beijing, which was launched in July 2008.

However, the captured CO_2 then needs to be stored. CSIRO is a major contributor and key partner in the CO2CRC's Otway Storage Project, Australia's first demonstration of the geological storage of CO_2 and one of the largest and most comprehensive geological storage projects in the world. Over a period of two years from April 2008, it is planned to inject approximately 100 000 tonnes of CO_2 into a depleted natural reservoir using naturally occurring CO_2 from an adjacent field. The trial aims to demonstrate that CO_2 can be stored safely and effectively monitored deep in the subsurface, and that geological storage is a feasible mitigation option.

Other key achievements in the Energy domain include:

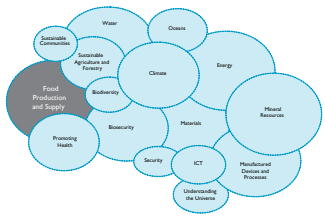
- commissioning Australia's first gas hydrates flow loop to enhance research into flow assurance in offshore pipelines
- developing a new method for estimating seam gas emissions from open cut coal mines
- the completion of a study for the Australian Government on health impacts associated with the use of ethanol blended fuels in motor vehicles.

Mrs Jennifer van Holst preparing a gas sample for carbon analysis. Photo: Chris Taylor

Food Production and Supply

Australian consumers are increasingly demanding fresh, natural, minimally processed and convenient foods for their health and wellbeing. CSIRO is integrating leading scientific disciplines to underpin Australian food industry innovation: combining nutrition with genomics, introducing advanced materials into packaging,and linking knowledge about food structure with processing and distribution technologies.

Creating new health products from milk



CSIRO scientists have discovered how to isolate and purify a naturally-occurring protein in cow's milk which could be used to treat a range of human health conditions.

Working in collaboration with Deakin University, the Innovative Dairy Products CRC, and the Geoffrey Gardiner Dairy Foundation, the CSIRO team discovered that the protein, Muc-1, has unique physical and biological properties including exceptional lubricating qualities and the ability to bind to bacteria, preventing them from attaching to the gut and causing disease.

Potential uses include as a therapeutic for inflammatory diseases of the gut; a preventative for traveller's gastrointestinal infections; a supplement to decrease spoilage of food products; and as an artificial saliva product to relieve 'dry mouth syndrome' – a chronic condition in many diseases and in people taking a large spectrum of drugs.

With the continued support of the Gardiner Foundation, the CSIRO team and its collaborators have been working with Australia's largest dairy processor and exporter, Murray Goulburn Nutritionals, to determine the commercial

CSIRO researcher Dr Lillian Sando, investigating a naturally occurring milk protein which could be used in the future to treat a range of human health conditions. Photo: David McClenaghan

feasibility of Muc-1 production. This innovative process is described in an international patent application to be held by CSIRO.

The research team also discovered there is considerable genetic variation in the Australian dairy herd for the production of Muc-1, with some cows able to produce a more effective form of the protein.

CSIRO's work with Muc-1 to convert a novel scientific idea into a commercial product has the potential to create new domestic and export business opportunities for Australia.

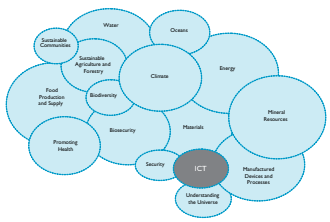
Other key achievements in the Food Production and Supply domain include:

- the discovery of the toxin that leads to necrotic enteritis, a disease that costs the world's poultry industry $2 billion annually
- helping industry use high pressure techniques, instead of high temperature, to preserve food with better results
- the detection of genes which help control carbohydrate storage in wheat and affect their ability to produce grain during drought
- the breeding of potential new macadamia varieties that could increase profitability by 30 per cent.

Information and Communication Technologies (ICT)

CSIRO is focused on developing technologies and systems that are relevant to Australia and are globally competitive, including breakthrough wireless communications and sensor network technologies. We are also working to develop advanced network infrastructure and applications to support the nation's research environment.

Minimising risk in computing environments



CSIRO has developed a portable device that allows people to do business across the Internet on any computer with a high degree of trust. A Trust Extension Device (TED) consists of software and firmware loaded onto a portable device, such as a USB memory stick or a mobile phone.

TED minimises risks associated with transactions in untrusted and unknown computing environments. It provides confidence about the integrity of a remote user's machine and the server or organisation they are transacting with. Hoax machines will be unable to pass TED's integrity checks.

At present, high-levels of trust require specific, well managed and controlled computing environments. Often these are not available. TED opens the way for secure transactions to be undertaken anywhere – even, potentially, in an Internet café.

The concept behind TED is that an enterprise, such as a bank, issues a trusted customer with a portable device containing a small operating system, as well as a set of applications and encrypted data. This device creates its own environment, even on an untrusted computer and, before it runs an application, it establishes trust with the remote enterprise server. Both ends must prove not only their identities to each other, but also that the computing environments on all machines are as expected. When TED is

removed from the host computer the virtual environment it created disappears, leaving no trace of its presence, or what the user did.

The TED could be applied:

- in a commercial environment to remotely access sensitive documents
- in a defence environment, allowing a mobile workforce to access confidential information and conduct transactions without carrying pre-configured laptop computers
- in accessing personalised government services
- to enable high school students to access nationally shared educational facilities, remotely
- where individuals give trusted parties access to their health records
- to prevent cheating and virtual identity frauds in on-line games communities.

CSIRO is currently selecting a company to commercialise the technology.

Other key achievements in the ICT domain include:

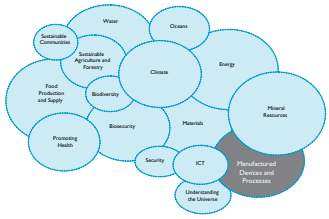
- the CSIRO-developed Fleck sensor network technology for collecting, processing and communicating data from the field which was licensed to a Tasmanian company, The Powercom Group
- highly accurate wireless positioning technology developed by CSIRO's ICT Centre was transferred to an Australian company, Trantek
- advances in terahertz imaging, which have potential applications in security, medicine and quality control.

The Trust Extension Device provides a secure online collaborative environment in any location which, once removed, leaves no trace of the work carried out. Photo: Peter Saunders

Manufactured Devices and Products

CSIRO is working with the manufacturing sector to develop technologies that reduce costs for a globally competitive manufacturing industry, and to underpin specific industries such as the Australian titanium industry. We will assist Australian manufacturers, particularly innovative small to medium enterprises, by delivering global technologies tailored for Australia.

NanoBang™ – an easy-to-use medical device



CSIRO scientists have developed an inexpensive, easy-to-use medical diagnostic device – NanoBang™ – that is both quick and measurable.

NanoBang™ exploits the properties of nanomaterials to create a simple-to-use sensor that takes conventional 'dip stick' tests (such as a home pregnancy test) to the next level.

While users of pregnancy tests are only looking for a yes/no answer, doctors diagnosing a heart attack, for example, need to know the severity. While such tests do exist, they can take hours. NanoBang™ gives a quantitative answer quickly and simply.

Most current quantitative systems give a read-out – a computer scans the test strip and analyses the intensity of the colour. This is relatively expensive and only gives an approximate indication. CSIRO's NanoBang™ technology solves these problems by making the read-out technology cheap and simple to produce.

CSIRO scientists have found a way of easily and cheaply turning the colour-response signal seen on the test strip into an acoustic signature, then converting it to an electronic signal. This signal can be used to detect an analyte – the chemical to be analysed.

Although the initial target applications are in the medical diagnostics area, the technology is equally suitable for veterinary, environmental, agricultural or food processing applications. The team is now preparing to find commercial partners.

Mr Lech Wieczorek prepares a NanoBang™ test strip sample for analysis. Photo: David McClenaghan

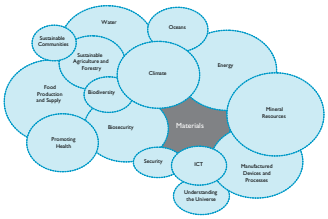
Other key achievements in the Manufactured Devices and Products domain include:

- CSIRO's HCA-Vision software. Two international pharmaceutical companies have purchased licences for the software which speeds the delivery of new drug products to market by rapidly analysing cell images during the drug discovery process
- a strong and electrically conductive polymer nanocomposite wire for electronic detonation in mining operations
- CSIRO's in-wheel motor, the most efficient in the world, was used in six of the top ten racers in the 2007 World Solar Challenge.

Materials

Science and technology provide the means for transforming and enhancing existing materials, as well as developing entirely new materials. CSIRO is using its capability to deliver materials with a clear performance edge. Some key developments will be in nanostructured materials, biomaterials and natural and synthetic fibre-based materials.

Fireproof cable – maintaining the integrity of essential circuits



CSIRO technology that transforms plastic into a fireproof ceramic in an intense fire has now been applied to multicore power cables and is earning our industry partner four million dollars annually.

CSIRO and Olex Australia (now part of Nexans, the world's largest manufacturer of electrical cables) developed a multicore cable that maintains circuit integrity for two hours in temperatures greater than 1000°C.

Fire rated Pyrolex® Multicore Ceramifiable®, as it is known, turns plastic into a solid ceramic on exposure to extreme heat. CSIRO, as part of

CSIRO's Mr Nick Rigopoulos and Dr Donavan Marney with the high-performance pyrolex multicore cable, developed with Olex (a Nexans Company), which is now in production.
Photo: Mark Fergus

the Cooperative Research Centre for Polymers, had worked with Olex to develop ceramifiable polymer protection for single core cables.

Multicore cables are far more useful, and more widely used, than single core cables. However, up to four parallel strands of copper carrying mains voltage creates problems, not the least of which is keeping them from shorting to each other. Traditional fire rating for multicore cables uses mica or glass tapes or metal sheaths, which are expensive and difficult to manufacture.

Working closely with Olex, CSIRO developed insulation that met stringent fire safety standards (a successful fire test for multicore cables being significantly more difficult than for single core) but which Olex could manufacture using existing equipment.

Together, CSIRO and Olex have succeeded where many experienced outfits have not. The engagement resulted in a three-fold increase in Olex's ceramifiable cable portfolio, domestic sales of which are in excess of $14 million a year, and Pyrolex® Multicore Ceramifiable® is now being marketed internationally. Nexans has invited CSIRO to continue as a research partner.

Other key achievements in the Materials domain include:

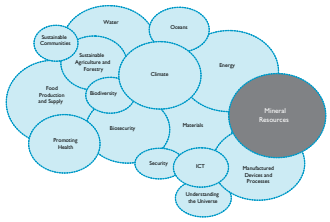
- SIROLOCK® – which significantly improves the efficiency of processing wool and non-woven fibres
- Dulux Powder Coatings, an eco-friendly, award-winning coating system for plastics
- a new application for geopolymers as a low-carbon replacement for cement in concrete.

Mineral Resources

CSIRO is helping make Australia the world leader in large-scale sustainable light metals production while also realising more new resources. We are working to provide the most advanced international mining system technologies in automation, electronics, data fusion, sensing and visualisation. We are developing advanced technologies to reduce exploration risk, grow Australia's known resource base and increase processing efficiency while reducing environmental impact.

Emergency two-way communications for underground miners

CSIRO has signed a ten-year licensing deal with the Australian company Mine Site Technologies Pty Ltd for commercialisation of underground wireless communications technology. CSIRO's invention will, for the first time, enable miners to send radio text messages through rock strata to personnel above ground, revolutionising search and rescue emergency operations.



CSIRO's wireless expertise has been recognised for decades, since its pioneering radiophysics research during World War II. This know-how was employed more than twenty years ago in the development of a personal emergency device (PED) for underground miners.

PED was successfully commercialised in the early 1990s, and is now carried by 95 per cent of Australia's underground coal miners. It is also a continuing export success. However, although PEDs receive text messages they are unable to send them. Two decades on, with support from the Australian Coal Association Research Program, CSIRO's research team achieved the

much tougher goal of two-way through-the-earth communication. This was challenging because the power of wireless devices in coal mines is severely restricted by the need to reduce the risk of explosions.

Miners with the new two-way technology can ask for information, report their condition and location, and guide rescuers in emergencies. The technology is also expected to improve productivity by providing a reliable communication channel during normal everyday operations.

The new technology will enter production as new US legislation mandates that underground miners are equipped with two-way communication systems by mid-2009. The US underground coal mining industry is expected to be a major buyer, with other export markets to follow. Mine Site Technologies expects the licensing deal to generate significant revenue of about $50 million in product sales and services per year once sales begin in 2009.

The company will continue making the PEDs in Australia, further encouraging development of a specialised Australian manufacturing and service industry centred on mine safety and automation.

Other key achievements in the Minerals Resources domain include:

- a successful trial of an acoustic monitoring alarm system for coal washing
- a successful trial of an on-line ultrasonic particle size analyser for use in alumina refineries
- the establishment of the Centre of Excellence for 3D Mineral Mapping with the Centre for Exploration Targeting, state government geological surveys, iVEC and AuScope, James Cook University, Curtin University, University of California – Santa Barbara, University of Campinas – Brazil, University of Zurich, international government agencies and the private sector.

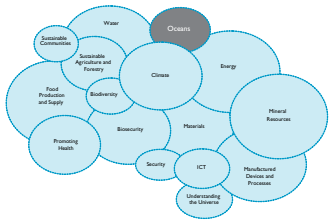
CSIRO has invented an underground to surface wireless communication system for use in mines. Photo: David McClenaghan

Oceans

In partnership with the Australian Government and other research providers, CSIRO is investing in significant marine research infrastructure to help conserve Australia's marine biodiversity. We aim to provide the science to transform Australia's fisheries into an economically and ecologically sustainable industry and multidisciplinary expertise in the development of Australia's coastal and marine regions.

New tools to manage our marine environment

The Wealth from Oceans Flagship and the Western Australian (WA) Government launched the world's first practical tools to help planners manage potentially competing uses of Australia's marine ecosystems.



The tools were developed as part of the North West Shelf Joint Environmental Management Study (NWSJEMS) – a $7.7 million project over seven years. They enable planners to envisage different development scenarios and management options, and comprehensively evaluate their potential impacts on marine ecosystems. The research was vital as coasts and oceans worldwide are being exposed to growing pressure from increasing population and industrialisation.

WA's North West Shelf (NWS) is one of the most economically significant marine regions in Australia. Industries include oil and gas, commercial fisheries, aquaculture, salt production, iron ore processing, shipping and tourism.

The high rate of growth in this region has also led to complex, and somewhat fragmented, management and regulatory structures. The WA Government recognised that a collaborative and informed approach is essential in balancing and managing the many uses of the NWS ecosystem.

(L-R) Wealth from Oceans Flagship Director Dr Kate Wilson, NWSJEMS project leader Dr Scott Condie (CSIRO), NWSJEMS researcher Dr Beth Fulton (CSIRO) and Senator the Hon Kim Carr, Minister for Innovation, Industry, Science and Research, at the launch of the North West Shelf Joint Environmental Management Study, NWSJEMS. Photo: Christian Sprogoe

Although models have been separately developed for many aspects of Australia's marine environment, this study adopted a more holistic approach that linked all the key elements of both the natural and human systems.

More than 25 government, resource industry, research and community organisations contributed to the project. The study found that overall the NWS is currently a healthy ecosystem with well-managed developments. However, new strategies will likely be required to effectively manage planned developments approaching $100 billion over the next decade. The techniques developed in NWSJEMS are being further improved and can be adapted for any marine ecosystem facing pressures from potentially competing uses.

The study is the foundation on which the Flagship is building the next generation of marine multiple-use management models. CSIRO is partnering with the WA Government and universities (through the Ningaloo Collaboration Cluster and the Western Australian Marine Science Institution) to make Ningaloo the next benchmark in modelling tools for marine managers. The approach is also being adopted around Australia and overseas.

Other key achievements in the Oceans domain include:

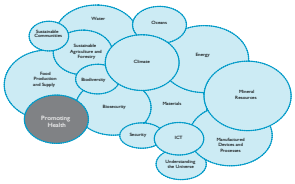
- identifying more than 80 new species of fish from marine biodiscovery voyages in Australian waters, the highest rate of new species descriptions since the collection was established in the 1940s
- producing comprehensive inventories and maps of Great Barrier Reef seabed habitats with our partners to help planning and management of the area
- the adoption of our Aquafin biogeochemical and nutrient models by aquaculture regulators, using them for future aquaculture development in south-eastern Tasmania
- our contributions to the Australian Government's marine biodiversity policies, which will help protect seabirds, school shark, spotted handfish, sawfish and other species.

Promoting Health

Australia has an ageing population contributing to reduced participation in life and high costs for related chronic diseases. CSIRO is working with key partners on improving the health and wellbeing of Australians through better prevention, early detection and intervention. Some major areas of focus include nutrition, obesity, diabetes, colorectal cancer and neurodegenerative diseases such as Alzheimer's disease.

Detecting heart disease early

Non-invasive heart monitoring technology patented by CSIRO has been licensed for product development and marketing. The technology has the potential to be used in inexpensive preventive diagnostic products, aimed at identifying early signs of heart disease and so reducing the burden of heart problems on the medical system, and on individuals and their families.



Taking measurements with the CSIRO prototype is extremely simple. For each subject the heart monitor, which is about the size of a mobile phone, is placed against the chest. The monitor emits very low power radio frequency energy, some of which is scattered by the chest wall and heart. This scattered radio energy is picked up by the monitor and can be displayed on standard digital display devices. The wave form generated by the scattered radio energy has

similar characteristics to aortic pressure signals, indicating dynamic parameters of the heart.

Researchers at Monash University are working with HD Medical on a clinical validation of CSIRO's prototype. They are comparing the heart rhythms of subjects with heart failure, including valve dysfunction, with those from healthy subjects. The clinical evaluation is intended to verify which aspects of heart function can be measured with the monitor.

HD Medical is currently considering an initial low-cost rollout in Third World markets. Subject to the success of the clinical validation, initial export licence revenues are estimated at more than $350 000.

Other key achievements in the Promoting Health domain include:

- a high resolution colonoscopy simulator designed to deliver cost-effective training away from the operating theatre and better care for patients
- a partnership with the Kolling Institute of Medical Research using new statistical techniques to discover genes that differentiate between types of brain tumours
- developing health data integration software to bring together dispersed databases in remote sites, to deliver a better understanding of the initiation and progression of chronic diseases
- a new computer vision system to analyse a process called 'vesicle fusion' in pancreatic cells to improve the understanding of diabetes, developed in conjunction with the Garvan Institute of Medical Research.

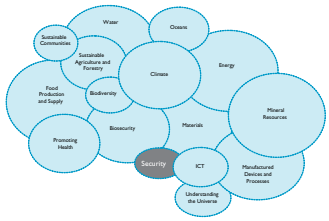
CSIRO has developed a heart sound analysis device that has the potential to revolutionise the early detection and management of heart disease. Photo: David McClenaghan

Security

Terrorism represents a major new security threat to Australia. CSIRO has developed world-first security technologies, such as the non-invasive scanning of airport cargo. We are working with other agencies to meet priorities in physical and information security, water and air contamination, critical infrastructure protection, and threat risk assessment.

Commercialisation of air cargo scanner

CSIRO is partnering with Chinese security inspection specialist Nuctech Company Ltd to develop a new air cargo scanner that combines its world-first neutron technology and Nuctech's proven x-ray systems.



Conventional x-ray scanners provide shape and density information, but are insensitive to composition. CSIRO's technology combines neutron and x-ray scanning to create material-specific images of the contents of air cargo containers.

The move to commercialisation follows the successful trial of a prototype air cargo scanner at a purpose-built commercial-scale facility at Brisbane International Airport. During the trial, conducted in conjunction with the Australian Customs Service, the technology demonstrated good detection rates for a wide range of threat items.

This new venture aims to develop an improved product with sharper images for improved object identification. This will be supported by quasi three-dimensional multi-image viewing to assist operators in resolving cluttered cargos, enabling faster and more flexible scanning and handling of cargo. The unit will be kept small for easy integration with airport systems.

Dr James Tickner checks a computer scan of a unit loading device containing mixed cargo. The image was taken using CSIRO's air cargo scanner located at the Lucas Heights research facility in New South Wales. Photo: Tim Tapsell

Nuctech and CSIRO are working together to manufacture the first commercial unit of the new air cargo scanner in Beijing. A detailed program of trials will be undertaken at the end of 2008 to demonstrate the technology.

Once commercialised, the scanning technology will help address the global need for increased security screening of air cargo and could potentially generate significant export earnings for Australia.

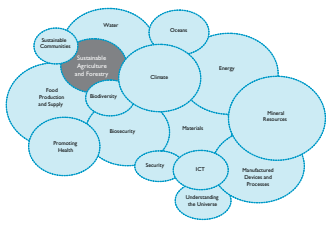
Other key achievements in the Security domain include:

- the development of a Joint Centre for Peace and Security between Monash University and CSIRO to explore the social issues underlying the security of our communities
- the successful implementation of the Government's Critical Infrastructure Protection Modelling and Analysis Program
- the commercial implementation of Modulated Digital Imaging technology for the prevention of pharmaceutical products counterfeiting
- the implementation of DataTrace technology to prevent theft of copper cabling from major infrastructure establishments
- DataTrace technology which won the DuPont Australia and New Zealand Innovation Award for Performance Materials.

Sustainable Agriculture and Forestry

CSIRO is working to ensure a greener agricultural industry with increased longer-term economic benefits. We are combining our skills in agriculture, environmental, economic and social sciences to address sustainability challenges facing Australian agriculture. We are strengthening our partnerships to better support sustainability in cropping, including water use and adapting to climate change, grazing, horticulture and forestry enterprises.

Returning productivity to saline land



Dryland salinity is a major threat to agriculture, river health and biodiversity in southern Australia.

Due to CSIRO research, salinised land can now be restored in a way to both protect the environment and reward livestock producers.

Researchers found revegetation of some types of saline land with saltbush-based pastures results in both improved economic returns from animal production and positive environmental outcomes.

More than 1200 producers across Australia are adopting the results of the research in saline areas of their farms. With water table salinity up to 1.5 times that of seawater, the initial challenge was to find a pasture system that could grow in highly saline areas.

Paddock scale experiments conducted on two farms in Western Australia over five years studied many aspects of the salt land pasture system including sheep productivity, nutritive value of the pasture, farm profitability, invertebrate biodiversity, and soil microbial activity. Salt and water movement was also determined and associated projects investigated grazing management, supplementation strategies and the physiological responses of livestock to high salt diets.

At one site, the saltbush-based pasture supported three to four times more sheep during autumn when feed supply is shortest.

Environmental benefits included reduced salinity and water logging at the soil surface, allowing healthier soils and greater plant diversity, and early results suggest a reduction of salt export to rivers. There were also social benefits including enhanced beautification of the landscape, and easier livestock management.

The research involved CSIRO in partnership with three state agencies, two universities and a large network of producers, with support from Land, Water and Wool and the CRC for Plant-based Management of Dryland Salinity.

Other key achievements in the Sustainable Agriculture and Forestry domain include:

- an 80 per cent increase in tea tree oil yield
- the international adoption of environmentally-friendly alternate fumigants
- a design system to accurately predict the lifespan of timber constructions in any climatic zone.

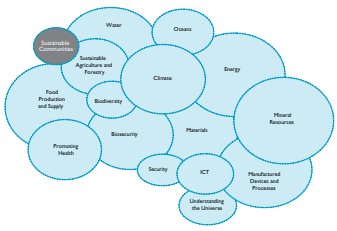
CSIRO's Dr Richard Silberstein and Dr Hayley Norman showing revegetation of saline land results in improved animal production and environmental benefits. Photo: Dean Thomas

Sustainable Communities

Australia's cities and urban regional communities face a number of critical issues including ageing and inadequate physical infrastructure, unsustainable resource consumption and negative social and health impacts from rapid urbanisation. CSIRO is providing scientific information to Australian governments, industry and the community on resource use, urban planning and design, natural resource management, improved environmental quality of cities and enhanced human health.

Building sustainable communities through partnerships

CSIRO is providing science-based solutions to help communities tackle sustainability challenges such as energy conservation and urban renewal through an innovative partnership with industry, non-government organisations and government.



Design concepts derived from CSIRO's Sustainable Communities Initiative (SCI) have already had significant impact, being adopted in towns and cities around Australia.

In Canberra, SCI is partnering with the ACT Government to plan a new sustainable community for 9000 residents in the suburb of East Lake. Working closely with the ACT Planning and Land Authority the project is developing ways to evaluate the ecological, social and economic outcomes of different planning scenarios to help transform the East Lake area into a vibrant, healthy and sustainable community. Early success has seen the ACT Government announce $1.7 million in additional project funding.

Following SCI scoping workshops for the proposed 'Lockerbie' development on the outskirts of Melbourne, Delfin Lend Lease changed the way they approach the design of urban developments across Australia. Delfin Lend Lease now develops their vision for a new sustainable urban development using the SCI scoping workshop process.

In response to the success of SCI projects, the Victorian Government, through Regional Development Victoria, have committed to working with the SCI in five regional communities across the state over the coming two years.

SCI involves 16 partners (see www.csiro.au/science/SCI for details) and is addressing local sustainability challenges in the Whitsundays and Surat Basin in Queensland, the Avon River Basin in Western Australia, the Australian Capital Territory, and Castlemaine and the outskirts of Melbourne in Victoria.

Other key achievements in the Sustainable Communities domain include:

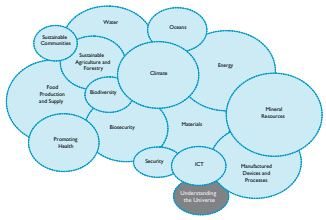
- a community driven evaluation of Aboriginal land and sea management in the Top End
- a preliminary report identifying the potential for rural businesses and communities to contribute to Australian action on climate change
- research on including Indigenous values in water allocation planning by the Northern Territory Government
- a report providing an objective assessment of rural land-use options in the cane growing landscapes of the Gold Coast.

CSIRO researcher Mr Guy Barnett discusses the sustainable urban renewal of East Lake in Canberra with Ms Alison Moore, from the ACT Planning and Land Authority. Photo: David McClenaghan

Understanding the Universe

CSIRO operates a world-class National Facility for radio astronomy for the Australian and international astronomical community, and operates the highest impact radio telescope in the world. We aim to address key science questions of 21st century astrophysics and physics, and build Australia's role in developing the next generation of international radio telescopes including the international Square Kilometre Array.

Gas 'finger' pierces our Galaxy



Using radio telescopes, CSIRO astronomers have found that a giant 'finger' of hydrogen gas is poking through our Milky Way Galaxy from outside.

The point at which the finger goes through may tell astronomers about the fate of the small galaxies the gas flows from. These galaxies, called the Large and Small Magellanic Clouds, are close companions of our own Galaxy.

The finger is the pointy end of the so-called Leading Arm of gas that streams ahead of the Magellanic Clouds towards the Milky Way. It is running into the starry disk of our Galaxy about 70 thousand light-years away from us. When you look out into the sky, the point of contact is near the Southern Cross.

Until last year, astronomers generally thought that the Magellanic Clouds had orbited our Galaxy many times, and were doomed to be ripped apart and swallowed by their gravitational overlord.

However, recent Hubble Space Telescope measurements suggested that the Clouds were moving much faster than previously thought. In turn, this implied that the Clouds are paying

CSIRO's Dr Naomi McClure-Griffiths, who led the team of international researchers to find the giant 'finger' of hydrogen gas, in front of the 64 metre Parkes Telescope which was used in conjunction with the Australia Telescope Compact Array at Narrabri to collect the data. Photo: David McClenaghan

our Galaxy a one-time visit rather than being its long-term companions.

Knowing where the Leading Arm is crossing the Galactic Disk will help astronomers predict where the Clouds themselves will go in future.

Contrary to the Hubble Space Telescope measurements, the new CSIRO result suggests that the Magellanic Clouds will eventually merge with the Milky Way, rather than zooming past.

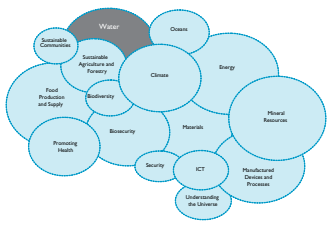
Other key achievements in the Understanding the Universe domain include:

- being on track to build the Australian SKA Pathfinder telescope
- pulsar timing observations which have allowed precision measurement of astronomical phenomena
- a new type of radio energy burst detected by the Parkes Radio telescope
- CSIRO's radio telescopes frequency coverage being extended as part of the continuing collaboration with NASA.

Water

Australia faces a serious water scarcity and quality crisis. CSIRO is expanding its activities in water management, infrastructure and technology to reduce the economic, social and environmental risks associated with Australian water use. We are working with our partners to revolutionise the way water resources information is collected, interpreted and reported. We aim to equip river managers with the science and tools to significantly enhance the health of our aquatic ecosystems and provide greater confidence in our national assessments of current and future water resource availability.

New membrane to reduce costs in water purification



A new membrane developed by CSIRO, in partnership with Hanyang University in Korea and the University of Texas, is expected to dramatically reduce the energy required to purify water.

Water recycling and desalination are becoming an increasingly important part of water supply strategies across Australia. Improving the energy efficiency of recycling and desalination schemes will make this supply option more viable, both economically and environmentally.

As published in the international journal *Science*, the secret to the new membrane lies in the hour-glass shape of its pores, which help to separate molecules faster and use less energy than other pore shapes. In plant cell membranes, hour-glass shaped pores known as 'aquaporins' selectively conduct water molecules in and out of cells while preventing the passage of other molecules, such as salt.

The new membrane, which is a type of plastic, allows carbon dioxide and other small molecules to move through its hour-glass shaped pores while preventing the movement of larger molecules like methane.

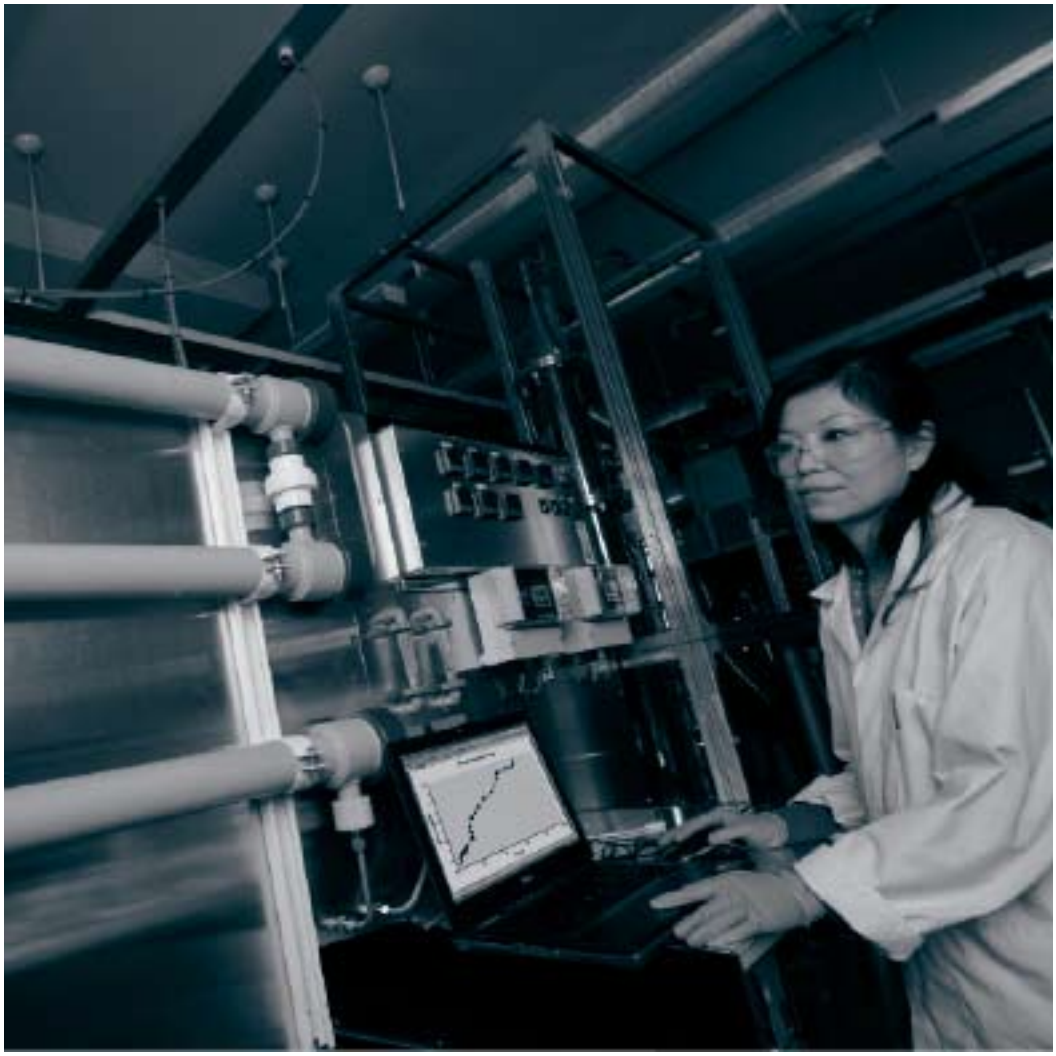
The ability of the new plastic to separate small molecules surpasses the limits of any conventional plastics, separating carbon dioxide from natural gas several hundred times faster than current plastic membranes and with significant improvement in the purity of separated gas.

The research shows how the plastics can be systematically adjusted to block or pass different molecules depending on the specific application.

This plastic will help solve problems of small molecule separation, whether related to clean coal technology, separating greenhouse gases, increasing the energy efficiency of water purification or by producing and delivering energy from hydrogen and ultimately climate change mitigation.

Other key achievements in the Water domain include:

- an irrigation scheduling system operated by mobile phones which helps growers to maximise water savings
- a watersense application in Ord sugarcane systems to reduce water usage
- developing an improved capacity to predict environmental impacts of inland acid sulphate soils.



Ms Zongli Xie, a Chemical Engineer at CSIRO, with a membrane testing facility for purification of industrial water. Photo: David McClenaghan

Science education and outreach

Science education and outreach is an important aspect of CSIRO's work. CSIRO's involvement in science education and communication contributes to the maintenance of Australia's science capacity, which helps Australia to remain innovative and competitive in science. CSIRO does this within the Science Outreach program by:

- conducting science education programs for primary and secondary school students and their teachers through nine Science Education Centres, school visits in metropolitan and regional areas and a range of other national programs – electronic, print and face-to-face
- sponsoring and/or supervising postgraduate level science students
- hosting the CSIRO Discovery Centre in Canberra, the visitor centres at the Parkes and Narrabri radio telescopes and the Canberra Space Centre at Tidbinbilla
- operating CSIRO PUBLISHING as an independent science and technology publisher with a global reputation for quality products and services covering a wide range of scientific disciplines, including agriculture, the plant and animal sciences, and environmental management.

CSIRO Education

CSIRO Education is one of Australia's largest informal science education providers. Its wide range of programs reaches a million Australian students, teachers and families annually, promoting the vital contribution of scientific research to our community, including the role of CSIRO, and also promoting science careers.

The nine CSIRO Science Education Centres (CSIROSECs) engaged over 380 000 students, teachers and parents, including school visits in metropolitan and regional areas. CSIRO's Double Helix Science Club has over 25 000 members, who enjoy the club's magazines, *The Helix* and *Scientriffic*, and hundreds of club events.

The BHP Billiton Science Awards are largely funded by BHP Billiton and are also supported by the Grains Research and Development Corporation and the Australian Science Teachers Association. They drew entries from 4152 students for the 2008 Awards. This year, three winners went on to represent Australia at two international competitions – the International Science and Engineering Fair, where Ms Storm Holwill won a third prize in her category, and the World Virtual Science and Engineering Fair in Doha, Qatar, where Mr Shaun Williams, a CSIRO Creativity in Science and Technology (CREST) student, won second prize in the senior high school division.

The Awards have been operating for 27 years and the program itself won the 2007 Special Award for Longevity in the Prime Minister's Awards for Excellence in Community Business Partnerships (see page 86).

Other programs offered by CSIRO Education include Scientists in School (see page 66); SCOPE, a weekly science TV program for young people produced in conjunction with Network Ten; and Science by Email, which had 27 077 subscribers at June 2008. CSIRO Education is also collaborating with the Australian Academy of Science to develop a major junior secondary school curriculum program called Science by Doing.

Scientists + teachers = inspiring education

Over 700 scientists from CSIRO and other science organisations have partnered with school teachers as part of the new Scientists in Schools project. Since July 2007, this project has achieved excellent educational outcomes in primary and secondary schools across Australia.

The partnerships address all areas of science, including maths and information technology. The flexible nature of the partnerships allows the scientist and teacher to develop their own program, which ranges from mentoring individual students to running school science fairs.

The schools have reported enormous benefits from their partnerships, increasing the amount and quality of the science they teach. Teachers are feeling confident and inspired in their science teaching, and students are developing a positive and personal connection to science in their community.

Participating scientists have noted the enthusiasm of teachers and students during their interactions, which have had a positive impact on the scientists' engagement with their own work.

The benefits of participating have flowed beyond school boundaries. Many schools are seeing their partnership as a catalyst to engage the broader community in science. Many science organisations are making use of Scientists in Schools to fulfil their community engagement goals, providing support to their staff through special leave or internal support networks.

Scientists in Schools also supports partnerships through the provision of symposia on current science topics. The first national symposium was held in 2007 at the CSIRO Energy Centre in Newcastle. Attended by 50 scientist-teacher partnerships from across the country, the symposium included inspiring presentations from leading researchers in energy and climate change as well as opportunities for teachers and scientists to share best practice for their partnerships.

This project is funded by the Department of Education, Employment and Workplace Relations and CSIRO.

Students from Macquarie Primary School's science club with Nicky Grigg, CSIRO, experimenting with the basics of fluid density using simple household ingredients. Photo: David McClenaghan

Outreach centres

The CSIRO Discovery Centre, located on CSIRO's Black Mountain site in Canberra, is a very successful showcase for the Organisation. The centre contains working research laboratories which allow the public to view science in progress, as well as a lecture theatre, meeting rooms and a science education centre. A major museum-quality interactive exhibition gives visitors the opportunity to learn more about CSIRO and its current research and achievements. CSIRO Discovery is an important Canberra tourist attraction and is enjoyed each year by local and interstate visitors.

During the financial year, a state-of-the-art 3D show featuring Omega 3, polymers and biosensors provided visitors with an insight into some of CSIRO's Flagship research. A new health and wellbeing exhibition was completed in mid-2008.

A dedicated public programs officer is currently working on initiatives to engage the community and inform scientists, business people and the general public about CSIRO's National Research Flagships. The centre has hosted the David Rivett Memorial Lecture, CSIRO Awards and Medals ceremony, a meeting of Prime Minister's Science, Engineering and Innovation Council and several significant science conferences. Another important role for CSIRO Discovery is to provide briefings to scientific collaborators and diplomatic groups on behalf of CSIRO.

Discovery's unique schools program has expanded its outreach activities, resulting in touring groups to Canberra visiting CSIRO Discovery from every state and territory in Australia. The growth has meant an annual increase of between 24 per cent and 30 per cent since the centre opened in 2000. Over 30 000 students visited Discovery in 2007–08. They were predominantly in school years 5 and 6.

The Australia Telescope National Facility has two outreach centres associated with its observatories: the Parkes Discovery Centre located in the shadow of the famous 64 metre 'dish' and the Visitor Centre at the Australia Telescope Compact Array near Narrabri. The visitor centres attract over 110 000 people every year.

The Canberra Deep Space Communication Complex (CDSCC) is managed by CSIRO under the terms of a US-Australian Treaty on Space-Tracking. CDSCC provides mission critical support to some $20 billion worth of space craft exploring the solar system. The Canberra Space Centre is CDSCC's face to the public, with some 70 000 visitors per year coming to have a look at CDSCC's array of 70 metre and 34 metre antennas and learn about the history of space exploration from the launch of Sputnik to the spacecraft roving the surface of Mars.

CSIRO Discovery provides the chance for students to view working, research laboratories. Photo: Carl Davies

CSIRO PUBLISHING

This business unit is an independent information business operating within CSIRO on a commercial basis on behalf of authors and customers in Australia and overseas. Annual sales of $11 million are generated from three product streams:

- **Journals** – 25 peer reviewed research journals are published in partnership with the Academy of Science and various scientific societies. With over 60 per cent of the author base and 80 per cent of the subscription readership from outside Australia this is an international publishing operation.
- **Books and magazines** – 60 new titles were published during the reporting year adding to a significant backlist catalogue of over 1200 products. In addition, we publish *ECOS* CSIRO's Towards a Sustainable Future magazine, and *Preview*, the magazine of the Australian Society of Exploration Geophysicists.
- **Multimedia** – a variety of products are produced including videos, multimedia and eLearning material both for CSIRO and partners such as The Learning Federation.

Science for the developing world

CSIRO is a key player in the advancement of knowledge and a powerful force for promoting technological change. While we have played a role in unprecedented economic and social advances over the last 60 years, the developing world has fallen behind lucky countries such as Australia. Recent initiatives are helping to bridge the knowledge gap.

In 2004, a partnership between commercial publishers and Cornell and Princeton Universities was formed by the United Nations to provide freely accessible content to the developing world using web-based technology. Through *Access to Global Online Research in Agriculture* (AGORA), the Food and Agriculture Organization offers a vast digital library to research groups in 107 countries. CSIRO contributed research from 16 journals published by CSIRO PUBLISHING.

Recent research on losses of nitrogen fertiliser under oil palm in Papua New Guinea published in the *Australian Journal of Soil Research* is available through AGORA and OARE. Photo: Dr Murom Banabas, Papua New Guinea Oil Palm Research Association

Statistics indicate that the research archive, dating from 1948 in some cases, is highly valued by students and researchers throughout the developing world.

The *Health InterNetwork Access to Research Initiative* was also launched in 2004 with support of the World Health Organization to provide access to biomedical and health literature. Over 3750 journals, including nine from CSIRO PUBLISHING, are freely available to health institutions in 113 countries, benefitting many thousands of health workers and researchers and, in turn, contributing to improved world health standards.

An *Online Access to Research in the Environment* (OARE) concept was established in 2006 by the United Nations Environment Programme to open up access to the world's environmental science. Over 1300 journal titles, including 16 from CSIRO PUBLISHING, are now available in 106 low-income countries.

Sustained investment in science and the knowledge created by Australian scientists, past and present, is helping to build a healthier world that is better able to feed and sustain itself.

National research infrastructure

CSIRO is in a unique position to manage and deliver national and international research infrastructure that not only assists CSIRO but also the National Innovation System. CSIRO manages two types of national research infrastructure; National Research Facilities and National Biological Collections.

The National Research Facilities are available for use by both Australian and international researchers and are not restricted to CSIRO personnel. The National Research Facilities are the:

- Australian Animal Health Laboratory
- Australia Telescope
- Marine Research Vessel *Southern Surveyor.*

The National Biological Collections 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 therefore a vital resource for conservation and research. The National Biological Collections included in this output group are the:

- Australian National Fish Collection
- Australian National Insect Collection
- Australian National Herbarium
- Australian National Wildlife Collection
- CSIRO Collection of Living Microalgae.

The research done by the taxonomy community who assist with the collections is increasing their influence and impact outside the confines of taxonomy to areas such as climate change, biosecurity, and natural resource management and the collections are seen increasingly as a valuable resource. This is in keeping with the focus on the National Research Priorities and has been exemplified by the recently successful bids in the National Collaborative Research Infrastructure Strategy and the Commonwealth Environment Research Facilities, with the *Atlas of Living Australia* and the Taxonomic Research and Information Network respectively.

The review, *What future for Australia's biodiversity? Increasing the impact of CSIRO's biodiversity research* (2007) recommended a redirection

of strategic science effort within the biological collections. In July 2008, a new theme (*Australian National Biological Collections – Delivering Biodiversity Knowledge*) was developed to enhance the science impact and effectiveness of the collections. The theme includes the four major collections and the CSIRO Collection of Living Microalgae.

This will create an on-line, dynamic knowledge base of Australia's unique biodiversity and capitalise on effective linkages between the National Biological Collections. The combined resources of the collections and their underpinning research will inform the national response to biodiversity decline. Research in this area ensures Australia has the knowledge and tools to address critical issues of species relationships, location and identity in the management and conservation of ecosystems and biodiversity.

The science challenge is to understand the processes influencing the nature, status and extent of plant and animal biodiversity in rapidly changing environments. Clearer understanding of the evolutionary forces that have shaped the Australian biota will inform our understanding of the way species and communities will respond to global change, and thus help shape management strategies.

The research has a dual focus:

- to fill significant gaps in our systematics and taxonomic knowledge base providing more predictive capability around relationships and evolutionary drivers of our vertebrate, invertebrate, plant and fungal biodiversity
- to mobilise information in the national biological collections with leading-edge biodiversity informatics approaches, in order to support national and global biodiversity initiatives in response to environmental change and threats.

National Facilities

Helping Australia eradicate equine influenza

The Australian Animal Health Laboratory (AAHL) has played a central role in eradicating the highly contagious horse disease, equine influenza (EI), from the nation.

Australia was officially declared free of EI in June 2008, ten months after the first cases were detected in what has proved to be the largest exotic animal disease event in Australian history.

If EI were to become endemic in Australia it would have a major, ongoing impact on the country's multi-billion dollar horse racing and recreational industry. Successful eradication of EI has emphasised Australia's credentials as a country with excellent animal health capability.

Located in Geelong, Victoria, AAHL is one of the few biosecure facilities in the world that can safely handle live transboundary animal disease agents. The national facility is Australia's front-line diagnostic laboratory for outbreaks of emergency animal diseases such as EI.

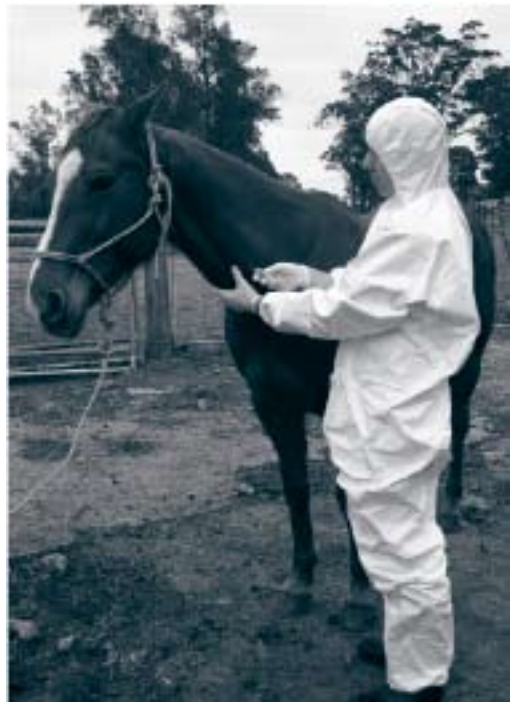
CSIRO scientists at AAHL quickly identified the first case of EI in Australia using serology and rapid polymerase chain reaction (PCR) tests originally developed to detect avian influenza and immediately confirmed the diagnosis by sequencing part of the viral genome.

The PCR tests were subsequently adopted by Australia's State and Territory veterinary

laboratories to monitor the spread of the disease and later were used to demonstrate that Australia had eradicated the disease and was free of EI. AAHL played a central role in the quality assurance of the tests deployed to these other laboratories.

The outbreak virus was successfully isolated by CSIRO scientists, enabling full genetic sequencing of this strain. This information helped determine the probable source of the infection and aided veterinary authorities in selecting the most appropriate vaccine strain to use in the face of the Australian outbreak.

Through excellent research and quality services, AAHL continues to enhance the international competitiveness of Australian agriculture and trade, the wellbeing of Australians, and the quality of their environment.



Blood being drawn from a horse for equine influenza testing. Photo: NSW Department of Primary Industries

Telescope networks go global and real-time

Using high-speed data networks, scientists from the Australia Telescope National Facility have connected radio telescopes in several countries and streamed their data back to Australia for instant processing. This has slashed the time needed for multi-telescope experiments from weeks to hours.

The technique, called electronic very long baseline interferometry (eVLBI), uses several widely separated telescopes to simulate a much bigger one, up to thousands of kilometres in size.

In the world of radio telescopes, bigger is generally better because it allows you to make higher-resolution images. But it is not practical to build an individual telescope more than a couple of hundred metres in size, hence the need to link several telescopes to mimic a big one.

In an eVLBI test in 2007, a CSIRO telescope was linked with others in China and Europe to create an 'instant world telescope' that was effectively the same as a single telescope 12 000 km in diameter.

That experiment was part of the Express Production Real-time e-VLBI Service (EXPReS) project, and was coordinated by the Joint Institute for VLBI in Europe (JIVE). The telescope data was streamed to Europe and processed there.

In 2008, CSIRO astronomers worked from Shanghai, China, to control telescopes in Australia, China and Japan and stream their data

Dr Chris Phillips and other CSIRO astronomers have linked telescopes around the world in real-time using high-speed data networks. Photo: Chris Walsh, Patrick Jones Photographic Studio

to CSIRO's Parkes Observatory for processing, showing Australia's ability to act as a processing centre. About half a gigabit of data had to be transferred from each telescope every second.

The dedicated 'lightpaths' for the experiment were provided by Australia's National Research and Education Network and counterpart institutions in China, Japan and the USA.

CSIRO's pioneering efforts in eVLBI were recognised by an award from the US-based Internet2 consortium, which represents more than 300 universities, companies and government research institutions. The award will give CSIRO a dedicated ten gigabit per second link across the USA for a year. CSIRO will use the link to work with international partner institutions to further develop and refine the technique of eVLBI (see page 85).

The *Southern Surveyor* reveals Australia's ocean riches

The Marine National Facility – Research Vessel *Southern Surveyor* benefits the nation by supporting deep-water marine research in Australian waters. The facility is owned and managed by CSIRO and its operations funded by the Australian Government, supporting many research organisations and enabling oceanographic, geo-scientific, fisheries and ecosystem research.

In 2007, as part of a *Southern Surveyor* voyage, a multidisciplinary research team from CSIRO and the Australian National University were investigating the activity of subsea volcanoes to the north of Papua New Guinea. They discovered the world's first upper mantle xenolith. A xenolith is a fragment of rock embedded in another type of rock and forms as rising magma forces its way to the surface, tearing fragments from rock walls, which are then incorporated into the cooling magma.

The discovery will have fundamental impacts on the scientific understanding of explosive volcanism, mineralisation, and formation of the continental crust. World-wide, only a handful of mantle xenoliths have been recovered; despite

Geologists on board the *Southern Surveyor* sorting through rock samples recovered by dredging operations on the Bismark Sea. Photo: David Fuentes

intensive searches less than ten occurrences are known globally.

Researchers from CSIRO and the South Australian Research and Development Institute aboard the *Southern Surveyor* explored, for the first time, deep-sea canyon systems in the Indian Ocean searching for new life forms. At depths down to five kilometres below the surface of the sea more than 100 deep-sea fish species were found, suggesting a very diverse marine ecosystem. Specimens included the rarely seen black dragon fish and lighthouse fish and a juvenile orange roughy, now a protected species. The species retrieved will help build an important reference bank of the region's fish life that will be used to help monitor and manage the area.

The voyage occurred, by coincidence, during the most intensive period of upwelling ever recorded, providing a highly valuable data set for oceanographers, biologists and geologists throughout Australia and overseas.

In addition, mapping of the canyon terrain has revealed the existence of massive underwater cliffs that are unparalleled in Australia, and will undoubtedly stimulate new interest in the evolution and biology of Australia's deep-water canyon systems.

Intellectual property – commercialisation

Commercialisation of CSIRO's intellectual property (IP) is managed by CSIRO's commercialisation team so as to promote the uptake and application of the technology in ways that will maximise the benefit to Australia. In light of its increasing importance, the Executive Team approved in 2007 a strategic change program to significantly improve IP management and awareness in CSIRO.

In 2007–08, revenues from IP increased significantly to a record $81.7 million compared to $30.6 million in 2006–07 and $9.3 million in 2000–01. This significant improvement over the budgeted IP earnings for 2007–08 of $45.7

million was driven primarily by a single, large transaction where CSIRO sold 47.5 per cent of its shareholding in its spin-out company, Carbon Energy Pty Ltd to Metex Resources Ltd (now renamed Carbon Energy Ltd) for cash and shares. This had a flow-on contribution to CSIRO's equity portfolio which has increased in value from $50.1 million as at 30 June 2007 to $118.6 million as at 30 June 2008. CSIRO also realised close to $4 million cash from disposals from the portfolio. Spin-out and licensing activity in general has continued at good levels with two new spin-out companies formed and a number of commercial licenses with high-value potential were executed.

The two new companies formed during the year from CSIRO developed technology are:

- Skiatech Pty Ltd, a joint venture company formed with Nuctech Company Ltd, a Chinese security inspection system specialist, to commercialise the next generation in air cargo scanning technology. CSIRO's scanning technology is designed to accurately and rapidly detect a wide range of threat items concealed inside air freight containers. The new venture will see Nuctech and CSIRO working together to manufacture the first commercial unit of the new air cargo scanner in Beijing (see page 58 for more details).

- Smart Storage Pty Ltd, a company formed by CSIRO and Cleantech Ventures Ltd, an Australian venture capital firm, to develop and commercialise battery-based storage solutions based on CSIRO's 'UltraBattery' which has been successfully trialled in hybrid vehicles. The Smart Storage battery technology aims to deliver a low-cost, high-performance, high-power stationary energy storage solution suitable for grid-connected and remote applications.

CSIRO's project to licence its patent holdings in wireless local area network (WLAN) technology, in order to derive significant value for Australia, continued through 2007–08. In the lead case in the US, the District Court's decision upholding CSIRO's position in relation to patent validity and infringement, and granting a permanent injunction, was the subject of an appeal that was heard during April 2008. Other cases continued in the Eastern District of Texas including a 'Markman' hearing in June 2008. Whilst these cases have continued, commercial use of the technology has continued to grow around the world.

The output of IP in the form of inventions, patents, trade marks, plant breeder's rights and registered designs continued in 2007–08 at similar levels as in recent years (see Table 2.1). The achievements reported earlier in Section 2 include numerous examples of the successful adoption and impact of CSIRO IP.

Client reporting

CSIRO completes much of its work under collaborative or contractual arrangements. Often the results of this work are not published, but are provided directly to the sponsor or partner as a client report. This is a very important channel for assisting industry and government clients and delivering benefits to Australia from CSIRO research. Client reports cover such things as testing whether a novel product developed by a company meets an industry standard or applying a CSIRO technology to a specific problem in private industry. The number of client reports produced by CSIRO for the last five years is shown in Table 2.2. Reports generated under these arrangements may include individually authored chapters as well as whole reports.

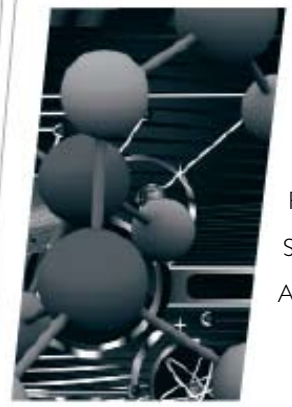
Table 2.1: CSIRO intellectual property outputs

IP category[a]	Sub category	2003–04	2004–05	2005–06	2006–07	2007–08
Patents	Current PCT applications	92	95	74	91	111
	Granted	2079	2048	2113	2067	1933
	Live cases	3961	3919	4084	3922	3787
Inventions	Patent families	754	745	780	734	741
	New	89	79	134[b]	84	67
Trade marks	Australian	290	306	281	287	291
	Foreign	92	100	91	104	113
Plant breeder's rights	Australian	77	80	113	119	122
	Foreign	17	21	17	25	25
Registered designs	Australian	3	3	2	3	2
	Foreign	12	12	12	12	11

(a) IP categories are defined in the glossary (page 233)
(b) Of the 134 provisional applications in 2006, 45 were multiple applications filed in support of several inventions. These will ultimately finish up as one or two patent families. Therefore, the number of inventions for the purpose of comparison to previous years is approximately 90.

Table 2.2: CSIRO client reports

	2003	2004	2005	2006	2007
Client reports	8451	8242	10 774	13 455	11 187



Section 3 – Science
Performing high-quality science

Performing high-quality science

The quality of CSIRO's science is critical to the Organisation's reputation and impact. CSIRO must therefore continue to develop and maintain high-quality science capabilities (including world-class scientists and facilities and relationships), in order to continue to produce quality scientific outputs such as publications, patents and inventions.

Investing in research capability

Renewal and continual development of our research capability was a key consideration in this year's Science Investment Process (SIP). CSIRO is continuing to build the capabilities required for future success through each of its Theme portfolios. For this reason Theme Leaders share responsibility for capability development with capability leaders (Research Program Leaders) and the development of research capabilities is supported through investments in the research Themes. However, to ensure that our capability leaders are able to anticipate needs and more systematically build longer-term capability that is aligned to our strategy, there are supplementary direct investments in capability development at both business unit and whole-of-enterprise levels.

The development of **Transformational Capability Platforms** (TCPs) is an initiative to ensure the long-term sustainability and future impact of the Organisation. Direct funding is now being provided for four TCPs highlighted in the CSIRO Strategic Plan: Transformational Biology; Advanced Materials; Computational and Simulation Sciences; and Sensors and Sensor Network Technologies (described below). In each of these areas a timely step-change is required to ensure that CSIRO's science remains at the forefront of international research. The TCPs represent cross-organisational capabilities with application across multiple areas of CSIRO research.

Additional funding has been allocated for 2008–09 to implement the **Advanced Computing Strategy** which will underpin the Transformational Capability Platforms. A number of **cross-organisational science networks** will also be established to foster connectivity and integration in selected capability areas; Earth Observation and Advanced Materials Networks are examples.

CSIRO's Transformational Capability Platforms

Transformational Capability Platforms are a strategic initiative to ensure that CSIRO's science remains at the forefront internationally. Investment in each Transformational Capability Platform will enable a step-change in CSIRO's research capabilities on a scale and scope beyond what is possible for any single Business Unit by:

- catalysing and accelerating capability development
- establishing a science network to foster connectivity and integration across all relevant CSIRO capabilities.

Transformational biology: Combining human, plant, and animal biology with genomics, phenomics, and whole-of-system approaches.

Advanced materials: Combining physics, engineering, chemistry and biology to develop the materials of the future.

Computational and simulation sciences: Developing broad-scale computation capability for diverse and practical applications for industry and community.

Sensors and sensor network technologies: Developing scientific expertise for large-scale deployment of sensor applications, transforming our ability to monitor and control our environment.

These four Transformational Capability Platforms are cross-organisational, applicable in multiple areas of CSIRO research and will underpin sustained high impact

The introduction of **Capability Development Funds** (CDFs) for all CSIRO Divisions is designed to provide Divisions with greater flexibility to explore opportunities to initiate new capability areas or to extend existing capabilities into new areas of potential impact.

Developing world-class scientists

The exceptional quality of CSIRO's scientists, engineers and technologists is well illustrated by the many awards and honours bestowed upon them in the year under review (see pages 83–95). Exceptional scientists ensure CSIRO's future and enhance our ability to contribute to the prosperity and wellbeing of Australia. In order to retain, develop and recruit world-class scientists, CSIRO, through the Office of the Chief Executive's Science Team, manages a range of initiatives. The purpose of these initiatives is to ensure that CSIRO maintains the highest quality of research and scientific capability, and to build a pipeline of research leaders by attracting and developing high-quality, early and mid-career scientists who have the potential to become leading scientists.

These initiatives also bolster CSIRO's national and international authority and leadership across a broad range of scientific domains by promoting science excellence and increasing national and international collaboration.

Supporting postgraduate training and development

The ongoing delivery of quality postgraduate student supervision reflects CSIRO's contribution to developing the skills base of Australia and our own staff. CSIRO's 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. PhD 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.

During the year, the scheme was extended by the establishment of a corporately sponsored PhD scholarships program. Fourteen scholarships have been awarded during 2007–08 and a further 20 scholarships will be offered in 2008–09.

Table 3.1 demonstrates that CSIRO's continuing commitment to postgraduate training, in partnership with university colleagues, remains very strong with 634 jointly supervised postgraduate research students during 2007–08 and a new intake planned for early 2008–09.

CSIRO also sponsored 134 vacation students and 214 industrial trainees during 2007–08.

Under the **Postdoctoral fellows program,** 40 new postdoctoral fellows were appointed in

Table 3.1 – Postgraduate supervision and sponsorship

Sponsored postgraduates [a]	2004	2005	2006	2007	2008
PhD	219	232	259	256	241
Masters	3	11	8	4	18
Honours	13	2	10	16	13
Total	**235**	**245**	**277**	**276**	**272[b]**
Supervised postgraduates [a]	**2004**	**2005**	**2006**	**2007**	**2008**
PhD	464	463	352	582	523
Masters	46	32	40	31	48
Honours	56	43	31	61	63
Total	**566**	**538**	**423**	**674**	**634**

(a) As at 31 May each year. A student may be either sponsored, supervised or both. The total number of individual students sponsored and/or supervised as at 31 May 2008 was 646, including more than 130 supervised in collaboration with CRCs. See glossary page 233 for definition of sponsorship and supervision.
(b) Includes 98 students fully sponsored and 174 students partially sponsored by CSIRO.

Table 3.2: CSIRO Postdoctoral fellows

	2003–04	2004–05	2005–06	2006–07	2007–08
Postdoctoral Fellows	259	283	290	294	301

2007–08. During the year, the program focused on rolling out a new mentoring and development scheme aimed at enhancing the postdoctoral experience at CSIRO. The total number of postdoctoral fellows is shown in Table 3.2.

The Julius Career Awards[1] are designed to enhance the careers of exceptional scientists at CSIRO. The award aims to develop and retain outstanding early to mid-career scientists with a view to enhancing science quality and to reinforce a culture of scientific excellence. The prestigious awards provide support towards professional development including facilitating secondment and experience in world-class national and international facilities. In 2007–08, 12 awards were offered with a further ten awards to be offered in 2008–09 (see page 95 for details of awardees).

Payne-Scott Award[1]**:** This new award provides support to researchers who have taken career breaks to care for family. It provides a one year grant to support scientists to re-establish themselves and re-connect with the research underway in their field and related fields of research.

The CEO's Science Leader Scheme is a major initiative to promote scientific excellence. Over a period of five years, the scheme aims to attract up to 25 of the best mid-career scientists from across the globe and provide them with resources and flexibility to allow them to deliver outstanding scientific impacts. These scientists will be working in research areas that complement or extend CSIRO's core research areas. Five CEO Science Leaders were appointed in 2007–08, taking the total to 15 since establishment of the scheme.

The Newton Turner Award[1] aims to further develop and retain exceptional senior scientists at CSIRO with a view to reinforcing a culture of scientific excellence. This new award will provide a one year grant for professional development support to scientists who have already demonstrated outstanding scientific achievement. Ten awards will be offered in 2008–09.

CSIRO Fellows are exceptional scientists who have displayed eminence in a significant field of science or engineering. CSIRO Fellows play a key role in mentoring and supporting programs to develop and help attract early career scientists. Two new CSIRO Fellows were appointed in 2007, taking the total to 12.

CSIRO is host to many visiting researchers in any given year. Building upon this, the **Distinguished Visiting Scientist Scheme** provides support for leading researchers in their field to come and work in CSIRO, normally for a period of six to twelve months. During this period they carry out an agreed research program with a CSIRO team and deliver a number of seminars. During 2007–08, ten Distinguished Visiting Scientists received sponsorship to work in CSIRO.

CSIRO's science reviews

The continuing quality and relevance of CSIRO's science base is assured through a rolling cycle of Flagship Reviews and Capability Assessment Reviews. The first reviews in a new cycle will be undertaken in 2008–09 and all of CSIRO's research capabilities will be reviewed by June 2011. Assessments are conducted by review panels, membership of which includes both peer researcher and end user representatives. An international perspective is considered

[1] *These awards are named respectively after:*
- *The former Chairman of CSIRO, Sir George Julius*
- *The distinguished female Australian pioneer, Ruby Payne-Scott, in radiophysics and radio astronomy*
- *One of Australia's foremost geneticists, Helen Newton Turner*

an essential input to these reviews for overall benchmarking purposes. Results of the reviews will be reported to the Minister for Innovation, Industry, Science and Research.

The purpose of the **Flagship reviews** is to maximise the likelihood of achieving the planned outputs and outcomes of the Flagship Program. The reviews examine: whether the right science challenges are being tackled; whether CSIRO and our collaborators have, or can build, the competitive science capabilities needed to tackle these challenges with sufficient capacity for timely delivery; and the path to impact.

CSIRO's capability assessment reviews are a rolling program of regular assessment by expert panels with the objective of maintaining or, where appropriate, improving the quality and relevance of our science. Such reviews are a feature of best practice quality assurance for science in mission-directed research agencies.

This robust, rigorous and independent assessment process involves peer review of each Division's research capabilities by independent experts, from both Australia and overseas. The keystone of the review process is the testing by the review panel of each Division's self-assessment of its research capabilities; the scientific skills and infrastructure underpinning these capabilities; and the feasibility of achieving the agreed and documented Theme outputs and outcomes. The review panel's findings are provided to the Executive Management and the CSIRO Board, together with a response plan, and there is a follow-up examination of post-review implementation after 12 months. The first cycle of Divisional science assessment reviews was completed in 2006–07. The results have affirmed that CSIRO's science is conducted to a very high standard with effective linkages to relevant industry and community groups.

The findings of past reviews influenced the development of a number of organisation-wide initiatives, such as the Chief Executive Officer's Science Leader Scheme and extension of the CSIRO postdoctoral scheme described above.

Publications and citations

The number of publications produced by CSIRO reflects our contribution to, and hence ability to access, the world's knowledge base. CSIRO reports on five types of publications: journal articles, books/chapters, conference papers, technical reports and client reports. (The number of client reports is reported in Section 2, page 74).

CSIRO seeks to maintain or increase the publication output of CSIRO scientists while ensuring that the quality and impact of these publications continues to meet relevant benchmarks. To reflect this, two ratios are presented in Table 3.3. Quantity is indicated through the 'total number of refereed

Table 3.3: CSIRO publications by type

Publication type[a]	2003	2004	2005	2006	2007
Journal articles	1836	1858	1945	2198	2239
Books/chapters	240	267	238	227	234
Conference papers	1428	1713	1852	1830	1525
Technical reports	442	277	620	676	613
Total	**3946**	**4115**	**4655**	**4931**	**4611**
Citations per paper	9.18	9.87	10.46	11.09	12.17[b]
Total publications per RS/E [c]	2.53	2.60	2.92	3.00	2.81

(a) See glossary page 233 for definition of publication types (b) Essential Science Indicators, ISI, Thomson Reuters – Scientific, for the period ending 30 June 2008 (c) RS/E – research scientist/engineer

publications per research scientist/engineer'. Quality is indicated through the 'number of citations per paper'.

Over the period 2003 to 2008 the average rate at which CSIRO's papers were cited, a critical measure of the impact of our science, has increased from 9.18 citations per paper (cpp) to the current rate of 12.17 cpp. This exceeds the average citation rates for Australia (10.20 cpp) and the world (9.37 cpp). Although citation rates generally have increased over time, CSIRO's rate of increase in citations per paper is greater than the average rate of increase for Australia and for the world[2].

Amongst Australian institutions that publish across a broad range of research fields, and ranked by citations per paper, CSIRO (12.17 cpp) and the ANU (12.13 cpp) lead in Australia. Worldwide, CSIRO remains in the top one per cent of leading scientific institutions in 13 research fields based on the total number of citations to papers published in these fields[2]. CSIRO has retained its ranking amongst the world's top ten institutions in three fields: plant and animal sciences; agricultural sciences; and environment and ecology. CSIRO is the first ranked Australian organisation in these three fields.

CSIRO's scientists continue to publish in a number of highly prestigious journals. In 2007, CSIRO scientists published our highest ever number of publications, 23 articles in total, in these journals – six in *Nature* and its affiliates; 12 in *Science*; and five in the *Proceedings of the National Academy of Sciences* in the USA. In the last ten years, 168 articles have been published in these journals.

[2] *Essential Science Indicators, ISI, Thomson Reuters – Scientific, for the period ending 30 June 2008*

The formal registration of **intellectual property** (IP) as inventions, patents, trade marks, plant breeder's rights and registered designs is another form of scientific output. CSIRO's IP activity is reported in Section 2 (see page 73).

Science infrastructure and outreach

CSIRO's, and Australia's, ability to continue performing high-quality science depends, in part, on access to appropriate scientific facilities and a continuing supply of keen and well-trained science graduates. CSIRO plays an important role in both respects through its management of **National Facilities and Collections** (reported in Section 2, page 69), the **supervision of postgraduate students** (reported on page 79) and the delivery of high-quality **CSIRO Education Programs** focused on the needs of teachers and students. (reported in Section 2, page 65).

Awards and honours

In 2007–08, CSIRO scientists won international and national acclaim for the excellence of their work. These awards are further demonstration of our effectiveness in research and its application in industry and the community. Over 100 awards were received by CSIRO staff, including the prestigious Prime Minister's Science Prize and Eureka Prizes.

Prime Minister's Science Prize

Dr Peter Waterhouse and **Dr Ming-Bo Wang** (Plant Industry) won the *2007 Prime Minister's Prize for Science* for their discovery and development of a gene silencing mechanism in crop, medical and livestock research around the world. The Prime Minister's Prize for Science, the nation's premier science award, is presented to Australian scientists who promote human welfare through an outstanding achievement in science or technology.

Dr Ming-Bo Wang and Dr Peter Waterhouse, winners of the 2007 Prime Minister's Science Prize. Photo: Carl Davies

Science Minister's Prize for Life Scientist of the Year

Dr Beth Fulton (Marine and Atmospheric Research, Wealth from Oceans Flagship) was awarded the *Science Minister's Prize for Life Scientist of the Year* in recognition of her outstanding achievements in marine ecosystem modelling and her impact on understanding climate change and managing the impact of fishing.

Dr Beth Fulton, winner of the Science Minister's Prize for Life Scientist of the Year. Photo: CSIRO

Australian Museum Eureka Prizes 2007

Dr Garry Cook, Dr Jon Schatz (Sustainable Ecosystems) and **team** won the inaugural *Eureka Prize for Innovative Solutions to Climate Change*. The West Arnhem Land Fire Abatement (WALFA) project is an innovative venture that links Indigenous knowledge to the science of greenhouse gas mitigation and savanna burning. The WALFA team has spent ten years developing the program which aims to abate West Arnhem Land wildfire.

Dr John Church (Marine and Atmospheric Research, Wealth from Oceans Flagship) was awarded the *2007 University of New South Wales Eureka Prize for Scientific Research* for development of a cohesive global sea-level record that is being used to further our understanding of sea-level rise and to test climate change models.

Dr Shahbaz Khan (Water for a Healthy Country Flagship) and **team** won the *2007 Land & Water Australia Eureka Prize for Water Research and Innovation* for their research into water efficient irrigation in Australia and overseas.

Australian Honours

Order of Australia

Officer (AO)

Dr Geoff Garrett (Chief Executive) for services to scientific research and administration through leadership of the CSIRO, and the development and implementation of innovative research initiatives.

Member (AM)

Professor Tom Spurling (CSIRO Board member) for services to chemical science through contributions to national innovation policies, strategies and research, and to the development of professional scientific relationships within the Asian region.

Medal (OAM)

Dr Douglas Ratcliff (retired, Mathematical and Information Sciences) for his services over the past ten years assisting in the delivery of information technology to staff and students at Albany Creek State School.

International Awards

Dr Adrian Baddeley (Mathematical and Information Sciences) was named the *2008 Georges Matheron Lecturer* by the International Association for Mathematical Geology for his contributions to research in the fields of spatial statistics and image analysis.

Dr Brian Boyle (Australia Telescope National Facility) won the *2007 Gruber Cosmology Prize* (shared) from the US Gruber Foundation. This prize was awarded to the Supernova Cosmology

Project and the High-z Supernova Search team, for their discovery that the expansion of the Universe is accelerating.

Mr David Cooke (retired, Australia Telescope National Facility) received one of the inaugural *Stars of Australia* awards from the Australian American Chamber of Commerce and the Western Australian Trade and Investment Office for his role in the 1969 Moon landing.

Dr Peter Cook (Land and Water) has been chosen as the *2009 Henry Darcy Distinguished Lecturer* from the United States-based National Ground Water Association. It is the first time the lectureship has been granted to a researcher outside North America.

More than 20 **CSIRO staff** from Marine and Atmospheric Research and Sustainable Ecosystems contributed to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) in 2007. Contributors to this and previous reports were recognised for their activities that led to the award to the IPCC of the 2007 *Nobel Peace Prize*, including current and former staff from Energy Technology, Entomology, Land and Water, Marine and Atmospheric Research, Materials Science and Engineering, Plant Industry and Sustainable Ecosystems.

Dr Melissa Dobbie (Mathematical and Information Sciences) won the *2007 AusCan Scholarship* cosponsored by the Statistical Society of Australia and the Statistical Society of Canada, for her potential as a young statistical researcher.

e-Very Long Baseline Interferometry (VLBI) team (Australia Telescope National Facility) was awarded an *Internet2 Driving Exemplary Applications Wave of the Future Award* from the Internet2 consortium, which represents more than 300 US universities, companies and government research institutions for a proposal for the development of electronic VLBI.

Dr Michael Fenech (Food Science Australia) was awarded the *2008 Alexander Hollaender Award* from the Environmental Mutagen Society, Puerto Rico, in recognition of his outstanding contributions in the application of the principles and techniques of environmental mutagenesis to the protection of human health. Dr Fenech also received a *2007 Flinders University Convocation Medal* for outstanding national and international achievement in the field of environmental health and nutrition.

Mr Russell Gough (Australia Telescope National Facility) won the *Electronics Design Strategy News (EDN) Innovation Award* for the Peregrine-LaTrobe-CSIRO developed design for the best application of analogue design by international electronics publisher EDN magazine.

Dr Bronwyn Harch (Mathematical and Information Sciences) won the *2008 Abdel El-Shaarawi Young Investigator Award* from The International Environmetrics Society for contributions to the construction of biological indexes for freshwater quality and for the development of monitoring programs for water quality.

Dr Marianne Horak (Entomology) won the inaugural *JO Westwood Medal* from Britain's Royal Entomological Society and the Department of Entomology of the Natural History Museum, London for her book *Olethreutine Moths of Australia.*

Dr Carole Jackson (Australia Telescope National Facility) won a *Group Achievement Award* from the Royal Astronomical Society, UK for the 2-degree Field Galaxy Redshift Survey.

Dr Kai Knoerzer (Food Science Australia) won the 10th *George Carl Hahn Prize* from G C Hahn & Co, Germany, for his work on modelling microwave food processing and pressure assisted thermal sterilisation. Dr Knoerzer was also awarded the *Scientific Research Award of the Association of German Bakery Product Manufacturers* for his work on microwave technology and magnetic resonance imaging.

Dr Keith Millington (Textile and Fibre Technology) was awarded a *Centenary Medal* from the Society of Dyers and Colourists in the UK. Dr Millington won the award for his recent review of scientific literature on the photo-yellowing of wool.

Dr David Muir (Minerals) received the *BHP Billiton Gold Medal* awarded by the Institute of Mining Metals and Materials (London) for the

best technical paper in the field of extractive metallurgy published by the Institute in *TransIMM*.

Dr Erin Peterson (Mathematical and Information Sciences) won the *Pacific Institute of Mathematical Sciences Acceptance and Award* to attend the Modelling Environmental Space-Time Processes course at the University of Washington, for her statistical modelling research in south-east Queensland waterways.

Mr Mark Raven (Land and Water) won equal third place in the world in the International Clay Minerals Society's *Reynolds Cup* for quantitative mineralogical analysis.

Dr Maarten Ryder (Sustainable Ecosystems) received the *International Collaboration Prize for Science and Technology* from the Shandong Government, People's Republic of China for his work on biological disease control treatments for crops and the development of a collaborative project on the economic use of saline water and soils in Australia and the Yellow River delta region.

Dr Peter Thorburn and **team** (Sustainable Ecosystems) won an *international prize* from the International Society of Sugar Cane Technologists for the development of 'nitrogen replacement' an approach to fertiliser management which could have major environmental and economic benefits for cane-growing regions.

Mr Tobias Westmeier (Australia Telescope National Facility) was awarded a *PhD Award* for his outstanding PhD thesis from the Department of Physics and Astronomy by the University of Bonn.

Australian Awards

Dr Bob Anderssen (Mathematical and Information Sciences) was awarded a *DSc (honoris causa)* by La Trobe University for his contributions over many years to applied mathematics.

Ms Loren Bardwell (Land and Water) was awarded the *Robert K Murphy Research Scholarship* to assist the student in their research during the completion of their honours year. Ms Bardwell was also awarded the *RACI Prize* for academic excellence in analytical chemistry and the *Agilent Technologies Prize* for the most competent analytical chemist all awarded from the University of Technology, Sydney.

Dr Anne Bourne (Honorary Fellow, Entomology) was awarded a *Lifetime Contribution to Science Award* from the Queensland Smart Women Smart State Award. Dr Bourne continues to play a critical role in biological and climate science by designing experiments, analysing data and interpreting results.

CSIRO Education won a *2007 Prime Minister's Award for Excellence in Community Business Partnerships*. The award recognises a 27-year partnership between BHP Billiton and CSIRO Education and the engagement of school children in real-life science through the BHP Billiton Science Awards. The Australian Science Teachers Association is also a partner.

Dr Neal Dalgliesh (Sustainable Ecosystems) won with the *Seed of Light Award* from the Grains Research and Development Corporation for his significant contributions to communicating the outcomes of research to improve production, sustainability and profitability across the Australian grains industry.

Dr Catia Domingues (Marine and Atmospheric Research, Wealth from Oceans Flagship) won a *Department of Innovation, Industry, Science and Research's Fresh Science Award*. The awards recognise new and interesting research being done by early-career scientists.

Dr Hugh Dove (Plant Industry) was awarded the *Research Medal of the Nutrition Society of Australia* for his contributions to the science of animal nutrition.

Datatrace DNA won the *Du Pont Australia and New Zealand 2007–08 Innovation Award for Performance Materials*. Datatrace is commercialising CSIRO technology developed by **Dr Peter Osvath** and **team** (Molecular and Health Technologies) involving a molecular tracking and authentication system targeted at increasing the security of industrial products.

Mr Alan Dyce, (Honorary Fellow, Entomology), has been awarded the *Australian Medal of*

Agricultural Science by the Australian Institute of Agricultural Science and Technology. This prestigious award recognises Mr Dyce's life's work and his enormous contribution to Australian science and agriculture.

Mr Ted Edwards (post-retired Fellow, Entomology) and **Mr Paul Zborowski** received a *Whitely Award* for their book, *A Guide to Australian Moths* from the Royal Zoological Society of New South Wales.

Dr Cathy Foley (Materials Science and Engineering) was awarded the *2007–08 Institute of Electrical and Electronics Engineers (IEEE) Distinguished Lecturer* by the IEEE Council of Superconductivity. Dr Foley also received a *2007 Macquarie University Alumni Award for Distinguished Service*.

Dr Patrick Glynn (Exploration and Mining) won a *2007 Australian Coal Association Research Program Award for Research Excellence* for his collision avoidance for mine haul trucks research work.

Dr Voytek Gutowski (Materials Science and Engineering) received the state of *Victoria's 2008 Premier's Sustainability Award for Products or Services* for the development of a powder coating for heat-sensitive substrates that is both emissions free and environmentally sustainable.

Dr Kim Halpin (Livestock Industries) was named one of Victoria's *Young Tall Poppies*. The prestigious Young Tall Poppy Science Awards form an important component of the Tall Poppy Campaign which was established by the Australian Institute of Policy and Science to promote awareness of Australia's intellectual achievements. Dr Halpin is responsible for leading the molecular diagnostic investigations surrounding suspected animal disease outbreaks, both in Australia and overseas.

The **ICT Centre's MultiGigabit MM-Wave Wireless team** (ICT Centre) won the prestigious *Engineering Excellence Awards for Research and Development* from Engineers Australia. The team developed a world first multi-gigabit wireless link which operates at speeds of up to six gigabits per second. Future plans include increasing this speed to 12 gigabits per second.

Dr Geoff Inman-Bamber (Sustainable Ecosystems) was awarded the *Australian Society of Sugar Cane Technologists' Presidents Award for 2008* for leadership in sugarcane physiology.

Dr Shirley Jeffrey (Marine and Atmospheric Research) was awarded the *2007 Shinkishi Hatai Medal* from the Pacific Science Congress for her long time work on the analysis and determination of pigments in phytoplankton. Since phytoplankton is the only primary producer in oceanic ecosystems, her contribution is among the most fundamental to the science of Pacific marine biology.

Dr Tony Koslow (formerly Marine and Atmospheric Research) won the *2007 Victorian Premier's Literary Award* for the book, *The Silent Deep: The Discovery, Ecology and Conservation of the Deep Sea*.

Dr Stuart Lucas (Textile and Fibre Technology), **Mr Nick Schopman** and **Dr Scott Sheedy** (Livestock Industries) each received a *Smart Geelong Network Researcher of the Year Award* for their research achievements in innovation and advanced manufacturing, biotechnology, and animal health respectively.

Dr Ian Madsen (Minerals) received the inaugural Australian X-ray Analytical Association (AXAA) *Bob Cheary Award for Excellence in X-ray Diffraction* in recognition of his long-term contributions to the field and to AXAA.

Dr Peter Manins (post-retired Fellow, Marine and Atmospheric Research) was awarded the *Clean Air Medal* from the Clean Air Society of Australia and New Zealand for distinction in the atmospheric sciences, air quality and environmental protection.

Dr Naomi McClure-Griffiths (Australia Telescope National Facility) won the *Powerhouse Museum Wizard Award* which recognises emerging leaders in Australian innovation and achievement.

Mr Tom McGinness (Flagships) won an *Order of Merit from the Australian Institute of Company Directors* one

of only four recipients out of 2059 participants in the Company Directors Course in 2007.

Mr Colin MacRae (Minerals) was awarded a *Distinguished Service Award* by the Australian Microscopy and Microanalysis Society (AMMS) in recognition of his long-term contributions to the field and to AMMS.

Dr James Moody (International) was awarded the *2007 Australian Financial Review BOSS Magazine Young Executive of the Year* for his outstanding leadership and business skills.

Dr Richard Morris (Research Fellow) and **Dr Erick Ramanaidou** (Exploration and Mining) were awarded the *Stillwell Medal* for their article titled 'Genesis of the Channel Iron deposits of the Pilbara of Western Australia'. The Stillwell Award is a prestigious medal awarded to the author or authors of the best paper of the year in the *Australian Journal of Earth Science*, judged by the editorial board.

Dr John Oakeshott (Entomology) and Orica Watercare's Remediation business was awarded the prestigious *Technology and Innovation Award* for the Landguard™ technology at the annual Agribusiness Awards for Excellence. The award recognises innovation of high-value to the customer and demonstrated high potential profitability through successful adoption.

Dr Christine O'Keefe (Preventative Health Flagship and Mathematical and Information Sciences) won the *Accenture Prize for Corporate Strategy 2006* and the *Acumen Alliance Prize for Entrepreneurship and New Venture Planning 2007* in the Master of Business Administration (MBA) degree program at the Australian National University.

Dr Peter Roupas (Food Science Australia) won the *Dairy Industry Association of Australia Loftus Hill Silver Medal* for publishing papers that have made a significant contribution to dairy science or technology.

Dr Melony Sellars (Food Futures Flagship, Marine and Atmospheric Research) received the *Science and Innovation Award for Young People* from the Department of Agriculture, Fisheries and Forestry for her work on improving prawn growth through increased heterozygosity.

Dr Anna Straton (Sustainable Ecosystems) was awarded *Young Alumnus of the Year* from the University of Queensland. The Young Alumnus of the Year is awarded to a graduate under the age of 35 who has made an outstanding contribution and whose achievements have brought recognition to the university.

Dr James Tickner (Minerals) was named as one of *New South Wales Young Tall Poppies.* Dr Tickner develops radiation instrumentation for problems as diverse as finding landmines, measuring contaminants in coal, detecting minute amounts of precious metals such as gold and developing scanning technology for screening luggage and air cargo.

Mr Marinus van der Sluijs (Textile and Fibre Technology) received a *2007 Cotton Catchment Communities' CRC Annual Impact in Adoption Award* in recognition of his leadership of the Cotton Field to Fabric Training Program which enables the sharing of information across all sectors of the cotton production pipeline.

Mr Tom van Gerwen (volunteer Fellow, Entomology) has won an award for the Education, Science and Technology Category in the *ACT Volunteer of the Year Award 2008*. Mr van Gerwen was recognised for his role, as a volunteer, in managing the Australian National Insect Collection Volunteers Scheme for the past ten years, since its inception.

Dr Colin Ward (Molecular and Health Technologies) was awarded the *Lemberg Medal* by the Australian Society for Biochemistry and Molecular Biology. It is awarded annually to a distinguished Australian biochemist or molecular biologist for their sustained contributions to the field.

Dr David Yeates and **team** (Entomology) received a *Whitley Award* for their CD *On the Fly: The Interactive Atlas and Key to Australian Fly Families* from the Royal Zoological Society of New South Wales.

CSIRO Medals and Awards

The CSIRO Medals 'Honouring Excellence'

The Chairman's Medal

The ICT Centre Gigabit Wireless Team (Information and Communication Technologies) won the *2007 Chairman's Medal* for the development the world's fastest and most spectrally efficient six gigabit per second wireless millimetre-wave communications link.

The winners of the *Chairman's Medal* were:

Team leader: **Mr Ian Davis**
Team members: **Dr David Abbott, Mr Tony Adriaansen, Dr John Archer, Dr John Bunton, Mr Val Dyadyuk, Mr Alex Grancea, Dr Y Jay Guo, Ms Jayasri Joseph, Mr Rod Kendall, Mr Alex Krum-Heller, Mr Tom McGinness, Mr Boyd Murray, Mr Joseph Pathikulangara, Mr Melvyn Pereira, Dr Craig Russell, Ms Oya Sevimli, Mr Rob Shaw, Ms Mei Shen, Mr Leigh Stokes** and **Mr Juan Tello.**

The CSIRO Medals for Research Achievement

The *CSIRO Medals for Research Achievement* for 2007 were awarded to:

- **Water for a Healthy Country Flagship – Irrigation Team** (Water for a Healthy Country Flagship) for research that has significantly advanced the sustainable management of Australia's water resources, specifically within the irrigation sector.

Winners of the Chairman's Medal from L to R, back row: Dr John Bunton, Dr David Abbott, Mr Rob Shaw, Mr Joseph Pathikulangara, Mr Tom McGinness, Mr Rod Kendall and Dr Geoff Garrett (Chief Executive). Middle row, L to R: Dr Alex Zelinsky, Dr Y Jay Guo, Mr Val Dyadyuk, Mr Alex Grancea, Mr Juan Tello, Ms Mei Shen. Front row, L to R: Ms Oya Sevimli, Dr John Stocker (Chairman), Mr Ian Davis, Mr Boyd Murray, Ms Jayasri Joseph, Mr Tony Adriaansen. Photo: Carl Davies

Members of the Water for a Healthy Country Flagship Irrigation Team L to R: Dr Akhtar Abbas, Dr Sarah Ryan, Ms Jiaxin Mu, Mr Tariq Rana, Dr Chris Smith, Dr John Blackwell, Dr John Stocker (Chairman), Dr Shahbaz Khan, Dr Shahbaz Mushtaq, Dr Mohsin Hafeez, Dr Zahra Paydar, Dr Geoff Garrett (Chief Executive). Photo: Carl Davies

Members of the CSIRO Bee Team L to R: Dr Frances FitzGibbon, Dr Ros Blanche, Dr Matt Thomas, Dr David Cook, Dr John Stocker (Chairman), Dr Denis Anderson, Dr Paul De Barro, Dr Saul Cunningham, Dr Matt Colloff, Ms Kerrie Medveczky, Dr Geoff Garrett (Chief Executive). Photo: Carl Davies

Members of the LANDTEM™ Team L to R: Dr John Stocker (Chairman), Mr Chris Lewis, Mr Chris Williams, Dr John Macfarlane, Mr Rex Binks, Dr Jia Du, Mr Keith Leslie, Dr Marcel Bick, Mr Peter Sullivan, Mr Bob Thorn, Mr Wayne Murray, Mr Mark Roberts, Dr Simon Lam, Dr Geoff Garrett (Chief Executive). Photo: Carl Davies

Team leader: **Dr Shahbaz Khan**
Team members: **Dr Akhtar Abbas, Mr Saud Akbar, Dr John Blackwell, Ms Demelza Brand, Dr Siegfried Demuth, Dr Mohsin Hafeez, Mr Ismail Hirsi, Ms Jiaxin Mu, Dr Shahbaz Mushtaq, Dr Zahra Paydar, Mr Tariq Rana, Dr Sarah Ryan, Dr Chris Smith, Mr Murray Smith, Mr Brett Tucker, Dr Emmanuel Xevi** and **Dr Cui Yuanli.**

- The **CSIRO Bee Team** (Entomology) for raising awareness of the biosecurity threats to Australia's pollination services and to the viability of key agricultural industries.

Team leaders: **Dr Denis Anderson** and **Dr Paul De Barro**
Team members: **Dr Ros Blanche, Dr Matt Colloff, Dr David Cook, Dr Saul Cunningham, Dr Frances FitzGibbon, Ms Kerrie Medveczky, Ms Fiona Spier** and **Dr Matt Thomas.**

- **The LANDTEM™ Team** (Materials Science and Engineering) for a significant world's first scientific and technical outcome in the development of the LANDTEM™ system for minerals exploration based on High Temperature Superconducting devices known as SQUIDs.

Team leader: **Mr Keith Leslie**
Team members: **Dr Marcel Bick, Mr Rex Binks, Dr Jia Du, Dr Cathy Foley, Dr Simon Lam, Mr Christopher Lewis, Dr John Macfarlane, Dr Emma Mitchell, Dr Karl Muller, Mr Wayne Murray, Mr Mark Roberts, Dr Graeme Sloggett, Mr Peter Sullivan, Mr Robert Thorn, Dr David Tilbrook** and **Mr Christopher Williams.**

The CSIRO Medal for Business Excellence

The *CSIRO Medal for Business Excellence* was awarded to the **CSIRO T-Mag™ Technology Commercialisation Team** (Materials Science and Engineering) for the establishment of a CSIRO joint venture (T-Mag™ Pty Ltd) with an SME consortia to develop and commercialise the T-Mag™ technology for the global exploitation of magnesium castings to reduce vehicle weight, fuel consumption and greenhouse emissions.

Team leader: **Mr Sam Tartaglia**
Team members: **Dr Mark Bonnar, Mr John Carrig, Mr Brad Cowley, Mr Geoff Delooze, Mr Andrew Downs, Mr Barrie Finnin, Mr Steven Groat, Mr Paul Jarmain, Dr Thang Nguyen, Ms Lynda O'Brien, Mr Stuart Pearce** and **Dr Kevin Rogers.**

The CSIRO Medal for Lifetime Achievement

Dr Richard Manchester (Australia Telescope National Facility) was awarded a *CSIRO Medal for Lifetime Achievement* in recognition of his lifetime

Winners of the CSIRO Medal for Business Excellence L to R: Dr John Stocker (Chairman), Dr Mark Bonnar, Dr Thang Nguyen, Mr Sam Tartaglia, Mr Steve Groat, Mr Barrie Finnin, Ms Lynda O'Brien, Dr Geoff Garrett (Chief Executive). Photo: Carl Davies

Dr Richard Manchester, winner of the CSIRO Lifetime Achievement Medal, speaking at the awards ceremony. Photo: Carl Davies

contributions to the discovery and study of pulsars in the Galaxy. Dr Manchester provided significant leadership, mentoring and inspiration for the next generation of astronomers through world-leading pulsar research. This included the discovery in 2003 of the renowned highly relativistic double–pulsar system, the first of its kind, and a 'holy grail' of pulsar astronomy that provides unprecedented insights into fundamental physics.

Fellowships and Societies

Dr Charles Butt (Exploration and Mining) and **Dr Robert Evans** (Forest Biosciences) were appointed as *CSIRO Fellows.*

Dr Trevor Bird (ICT Centre) and **Dr Ilija Sutalo** (Materials Science and Engineering) were elected as Fellows of *Engineers Australia.*

Dr Peter Corke and **Dr Alex Zelinsky** (ICT Centre) were elected as Fellows of the *Institute of Electrical and Electronics Engineers*, the world's leading professional association for electrical and electronic technology.

Dr Hugh Dove (Plant Industry) was elected a *Fellow of the Australian Society of Animal Production* for services to animal science.

Dr Ilana Feain (Australia Telescope National Facility) was awarded a *L'Oreal Australia for Women in Science Fellowship* to further her involvement in Global Jet Watch, a program that enlists high school students to do ground-breaking astronomy.

Dr Thilak Gunatillake (Molecular and Health Technologies) was named a *Fellow of the Biomaterials Science and Engineering* by the International Union of Societies for Biomaterials Science and Engineering, for achievement in the field of biomaterials science and engineering.

Dr Bruce Hobbs (Research Fellow, Exploration and Mining) was made a *Fellow of the Geological Society of Australia.*

Dr Peter Lilly (Minerals Down Under Flagship), **Dr Kelly Thambimuthu** (Centre for Low Emissions Technology) and **Dr Graeme Woodrow** (Molecular and Health Technologies) were elected to the *Australian Academy of Technological Sciences and Engineering.*

Mr Chris O'Neill (Livestock Industries) was awarded a *Churchill Fellowship* by the Winston

Churchill Memorial Trust for him to explore the integration of livestock behaviour into genetic improvement programs.

Dr Jenny Stauber (Land and Water) was awarded the 2008–09 *Bede Morris Fellowship* by the Australian Academy of Sciences and the French l'Academie des Sciences de l'Institute de France to travel to France and Spain as part of a project to develop molecular biomarkers to assess contaminant impacts on marine biota.

Dr Steve Wilkins (Materials Science and Engineering) was made an *Honorary Professor*, School of Physics, at Monash University.

Dr Harry Wu (Forest Biosciences) was awarded a *2008 Denis Cullity Fellowship* by Forest and Wood Products Australia. The fellowship is awarded to recipients so they can develop knowledge of innovative techniques and capabilities to benefit the Australian forest and wood products industry.

Dr Serge Zhuiykov (Materials Science and Engineering) was awarded the *2007 Senior Scientist Invitations Fellowship* to Japan by the Australian Academy of Science and the Japanese Society for the Promotion of Science.

The CSIRO Awards – Celebrating 2007 Achievements

One-CSIRO Awards

The *One-CSIRO Award* was awarded to the CSIROpod Team (CSIRO Media). The CSIROpod One-CSIRO approach created a major science communication phenomenon. CSIROpod has allowed CSIRO scientists to share knowledge with colleagues and further their science to the world.

Team leader: **Ms Marilyn Chalkley**
Team members: **Mr David Brew, Ms Beck Eveleigh, Ms Lisa Howdin, Ms Kylie Johnson, Mr David McClenaghan, Mr Justin McGuire, Mr Matteo Montebello, Mr Huw Morgan, Mr Steve Nyhof** and **Mr Bill Stephens.**

Look Out!!! Award

The *Look Out!!! Award* was awarded to the Adaptive Wireless Project Team (ICT Centre). The team developed new signal processing algorithms for wireless broadband communications, along with a new flexible demonstration platform, and have achieved world's best spectral efficiencies, consolidating CSIRO's world leadership in the field.

Team leader: **Dr Iain Collings**
Team members: **Dr Thangadurai Arivoli, Dr Zhuo Chen, Ms Jayasri Joseph, Mr Rodney Kendall, Mr Matthew Mckay, Mr Boyd Murray, Mr Joseph Pathikulangara, Dr Hajlme Suzuki** and **Dr Zhongwel Tang.**

Partnership Excellence Awards

The *Partnership Excellence Award* was awarded to the Energy Futures Forum Project Team (Energy Transformed Flagship) for convening and managing the Energy Futures Forum, a unique exercise that brought together Australia's energy and environment stakeholders to identify plausible scenarios and their implications for the nation's energy future.

Team leader: **Mr Paul Graham**
Team members: **Ms Naomi Boughen, Ms Josephine Cheng, Dr Roger Jones, Dr Anna Littleboy, Ms Kim Phillips, Dr Franzi Poldy, Dr Benjamin Preston, Dr Luke Reedman** and **Dr John Wright.**

The *Partnership Excellence Award* was awarded to the Lower Murray Landscape Project Team (Water for a Healthy Country Flagship). This ambitious tri-state partnership has enabled the assessment of the costs, benefits, and trade-offs of alternative landscape futures for the riverine and agricultural landscapes of Australia's Lower Murray region. The analysis is helping regional agencies and government to review and improve

their natural resources management plans. This research contributes to the Water for a Healthy Country Flagship.

Team leader: **Mr Jeff Connor**
Team members: **Dr Geoff Barrett, Ms Lorraine Bates, Dr Brett Bryan, Dr Neville Crossman, Dr Rebecca Doble, Dr Amgad Elmahdi, Ms Catherine Johnston, Mr David Kaczan, Mr Darran King, Ms Wendy McIntyre, Dr Wayne Meyer, Mr Trevor Pickett, Dr Sarah Ryan, Mr Matt Stenson, Dr Glen Walker** and **Dr Enli Wang.**

Occupational Health and Safety Achievement Awards

The *Occupational Health and Safety Achievement Award* was awarded to the Cold Spray Team (Materials Science and Engineering) for the development and implementation of a state-of-art health, safety and environment (HSE) Cold Spray facility that became industry standard. The HSE for Cold Spray technology has been transferred to Australian industry and is contributing towards the safe operation of Cold Spray technology globally.

Team leader: **Dr Mahnaz Jahedi**
Team members: **Ms Krista Black, Dr Darren Fraser, Mr Stefan Gulizia, Dr Peter King, Dr Caixian Tang, Dr Bill Tiganis** and **Dr Saden Zahiri.**

Environmental Achievement

The *CSIRO Environmental Award* was awarded to Science by Email (CSIRO Education). Science by Email engages and enthuses students, teachers and the wider community about CSIRO, science and its applications, with a focus on the environment. 27 000 subscribers receive it weekly.

Team leader: **Mr Ross Kingsland**
Team members: **Ms Beth Askham, Mr Harry Kontos, Ms Jasmine Leong, Mr Justin McGuire, Mr Matteo Montebello, Ms Gabrielle Tramby** and **Mr Graham Walker.**

Diversity Award

The *Diversity Award* was awarded to the CSIRO Entomology Equity and Diversity Committee who displayed exceptional efforts to promote equity and diversity within CSIRO Entomology and in CSIRO more generally.

Team leader: **Dr Sue Brown**
Team members: **Ms Ruth Aveyard, Ms Celine Clech-Goods, Dr Frances FitzGibbon, Dr Oliver Knox, Ms Stasia Kroker, Ms Justine Rava, Dr YongLin Ren, Ms Suellen Slater, Dr Tanja Strive, Mr Wolfgang Wanjura** and **Dr Sarah Weisman.**

Service from Science Award

The *Service from Science Award* was awarded to the Alphachron Instrument Commercialisation Team (Exploration and Mining). The team designed, developed and globally sold an innovative helium extraction and measurement instrument. The technology was licensed to Australian Scientific Instruments, implementing a new model for CSIRO engagement with the Australian SME sector.

Team leader: **Dr Brent McInnes**
Team members: **Dr Peter Crowhurst, Dr Noreen Evans, Mr Brad McDonald, Mr Tim McLennan** and **Dr Des Patterson.**

Go for Growth Award

The *Go for Growth Award* was awarded to the Reversible Addition Fragmentation Chain Transfer Technology (RAFT) Freedom to Operate Team (Molecular Health and Technologies). The team restructured the commercial arrangements with DuPont providing both CSIRO and DuPont with the rights to exploit the RAFT Technology in their areas of interest. This enabled CSIRO to exploit the technology as a platform for growth in the emerging and growing opportunity areas of renewable energy and nanomedicine and more broadly for both parties to maximise the uptake and impact of this pivotal technology.

Team leader: **Dr Megan Fisher**
Team members: **Mr Rick Aarons, Mr Rajiv Cabraal, Dr Geoff Houston, Dr Anna Johnston, Dr Graeme Moad, Dr Ezio Rizzardo, Dr Greg Simpson, Dr San Thang, Dr Gerry Wilson** and **Dr Graeme Woodrow.**

John Philip Award

Dr David Newth (Marine and Atmospheric Research) was awarded a *2007 John Philip Award for the Promotion of Excellence in Young Scientists* for significant advances in massive agent based modelling and its applications to Australian response to infectious disease outbreaks, bio-terrorism, climate change and national security.

Julius Career Awards

The *Julius Career Awards* recognise exceptional early to mid-career scientists. Julius Career Awardees receive a grant over three years to contribute towards their professional development. The Award provides opportunities for international research experience and secondments to industry (see page 80). The Julius Career awardees were: **Dr Adam Best; Dr Stephen Cameron; Dr Shane Griffiths; Dr Rachel Hawken; Dr Bruce Mungall; Dr Benjamin Preston; Dr Alex Smajgl; Dr Ben Trevaskis; Dr Steve Wakelin; Dr Scott Watkins; Dr Michelle Watt;** and **Dr Tim Wooster.**

Section 4 – Relationships
Building and maintaining strong relationships

Building and maintaining strong relationships

Building and maintaining strong relationships with customers, partners, staff and other stakeholders is critical to CSIRO's success. This section includes information on our engagement with the private sector, universities, governments and internationally. It also reports on our staff satisfaction and our health, safety and environmental performance.

How we engage externally

CSIRO works actively with our partners and customers to develop and support relationships best suited to achieving mutual goals. We have found that the most productive developments come from close working relationships based on a mutual understanding of business, community and technological needs.

CSIRO works with large and small organisations in both the public and private sectors, striving to deliver value at all stages of research, development and commercialisation. We provide a range of partnering and technology transfer arrangements which can be tailored to suit the requirements of individual organisations. We support our relationships in a range of ways including partnering at both strategic and transactional levels, through the formation of multidisciplinary customer teams and via dedicated relationship managers.

Customer and partner feedback

The relationships with our major clients and partners in many cases involve more than one of CSIRO's organisational units or disciplines. This is due to our continued focus on challenging problems that require the formation of multidisciplinary teams to deliver effective solutions. To ensure our research and relationships are targeted to deliver maximum impact efficiently, and to combat the increasing complexity of such programs and relationships, we have a number of initiatives which aim to improve our dealings with our customers, partners and beneficiaries of our research.

Our industry partners play a vital role in helping to set directions for our research and ensuring effective paths to adoption. Photo: Gregory Heath

Our Sector Advisory Councils comprise external representatives from industry and other stakeholders. They provide a valuable mechanism for feedback, advice and consultation in our research planning and priority setting processes. They cover the energy and transport; environment and natural resource management; health; information, communication and services; manufacturing; and mineral resources sectors. Membership can be viewed at www.csiro.au/SAC. Each of our Flagships also has a Flagship Advisory Committee that provides similar guidance see: www.csiro.au/FAC.

During the past year, we have had structured interviews with the senior executives of our key clients and partners. These interviews were mainly a listening exercise and, to achieve impartiality, were conducted by a CSIRO senior executive from a different area of activity who had no existing relationship with the client.

The feedback from clients and partners has been positive about the process and the willingness of CSIRO to listen and engage. In all cases, the client and partners took a frank and constructive approach to the interviews, providing open and honest feedback. This feedback was a 'view from the top' and, coupled with the more personal senior executive approach, presents a different perspective to the more operational feedback generated through the Customer Value Survey (CVS).

The following key findings can be deduced from the interviews:

- At the senior executive level, our relationships with our key clients and partners are mostly positive and either stable or improving.
- There is scope to move from a tactical to a more strategic relationship with some of our key clients and partners.
- A significant proportion of the organisations interviewed indicated that there was room to grow our level of business with them.
- Increasing CSIRO senior executive level strategic (sharing) dialogue with their counterparts was identified by almost all organisations as being important.
- We still need to act more consistently in a 'One-CSIRO' manner – the variable nature of our engagement with individual organisations was sometimes noted.

CSIRO continued with its CVS until November 2007 and the results to that date are reflected in Table 4.1.

Whilst the CVS was giving us feedback at an enterprise level, we found that the anonymous nature of the results in multidisciplinary projects makes it difficult to assign corrective action to organisational units. In the future we intend to supplement the enterprise level metrics of a modified CVS with the more personal feedback of the key client interviews and a new, standard end-of-project survey. These extra elements will make it easier to direct specific feedback to the relevant projects, organisational units and relationship managers who will then initiate appropriate improvement actions where necessary. This 'three tier' approach will enable us to monitor customer satisfaction at an enterprise level while enabling more targeted corrective action where shortcomings are identified.

Table 4.1: Customer value survey results

Survey result	2003–04	2004–05	2005–06	2006–07	2007–08
CSIRO score	7.0	6.5	6.4	7.0	7.1

See the glossary page 233 for a guide to the interpretation of CVS scores.

CSIRO's 'relationship footprint'

To boost Australia's innovative capability and achieve more effective science and technology solutions for the community, industry and the environment, CSIRO engages in a range of targeted partnerships, alliances and joint ventures. The following selected statistics are by no means exhaustive but serve to illustrate the depth and breadth of CSIRO's engagements. CSIRO:

- participates in 38 of the 58 currently active Cooperative Research Centres (CRCs) as at 30 June 2008 (and has been involved in 125 of the 168 CRCs since the scheme was launched in 1990)
- undertakes around 700 international projects each year
- is represented on key government councils and committees including the Prime Minister's Science, Innovation and Engineering Council, the Coordination Committee for Science and Technology, the Primary Industries Standing Committee and the Natural Resources Management Standing Committee
- has established ten Flagship Collaboration Clusters involving 21 universities, two CRCs and a number of other publicly-funded research agencies. Altogether, CSIRO collaborates with over 400 entities through the National Research Flagships. These include government departments, agencies and authorities at local, state and Commonwealth level, CRCs, national and international universities and research institutes, Australian SMEs, multinational companies, industry associations and hospitals
- co-authors nearly one-half of its publications with authors from other Australian institutions, and over one-third with international co-authors
- co-locates with other government and private sector organisations to form science hubs and precincts including:
  - South East Melbourne Innovation Precinct
  - Victorian Centre for Advanced Materials Manufacturing
  - Australian Resources Research Centre
  - The Centre for Low Emission Technology
  - The Australian e-Health Research Centre
  - Queensland Centre for Advanced Technologies
  - Australian Tropical Science and Innovation Precinct
- participates in major alliances including:
  - the Urban Water Security Alliance
  - Agriculture Research Western Australia Alliance
  - Western Australia Marine Science Institute
  - Western Australia Energy Research Alliance
  - National Hydrogen Materials Alliance

New customer engagement initiatives

In 2007–08, CSIRO implemented two additional ways for Australian Small and Medium Enterprises (SMEs) to connect with science, technology and innovation.

A Small and Medium Enterprise Engagement Centre (SME-EC) has been implemented because SMEs often find it difficult to find and apply the most appropriate science and technology to grow their business.

The SME-EC is a team of business and technically qualified managers that works across all parts of CSIRO. It also works with partner organisations in government and private sector to help Australian SMEs effectively navigate and engage with CSIRO and others in the National Innovation System (NIS). The SME-EC helps define technical issues, identifies the best way to address them using CSIRO, its Flagship Programs or external domestic or international partners and facilitates access.

During its start-up year, the SME-EC handled 95 enquiries. These initial figures demonstrate the value that the SME-EC offers to Australia's small and medium businesses, and it is expected this contribution will grow substantially over the coming year. SMEs and their various support agencies now have an effective, single point of entry to access the wealth of resources in CSIRO.

Australian Growth Partnerships (AGP) is a new, competitive, merit-based pilot funding program managed by CSIRO. This program was launched in September 2007 and provides a mechanism for CSIRO to assist Australian SME companies to improve their industry competitiveness through providing capital to the company for the specific purpose of providing solutions to technical barriers that constrain the SME's growth opportunities.

Under AGP, in exchange for providing investment capital, CSIRO enters into an R&D arrangement with the company on commercial terms that are aligned with the company's growth strategy. CSIRO seeks a commercial return from this investment of public monies, which can be by way of future royalty stream payments or by receipt of equity in the SME.

As an example of a project under AGP, in May 2008, CSIRO approved an investment over three years of $1.07 million in HySSIL Pty Ltd. This capital will allow the company to develop methods and establish plant-scale trials for the production of a second generation, light-weight, energy-efficient concrete. If successful, this new product will provide industry with an alternative to cement that is greenhouse gas-friendly and low-cost.

Government engagement

CSIRO's Ministerial and Parliamentary Liaison Office (MPLO) plays a central role in maintaining CSIRO's relationship with government and accountability to the Australian Parliament. It ensures that our portfolio Minister's needs for advice and information are met in a timely way and provides advice to CSIRO officers on the protocols of interacting with government and our minister. The MPLO is the CSIRO point of contact for ministers and their staff and is charged with ensuring that CSIRO's formal communications with ministers are of high-quality, timely, have necessary approvals, and reflect a One-CSIRO view. MPLO also facilitates CSIRO's accountability to Parliament by supporting the portfolio Minister and Executive Team through the Senate estimates process and other Parliamentary processes.

A very important aspect of CSIRO's broader relationship with both Australian and state governments is as a trusted source of scientific information and advice to inform government policy. A wide variety of mechanisms support this engagement as indicated in the following paragraphs.

High-level strategic meetings are held between members of the CSIRO executive team, Federal ministers and senior bureaucrats from relevant government departments on issues arising in key policy areas such as climate change, clean coal and solar thermal technologies. Among others, meetings have been held with the Departments of Environment, Water, Heritage and the Arts, and Resources, Energy and Tourism.

Visits by ministers and other parliamentarians to CSIRO sites included, for example, a visit by the Minister for Climate Change, Senator the Hon

Penny Wong to the Newcastle Energy Centre, where she was briefed on CSIRO's work in energy technology development.

Submissions to parliamentary, government and state inquiries or reviews are a major avenue for communicating science-based information. CSIRO made 31 such submissions during 2007–08. CSIRO officers also attended hearings of Parliamentary inquiries, provided private technical briefings to committees and engaged more broadly with government inquiries and reviews.

Important CSIRO submissions were made to the following Commonwealth inquiries:

- the review of the National Innovation System of Australia (Department of Innovation, Industry, Science and Research)
- the review of Australia's Automotive Industry (Department of Innovation, Industry, Science and Research)
- the review of Australia's textiles, clothing and footwear industry (Department of Innovation, Industry, Science and Research)
- the review of the National Collaborative Research Infrastructure Strategy Roadmap (NCRIS Secretariat)
- the inquiry into research training and research workforce issues in Australian Universities (House of Representatives Standing Committee on Industry, Science and Innovation)
- the review of Australia's Quarantine and Biosecurity Arrangements (Department of Agriculture, Fisheries and Forestry)
- the inquiry into climate change and environmental impacts on coastal communities (House of Representatives Liaison and Projects Office).

Contributions to state government inquiries included submissions in relation to:

- issues of sustainable natural resource management with reference to climate change (Legislative Assembly Standing Committee on Natural Resource Management New South Wales (NSW))
- nanotechnology in NSW (Legislative Council Standing Committee on State Development NSW).

CSIRO also contributed to the development of policy settings for science and innovation by participating in several roundtable discussions and debates. In particular, CSIRO

CSIRO's Dr Bill Humphries addressing Parliamentarians on how the textile industry can be transformed through the use of advanced materials at a CSIRO Science for Breakfast briefing at Parliament House in June 2008. Photo: Carl Davies

representatives (along with other relevant experts) met with the Minister for Innovation, Industry, Science and Research, Senator the Hon Kim Carr, to discuss health and safety issues associated with nanotechnology.

Three 'Science for Breakfast' briefings, hosted by CSIRO's previous and present portfolio ministers, were held for parliamentarians at Parliament House during the course of the year. Most breakfast briefings were accompanied by a series of meetings with relevant departments, individual briefings to parliamentarians, and a briefing to CSIRO staff.

More formally, the Chief Executive is an active member of the Prime Minister's Science, Engineering and Innovation Council and its standing committee; and of the Coordination Committee for Science and Technology. In addition, CSIRO officers have contributed to the work of these bodies through their membership of various working groups and sub-committees.

CSIRO relationship managers in Queensland, Victoria and the Australian Capital Territory (ACT) provide ongoing support for a program of engagement between CSIRO executives and senior bureaucrats around research programs and research infrastructure in these states and the ACT.

University collaboration

CSIRO has extensive collaborative relationships and arrangements with universities both in Australia and overseas as CSIRO is highly dependant on this sector to provide people with the skills that it needs to operate and fulfil its statutory functions. CSIRO helps train, and assists in the training of, researchers as a means of building Australia's scientific capability and capacity and collaborates extensively with the higher education sector in delivering science-based solutions that will increase Australia's competitive advantage. Some examples of collaboration include:

- More than 2600 of CSIRO's 6423 staff are currently located on, or directly adjacent to, university campuses. These provide the means of sharing research infrastructure and improve opportunities for increased collaboration.
- CSIRO staff currently supervise, co-supervise with universities and/or sponsor approximately 650 postgraduate students, including more than 130 supervised in collaboration with CRCs.
- More specifically, during the reporting year CSIRO and the Australian-American Fulbright Commission entered into a partnership to sponsor a new scholarship allowing US postgraduate students to work with one of the CSIRO National Research Flagships.

Many other examples of research collaboration are detailed throughout this report.

Flagship Collaboration Fund

The Flagship Collaboration Fund has continued to promote high-quality collaborations with Australian universities, research agencies and CRCs to undertake significant research linked to Flagship goals. In 2008, the Minister for Innovation, Industry, Science and Research approved an expansion in the scope of the Collaboration Fund to involve international universities in Flagship-led projects.

In the second half of 2007, two more second round Collaboration Fund clusters were established:

- redesigning grain polysaccharides (Food Futures)
- subsea pipelines for reliable and environmentally safe development (Wealth from Oceans)

In addition to the ten currently operating clusters, a third round of Collaboration Fund clusters was approved for funding in 2007. From round 3 there are three new clusters

currently being established in the areas described below. This brings the total number of Flagship Collaboration Fund clusters from the first three rounds of funding to 13:

- intelligent grid – modelling distributed generation and interruptible load (Energy Transformed)
- breakthrough technology for primary aluminium (Light Metals)
- a longitudinal study of dementia, cancer and cardiovascular disease in the elderly (Preventative Health)

The current ten clusters from rounds 1 and 2 involve 21 universities, two CRCs and a number of other publicly-funded research agencies. Approximately $28 million has been allocated to these from the Fund in 2007–08, and this has been supplemented by significant contributions from our partners ($42 million). Appendix 1 provides an overview summary of these clusters.

In June 2008, submissions were sought for a fourth round of clusters which will align with the research goals of the three new Flagships (Climate Adaptation, Minerals Down Under and Niche Manufacturing).

In addition to the clusters, 39 collaborative projects are now underway or have been completed, with a further ten approved. Twenty-two visiting fellowships are already underway or have been completed. As at March 2008, 109 postgraduate scholarships had been awarded.

Indigenous Engagement Strategy

CSIRO believes that Indigenous Australians have extraordinary cultural, economic and scientific contributions to make to Australia. Furthermore, CSIRO recognises the social and economic disadvantage experienced by Indigenous Australians and is committed to helping overcome this gap.

CSIRO initiated its Indigenous Engagement Strategy in July 2007. The Strategy aims to achieve greater Indigenous participation in CSIRO's research. This participation will ensure that CSIRO benefits from the insights that Indigenous people can bring to national challenges. It also provides a means of ensuring that CSIRO's activities are as effective as possible in contributing to the aspirations of Indigenous communities.

Three senior Indigenous staff have been appointed to co-lead a newly-formed Office of Indigenous Engagement established within the Office of the Chief Executive. The Indigenous Engagement Strategy addresses four areas: Scientific Opportunities; Employment; Education Outreach; and Cultural Learning and Development. With the guidance of an Indigenous Engagement Steering Committee, the following activities were initiated:

Science opportunities: The Office began work in building relationships to identify new science opportunities through sponsorship of the 2nd National Indigenous Land and Sea Management Conference held in Cardwell, Queensland. Additional sponsorship from the Office enabled the Murray and Lower Darling Rivers Indigenous Nations to hold a workshop to develop research opportunities on building resilience within Indigenous Traditional Owner groups in the Murray Lower Darling region.

During the year, planning advanced to convene the first of a series of Roundtables to be held during 2008–09. These significant events will deepen dialogue between Indigenous Australia and CSIRO, and explore research priorities for addressing the needs and aspirations of Aboriginal and Torres Strait Islander communities.

Indigenous engagement employment: An Indigenous Engagement Strategy Employment Working Group has been established, and job

advertisements now encourage Aboriginal and Torres Strait Islander peoples to apply for CSIRO positions. The first forum of CSIRO Indigenous staff was held in Sydney in April 2008.

Education and outreach: The primary focus is to encourage participation by Indigenous students in science at all levels of education. CSIRO engaged with Questacon in Canberra and Kormilda College in Darwin to explore and develop educational pathways. The Jack Cusack Memorial Scholarship, honouring the contribution of a respected Indigenous botanist with CSIRO, is run collaboratively with Kormilda College for five students. At the tertiary level, eight study awards were approved under the inaugural CSIRO National Indigenous Tertiary Study Awards program.

Cultural learning and development: The aim is to ensure that CSIRO is seen as a trusted research provider and an employer of choice by Indigenous peoples. The first of three pilots for an Indigenous Cultural Awareness Program has been held prior to rolling out in 2008–09. Further, an Indigenous Engagement 'Impact Discussion Series' began with CSIRO staff in major capital cities to facilitate discussion on the scale and scope of the national challenges facing Indigenous Australia.

CSIRO's global reach

CSIRO is a member of the global research community, in a global market for research capability, and is an organisation that aims to become a research enterprise with global reach. In 2007–08, CSIRO was engaged in over 700 international activities in 69 countries.

Aligned with its 2007–2011 Strategic Plan, CSIRO has developed a four year international strategy to focus on:

- development opportunities for our staff outside Australia, and opportunities to attract, retain and engage staff from the global talent pool

Dr Geoff Garrett, Chief Executive CSIRO, with Mr Li Zhijun, Vice President Nuctech Co Ltd, China at the official signing ceremony of the agreement between CSIRO and Nuctech in Canberra to commercialise cargo screening technology (see page 58 for more details). Photo: Carl Davies

- internationally significant projects aligned with, and supporting, national needs
- participation in global networks to share research infrastructure and relevant knowledge and intellectual property.

The strategy also focuses on the key regions of North America, Europe, China and India as well as a focus on global development.

Key highlights over the reporting period include:

- In 2008 CSIRO commenced a new alliance with AusAID in the Environment and Development domain and various projects with the Australian Centre for International Agricultural Research (ACIAR). Consistent with the Australian Government's aid and development objectives, CSIRO also undertook research in developing countries with global funding agencies such as the Asian Development Bank and the World Bank.
- CSIRO has increased its engagement with India's Council of Scientific and Industrial Research (CSIR) through projects supported by the Australia-India Strategic Research Programme. CSIRO and CSIR India are also working towards a renewed Memorandum of Understanding (MOU) and building a dedicated staff exchange program.
- Cooperation with partners in North America and Europe has long made up the bulk of CSIRO's international engagement, and takes place across the full range of CSIRO research. The numbers of CSIRO research publications with joint authors from North America and Europe continued to grow, with 247 joint publications in 2007 with US researchers and 393 with Europe. CSIRO also sponsored a new Fulbright scholarship for an outstanding young US researcher to spend up to a year working with one of the National Research Flagships.
- In July 2008, CSIRO and its Chinese partners officially launched a post-combustion capture pilot plant in Beijing that strips carbon dioxide from power station flue gases in an effort to stem climate change. Under the Australia-China Climate Change Partnership, CSIRO researchers are working with the Chinese Academy of Science to analyse the relationship between southern Australia's winter rainy season and East Asia's summer monsoon season and CSIRO is collaborating with the Chinese Academy of Forestry to develop and implement a pilot program for carbon accounting based on the Australian National Carbon Accounting System.
- The number of joint publications between CSIRO and Chinese collaborators has increased at a rate of more than 20 per cent per annum over the last three years. CSIRO hosted more than 24 PhD students in 2007–08 from China under an MOU with the Chinese Ministry of Education signed in 2005. CSIRO will also expand the scheme to include postdoctoral fellows and visiting scholars.

CSIRO, with eight other leading international science organisations, is a member of the Global Research Alliance (GRA). The GRA leverages the combined capabilities of the member organisations to target the United Nations' Millennium Development Goals in water, energy, health, transport and the digital divide.

Staff satisfaction

Throughout 2007–08, staff were surveyed using a range of polls and face-to-face feedback meetings including the Research Support Services post-implementation survey, Internal Communication survey, Enterprise Feedback Network, Change Partners and Strategy in Action Workshops. This extensive and direct engagement of many hundreds of staff has provided valuable feedback that has been used to fine tune the communication and implementation of our strategy.

In addition, a full Insight Survey was conducted by Towers Perrin ISR (formerly International Survey Research) in November 2007. All staff and students and Honorary Fellows were invited to participate. A response rate of 67 per cent was achieved.

Overall 'Staff Satisfaction' is determined as a composite of answers to three questions relating to:

- morale in your project/work area
- recommending (or not) CSIRO as a good place to work
- 'taking everything into account, how satisfied are you with CSIRO as a place to work?'

Despite the undoubted challenges of an organisation in transformation over recent times, our 2007 Staff Satisfaction rating (67) has remained constant compared with 2005 (and is the same as in 2003). Relative to other organisations, in 2007 our Staff Satisfaction rating is nine per cent above other global organisations undergoing significant change but, perhaps understandably, below the global R&D organisations' norm (by five per cent), and the Australian companies/organisations' norm (by two per cent).

There has been a significant increase over the last two years in support for our organisational direction, for the Flagships, for how we work together across the Organisation, and for our 'six key messages' (see page 19). These are all essential components of our strategy and remain key elements of our Strategic Plan 2007–2011. There has been a real improvement in staff belief in our strategy, and our ability to achieve this, and the progress we have been making in this regard.

Balancing this, our work-related organisation and efficiency, opportunities for innovation in the workplace, the management of our organisational change and survey follow-up, are areas where we need to do much better. Addressing one dimension of this, we can look forward to the introduction of consistent and streamlined administrative procedures and supporting information systems following implementation of the BETR program and the 'Go live' enterprise-wide SAP platform on 1 July 2008 (see page 122).

In summary, during this past period of rapid and considerable change, there has been an across-the-board strengthening of support for our strategic direction and belief in our ability to achieve our goals, and overall, staff satisfaction has held constant through some challenging times for everyone.

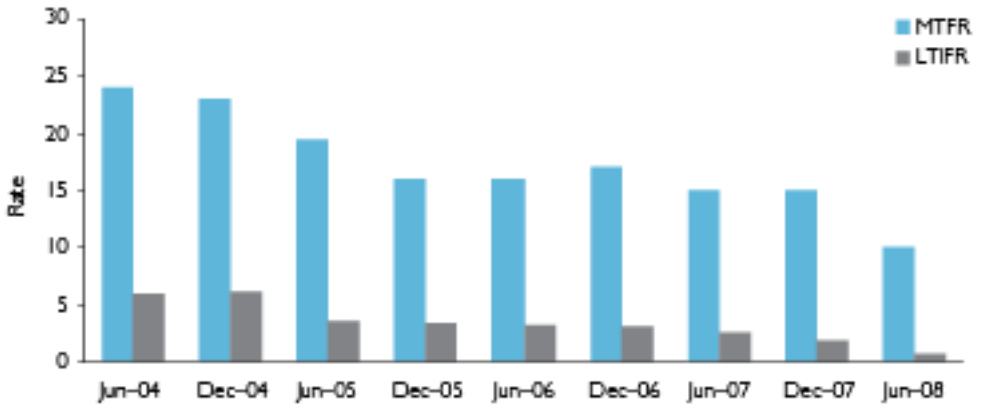
Health and safety

Fulfilling our duty of care in relation to the health and safety of our staff, visitors and other members of the community is essential if CSIRO is to build and maintain the strong relationships necessary to underpin the successful conduct, delivery and impact of research. This is a responsibility that CSIRO takes very seriously.

CSIRO's Health, Safety and Environment (HSE) 2004–07 Strategy has been successful in delivering a safer, cleaner and healthier working environment for its staff. The strategy has resulted in an increased awareness of HSE across the Organisation, the establishment of HSE management systems and procedures, reduced risk, and a measurable improvement in safety performance.

During 2007–08, the lost time injury frequency rate (LTIFR) improved by 74 per cent, and the medical treatment frequency rate (MTFR) improved by 37.5 per cent over the same period (see Figure 4.2).

Figure 4.2: CSIRO's injury frequency rates June 2004 to June 2008



Definitions:

- *Lost Time Injury Frequency Rate (LTIFR) is the number of incidents involving lost time from work greater than or equal to one full day or shift per million hours worked*
- *Medical Treatment Frequency Rate (MTFR) is the number of compensation claims per million hours worked plus the number of injuries requiring medical treatment.*

Table 4.2: CSIRO's workers' compensation premium

Premium rate (% of payroll)	2004–05	2005–06	2006–07	2007–08	2008–09
CSIRO	0.74%	0.77%	0.83%	0.68%	0.53%
All agencies	1.67%	1.77%	1.77%	1.55%	1.36%

CSIRO's health and safety performance compares favorably with other Australian Government agencies. This is reflected in our Workers Compensation Premium (Table 4.2). CSIRO's Premium Rate, determined on four year injury and claims performance, is one of the lowest amongst all agencies.

The Organisation's commitment to a safe and healthy work environment and systems of work has now seen the development of a new 2007–11 HSE Strategy in support of CSIRO's aspirational vision '*Striving for Zero Harm*' – encompassing zero injuries, zero illnesses, zero environmental harm, and zero tolerance of unsafe behaviours. The strategy was rolled out in early 2008 and seeks to deliver a change in the HSE culture and performance based on five key principles:

- leadership commitment and competency
- clear expectations and accountabilities of all staff
- effective HSE management systems and tools
- risk based prioritisation
- measurement, review, audit and closure.

The Strategy was produced with input from a wide range of stakeholders to ensure that it is relevant to staff working at all levels and in all functions of CSIRO. It is designed to promote

the active involvement and participation of leaders and staff in HSE improvements across the Organisation.

Significant HSE initiatives and activities during the reporting year include the following:

Psychological health and wellbeing: Several staff from a wide range of roles in CSIRO volunteered to form an enterprise working group that is seeking to identify psychological stressors and their impact, recommend mitigation strategies, and design a plan of action for improvements in psychological health and wellbeing. The group will provide a report of their conclusions and recommendations by the end of 2008.

Staff fitness – Global Corporate Challenge: CSIRO provided partial sponsorship for staff involvement in the Global Corporate Challenge (GCC) between May and September 2008. The GCC is a corporate health and wellbeing initiative developed specifically for the workplace, and is an excellent complement to CSIRO's Health and Wellbeing program. As participants record their daily walking activity levels, they move further along a virtual walk around the world. The team based challenge provides encouragement to maintain the long-term commitment and motivation needed to bring about positive, habitual change in fitness levels. Over 500 CSIRO staff in 73 teams volunteered for the challenge.

Software program to assist in reducing musculoskeletal injuries: In a major initiative to assist in reducing musculoskeletal injuries, WorkPace® has been installed on all Windows® based computers. WorkPace® is a software program designed to encourage users to take regular breaks and to exercise after a period of sustained computer-based activity. While implementation is voluntary, all staff are being encouraged to utilise the system. Initial feedback from staff has been positive and by the end of the reporting period, 25 per cent of Windows PC's users had activated WorkPace®.

HSE guidelines for nanotechnology: Nanotechnology is an emerging area of science and CSIRO is a world leader in nanotechnology and materials research. Understanding the important HSE considerations associated with this technology is a priority for CSIRO. HSE Guidelines for Nanotechnology and a Nanotechnology Risk Management supplement have now been completed. The purpose of these new guidelines is to prevent injuries and illness to staff and non-CSIRO personnel who work with nanotechnologies and maintain equipment and facilities, whilst caring for the environment. CSIRO is one of the first Australian organisations to establish guidelines in this new research area.

Contractor HSE Management Program: The Contractor HSE Management Program was rolled out during 2008. It is designed to provide staff who engage or manage contractors with clear guidance and expectations on meeting CSIRO's obligations in this important area. Training is being deployed to ensure full implementation of the new program which comprises procedures, guidelines and an induction manual.

HSE corporate citizenship roles: Over 1700 CSIRO staff carry out voluntary HSE corporate citizenship roles in addition to their regular duties. Examples include fire wardens, specialist safety officers, first aid officers and HSE committee members. These staff were formally recognised at the 2007 HSE Conference by the Chief Executive. Each Business Unit has provided staff recognition ceremonies and provided certificates to these staff.

HSE Annual Report 2007: The CSIRO HSE Annual Report records the achievements, activities and performance standards achieved to meet our HSE strategic goals, building our safety culture and includes our recognition of our environmental and social responsibilities. This report can be viewed on the internet at: www.csiro.au/HSEReport

'Syringe stop' reduces musculoskeletal risks

CSIRO's scientists have developed a simple and cost-effective device for improving accuracy and efficiency in measuring repeat volumes of chemicals delivered by syringe while also reducing the potential for musculoskeletal injuries. The device, referred to as a 'syringe stop', can be easily held on the finger and used in delivering minute, consistent quantities of chemicals.

The device acts as a stop to determine the level to which the plunger can be moved.

The device ensures accuracy, improves efficiency, reduces the need for digital pressure and static loading of muscles surrounding the upper limbs and spine, fine motor movements and demanding visual attention, all of which can contribute to injuries in the laboratory.

A range of syringe stops have been produced in a variety of colours. Each colour represents a particular quantity to be measured when using a particular volume syringe. The device is made of aluminium selected for its light weight and non-corrosive quality once anodised.

When the syringe stop is attached to a syringe it not only enables the operator to draw up minute and more accurate quantities of chemicals but also eliminates the need for fine motor movements that can lead to musculskeletal injuries. Photo: Eric Hines

Environmental policy and strategy

CSIRO acknowledges its obligation to manage the impacts that we have on the environment and communities in which we work – environmental sustainability is central, not just to our research, but to our operation as an enterprise. CSIRO's Environment Policy recognises environmental management as one of the highest corporate priorities and a key to sustainable development. To guide further improvement, CSIRO has developed a new Environmental Sustainability Strategy. The guiding vision of the Strategy is for CSIRO to be more environmentally sustainable in all its operations. The Strategy seeks to deliver on three high-level targets:

- CSIRO to become carbon neutral by 2015
- CSIRO to halve mains water use by 2015
- CSIRO to halve waste generation by 2015.

Achievement against each of the targets is underpinned by a suite of Strategic Initiatives – each Initiative has a series of activities, outcomes and measures. The Strategy is consistent with the CSIRO 2007–2011 Strategic Plan and provides a framework within which our environmental performance and culture can improve. Where appropriate, CSIRO science will be applied in the Strategic Initiatives, such that our environmental sustainability expertise is directly deployed into our own operations.

The Strategy was developed under the leadership of Executive Team member Dr Andrew Johnson working with a cross-section of CSIRO staff.

CSIRO staff improving our environment

Staff at CSIRO's Paul Wild Observatory, Narrabri, NSW, have been building fences and dams to protect and regenerate vulnerable catchment areas on-site. With funding from both the Namoi Catchment Management Authority and CSIRO, staff have re-established native vegetation in areas that had been cleared for construction. Hundreds of trees will eventually be planted over an area of several hectares. All local species, the trees will create a windbreak and provide habitat for birds and animals.

Staff in the Radiophysics laboratory at Marsfield, NSW, celebrated National Tree Day in July 2007 by planting drought-tolerant grevilleas. These native shrubs will provide a habitat for birds and animals, as well as beautifying the area.

Re-establishing native flora at CSIRO's Marsfield site, NSW. Photo: Daniel Legovich

Environmental performance

Accurate measurement and monitoring of environmental resource usage is an important part of effective and efficient science, management and business. In this section we report on CSIRO's energy and water consumption, greenhouse gas emissions, and notifiable environmental incidents.

Energy consumption: CSIRO's combined electricity and natural gas usage (essentially building use) was the lowest in five years. This has been achieved through site closures, energy efficiency initiatives and sustainable building design, notwithstanding some increases in air-conditioned floor space. Electricity and natural gas comprises 93 per cent of our energy use, with the remainder used in transport and standby generating plant.

CSIRO's energy usage in 2006–07 was 721 Terajoules (TJ), which is a decrease of four per cent on the 2005–06 usage of 753 TJ (see Figure 4.3). During the reporting period, electricity usage decreased by 0.2 per cent, natural gas usage decreased by eight per cent and usage of transport and other fuels decreased by 19 per cent.

Greenhouse gas emissions: In 2006–07, CSIRO's greenhouse gas emissions (GHG) of 143 228 tonnes were four per cent less than the 2005–06 level of 149 820 tonnes and are now the lowest in ten years (see Figure 4.4). The GHG emissions from energy use in buildings comprise 97.6 per cent of CSIRO's total emissions. CSIRO has negotiated for the purchase of accredited green power which will result in significant further reductions in GHG emmissions (see page 114).

Water usage: CSIRO has been working to reduce water consumption through a range of use-reduction and recycling initiatives including the implementation of water-saving technologies into building refurbishments and local staff-supported water saving projects. Despite a small increase in 2006–07 – up 1.7 per cent over the previous year to 836 649 kilolitres – total water consumption has fallen by 11 per cent compared to 2004–05 (see Figure 4.5). The rise in water consumption over the past 12 months is primarily due to increased water usage at the Black Mountain (ACT) and Belmont (Qld) sites.

Notifiable environmental incidents: CSIRO investigates all incidents that have potential for environmental impact. CSIRO recorded two notifiable environmental incidents in 2007–08. The first incident was reported to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) in July 2007, following the suspected inadvertent disposal of a low-level radiation source to landfill during the decommissioning of a CSIRO site. An independent risk assessment concluded that the risk to health and safety of people and to the environment was minimal. As a result of the loss of the source, CSIRO undertook a comprehensive review of its radiation source holdings. ARPANSA was satisfied with the actions undertaken by CSIRO to prevent a recurrence of this kind.

The second incident occurred at the CSIRO Queensland Centre for Advanced Technologies (QCAT) site in Queensland involving an overload in the sewage system. As part of the licence conditions, the Environment Protection Authority was notified, who requested further information. A review of the research plant was undertaken and options are being investigated.

Energy services

CSIRO Property Services provides professional technical advice and assistance on energy, water and sustainability initiatives across the Organisation to minimise the environmental impact, carbon footprint and energy costs of CSIRO's operations. Various initiatives have been implemented to improve the energy efficiency of its facilities and

Figure 4.3: CSIRO's energy use 2000–01 to 2006–07[1]

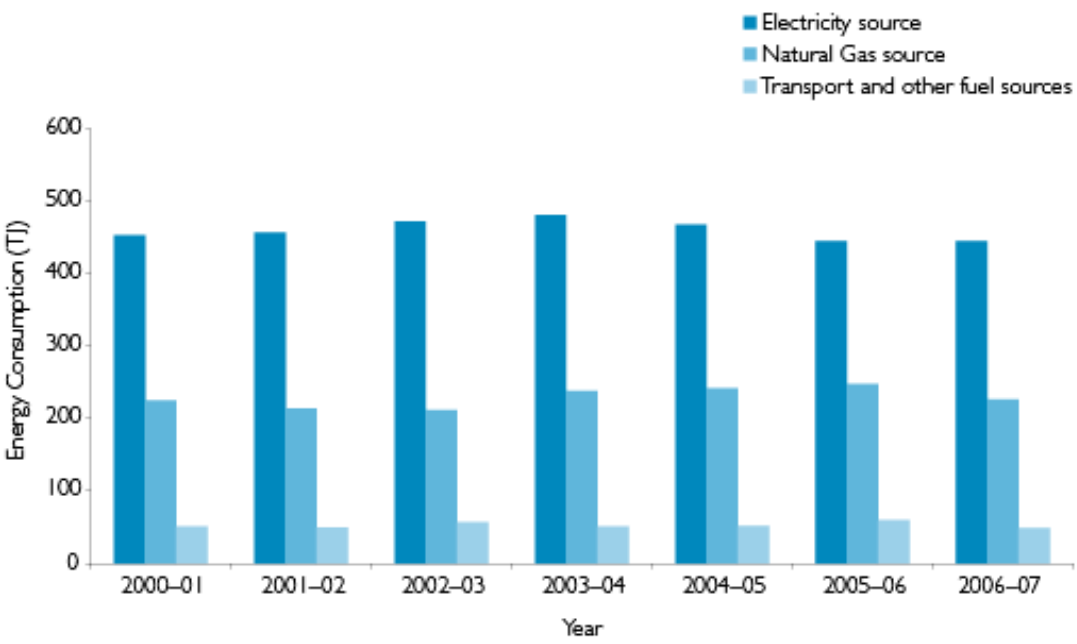
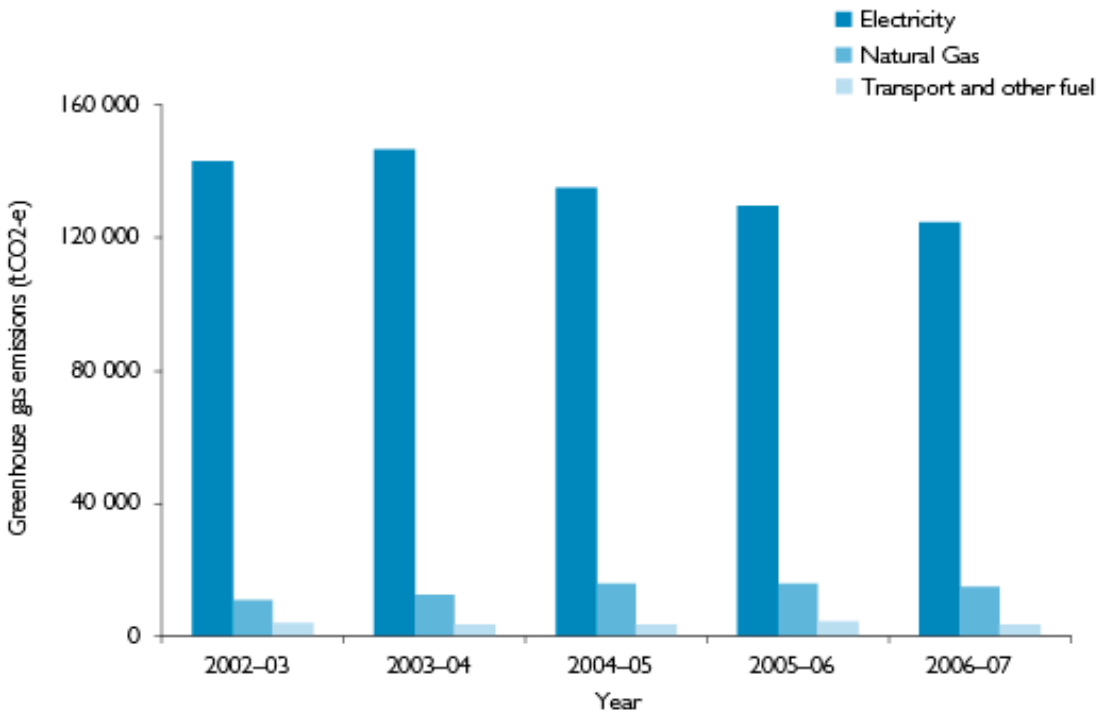
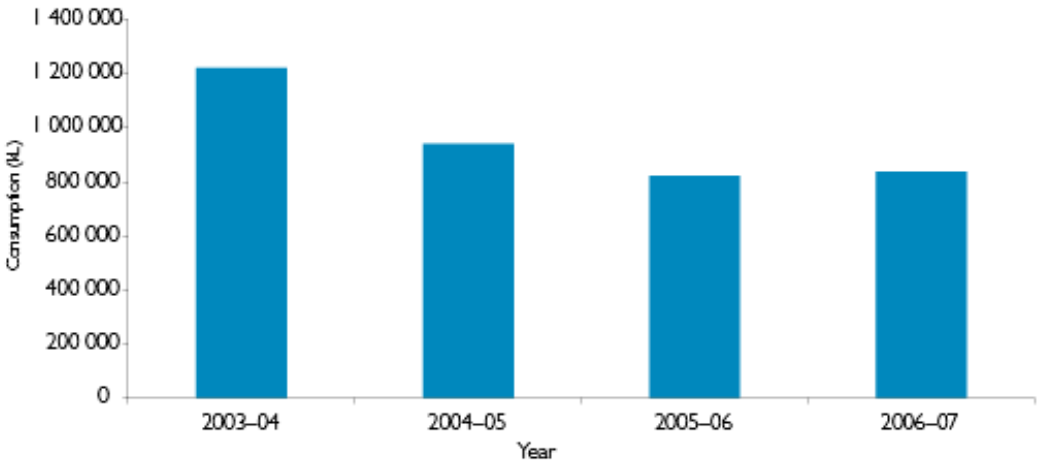


Figure 4.4: Greenhouse gas emissions 2002–03 to 2006–07[1]



[1]*2007–08 data not available until October 2008*

Figure 4.5: Water consumption 2003–04 to 2006–07[1]



[1]*2007-08 data not available until October 2008*

reduce greenhouse gas emissions, supported by purchasing green energy products and promoting sustainability. Financial sustainability has been achieved through value-for-money energy tariffs and resource management accountability.

CSIRO is committed to the Australian Government's Energy-Efficiency in Government Operations by voluntarily reducing its greenhouse gas emissions through the efficient use of energy. CSIRO reports its energy use to the government annually through the Department of Climate Change and Water.

CSIRO Property Services is responsible for negotiating energy supply contracts including the purchase of accredited green power. A contract was negotiated in 2006 from a single supplier for the three year supply of electricity to CSIRO sites within the Australian Capital Territory (ACT), New South Wales (NSW), Queensland (Qld), Victoria (Vic) and South Australia (SA) until 30 June 2009. The contract requires that the proportion of green power in CSIRO's electricity supply in these States shall increase from ten per cent in 2006–07 to 15 per cent by 2008–09, which will result in at least a 12 per cent annual reduction in CSIRO's total greenhouse gas emissions by 2008–09. The average quantity of renewable electricity used across the whole Organisation in 2006–07 was nine per cent of total electricity consumed.

CSIRO's enterprise-wide procurement strategy, through consolidating national and state-based electricity and natural gas supply agreements, will provide ongoing cost savings and reduction in greenhouse emissions for the Organisation.

Heritage protection

CSIRO has a strong association over its 80 plus year history with the development of industry, agriculture, environment and social aspects of Australia's history. As a community leader and Australian government agency, CSIRO has an obligation, both statutory (*Environmental Protection and Biodiversity Conservation Act (Cwlth) 1999* (EPBC Act)) and morally, to protect and

maintain heritage within its control. CSIRO holds its responsibility in high importance and is pro-active in assessing and maintaining its assets with any architectural, natural, cultural or social significance.

The CSIRO Heritage Strategy (2006) has been used as the basis for the management of actions and activities associated with CSIRO's heritage. During the financial year, the heritage management plan for the Yarralumla (ACT) site was reviewed and updated, and heritage assessments were performed by heritage consultants on Bakers Hill (WA), Highett (Vic), Aspendale (Vic), and Indooroopilly (Qld). The Mt Gambier (SA) site, divested during the year, had identified conservation values in an arboretum planted by CSIRO foresters. A conservation management agreement was established with the local government authority to protect the arboretum. In accordance with the schedule in the Heritage Strategy, a further four sites will be assessed during the coming year.

The heritage program provides for recording and reporting of management, maintenance and expenditure on CSIRO's heritage assets. Prior to any development activity occurring on CSIRO owned or controlled property, heritage values are assessed and incorporated into the development proposal. The refurbishment of the Entomology laboratory building and construction of a new laboratory building at the rear of the building at Black Mountain (ACT) is an example of providing science facilities to meet CSIRO's future research requirements while preserving and protecting its heritage values.

Section 5 – Resources
Effective and efficient resourcing

Effective and efficient resourcing

Effective and efficient resourcing of our activities is essential to CSIRO's capacity to deliver the innovative solutions required to address Australia's economic, social and environmental challenges. This section reports on CSIRO's strategic approach to investment in science through our science investment process, our people development initiatives and staffing demographics, and our financial performance.

Investment in science

The breadth and complexity of challenges and opportunities facing society requires CSIRO to make carefully considered choices of where to focus its research capability to maximise its contribution to society. The modest size of the Australian innovation system also requires tough decisions on where to invest limited research resources while maintaining the quality and distinctiveness of our science in a globally competitive environment.

CSIRO uses a two-stage Science Investment Process (SIP) to allocate its investment in science. Broad Direction Setting (BDS) is followed by the allocation of specific levels of investment to research Themes. This process is designed to evaluate and focus our whole science portfolio against a robust set of criteria which helps optimise the relevance and impact of CSIRO science to meet society's needs.

During 2007–08, the third BDS and SIP processes were undertaken. The investment decisions made by the Organisation through these processes include:

- increasing investment in the water, energy and climate outcome domains. This growth manifested itself through additional investments in the Energy Transformed Flagship, the Water for a Healthy Country Flagship and the Climate Adaptation Flagship. In line with CSIRO strategy and last year's New Policy Proposals, the Minerals Down Under Flagship, the Australian Animal Health Laboratory and the Australia Telescope National Facility were also grown
- increased funding for transformational capability platforms, transformational biology, advanced materials and advanced supercomputing as foreshadowed in the BDS. The new investments in computational and simulation science, and sensors and sensor networks were less than outlined in the BDS due to the early stage of the initiatives. However, a number of closely related themes were reorganised to provide additional support to these platforms
- keeping many themes and areas flat (in line with the proposals), however, a limited number of specific themes had resources cut or redirected. These included themes in the areas of Livestock, Manufacturing, Forestry, Textiles, Processing and Minerals
- generating funds for redeployment in high priority areas by driving consolidation/efficiencies in areas such as biodiversity, food, oceans and security
- redirection of appropriation funding from near-market and incremental research in the Food Production and Supply Domain to address, more systematically, issues affecting the long-term viability of Australian agriculture and food
- a significant realignment of the Food and Production domain resources into the Climate and Sustainable Agriculture domains. This move was enhanced by the decision to redirect further resources to grow the Climate Adaptation Flagship. The Agricultural Sustainability Initiative provided a clear and compelling investment case. It was determined that it should follow existing preparation processes for submission of a case, during 2008–09, for moving to a Flagship.

In responding to the recent financial constraints placed on the Organisation originating with the May 2008 Federal Budget, the BDS and the SIP criteria were used to focus skills and

resources on the most important issues for Australia while managing and minimising the impact of the funding reductions. On the basis of these principles, two CSIRO Business Units: Textile and Fibre Technologies (TFT) and Forest Biosciences (FB), and their respective capabilities were consolidated with other Business Units. It is important to emphasise that CSIRO's research into textiles and forestry will continue, as signalled in the BDS Statement and at a level commensurate with the support of the relevant stakeholders. In addition, three sites relating to Livestock Industries, Plant Industry and Forest Biosciences were nominated for closure and further consolidation of the Organisation's Sydney site arrangements with a focus on North Ryde was signalled.

People development initiatives

CSIRO People and Culture design and implement initiatives for the purpose of people and organisational development, in line with the following CSIRO strategic objectives: nurturing our innovative culture and working effectively and efficiently in our enterprise. Initiatives are planned with the CSIRO People Management Framework (see Figure 5.1) and key initiatives for the year were as follows:

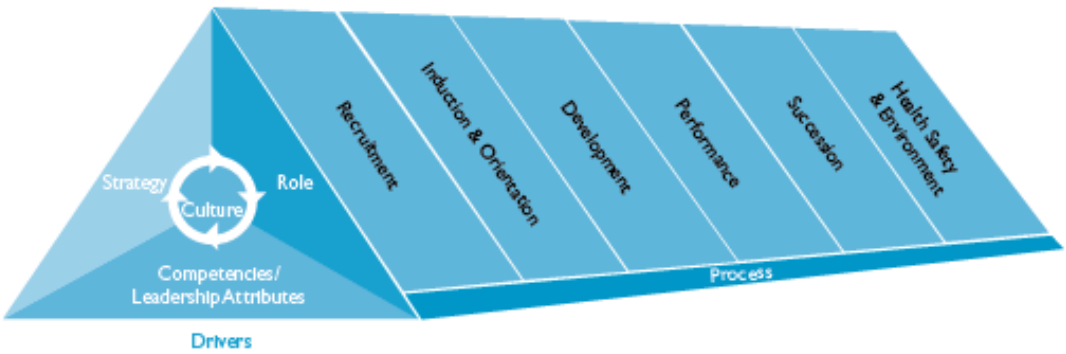
Strategy: Eight Strategy in Action workshops were delivered nationally for Business Unit management teams and other key people. The aims were to launch the 2007–2011 Strategic Plan, to create a deeper appreciation of the Plan's content, and to discuss implementation at both enterprise and Business Unit level.

Culture: A project entitled 'Behaviours we value' articulated the behaviours required to support execution of CSIRO's strategy. The purpose was to provide greater transparency and consistency in our expectations of staff. The resulting behaviours framework will be used in performance management and in staff development programs. A key outcome was a 360 degree feedback questionnaire for the Executive Team and Executive Management Council.

Role: Two series of Organisation Design Principles workshops were conducted for approximately 500 leaders. Key objectives were to provide greater clarity about the principles of matrix management in CSIRO and to improve role clarity for our leaders.

Induction and Orientation: A new National Orientation Program was implemented at the beginning of the year. The aim of the program is to provide new staff with the information they need in order to engage with the vision and strategy of CSIRO, as well as providing an overview of the systems and procedures they must be familiar with in order to work effectively across the enterprise.

Figure 5.1: CSIRO people management framework



Development: The new Learning and Development team has implemented a new series of programs designed to meet staff development needs in the context of CSIRO's strategy. The programs include the New People Leader Program, aimed at people making the transition to line management for the first time, with content focused on leadership, delegation skills, personal resilience and team management techniques.

Succession: A structured process for CSIRO-wide talent management has been implemented. The process enables the systematic identification and development of high-potential employees, ensuring availability of highly effective people for key current and future roles.

Process: Initiatives that underpin all practice areas were as follows:

- *Staff satisfaction*: Staff were surveyed using a range of polls and face-to-face feedback meetings. The results of the Insight Survey, the major CSIRO-wide survey mechanism, are reported in Section 4 (see page 107).
- *New business processes*: A range of new business processes has been built, partly through the implementation of an enterprise-wide SAP system. This project has standardised common processes to ensure a consistent approach across Business Units and has provided the opportunity to create further efficiencies as these processes are embedded.
- *Enterprise Agreement*: A new Enterprise Agreement is being developed with the relevant unions with the aim of achieving a fair, competitive and sustainable agreement that supports our strategy. Key themes are: building on our flexible employment arrangements, attracting and retaining good people, enhancing performance, improving CSIRO's efficiency and productivity and providing competitive salaries.

Financial performance

CSIRO's financial performance for 2007–08 is summarised in Table 5.1.

CSIRO's **operating result** for the year to June 2008 was a surplus of $47.7 million, against a break even budget. This comprised total revenue of $1 091.8 million (above budget by $4.7 million) and total expenses of $1 044.1 million below budget by $43.0 million.

This favourable operating surplus was primarily a result of an additional $47.2 million over budget in IP equity sales. This related to the receipt of 91.35 million Carbon Energy Ltd shares as part of the proceeds from the sale of CSIRO's interests in Carbon Energy Pty Ltd on 23 June 2008.

Total **external revenue** of $428.6 million exceeded the budget of $422.6 million by $6.0 million.

Table 5.1 Financial performance

Revenue by source	2003–04	2004–05	2005–06	2006–07	2007–08
	$m	$m	$m	$m	$m
Co-investment, consulting and services					
Australian private sector	66.5	63.9	67.6	58.0	68.2
Australian Governments	83.8	89.7	96.5	116.0	119.5
Research and Development Corporations	49.5	48.0	44.3	43.2	30.2
Cooperative Research Centres	36.1	35.2	35.2	39.8	38.2
Overseas entities	36.8	33.5	36.4	37.2	35.3
Work in Progress/Deferred Revenue Adjustment	1.4	(9.7)	(8.0)	(8.5)	(1.4)
Total co-investment, consulting and services	**274.1**	**260.5**	**272.0**	**285.8**	**290.0**
Intellectual property, royalties, etc	22.0	22.0	32.4	30.6	81.7
Total research and services revenue	**296.1**	**282.5**	**304.4**	**316.3**	**371.7**
Other external revenue[1]	23.9	33.7	43.9	44.5	41.3
Gain/(Loss) on sale of assets	5.0	0.0	15.5	2.7	4.8
Other fair value gains and reversals[2]	0.0	3.1	0.0	0.1	10.8
Total External Revenue	**325.0**	**319.3**	**363.8**	**363.6**	**428.6**
Appropriation revenue	**568.6**	**577.1**	**593.9**	**610.1**	**663.2**
Total revenue	**893.6**	**896.4**	**957.7**	**973.7**	**1091.8**
Less: expenses	898.9	917.2	947.8	972.7	1044.1
Operating result	**(5.3)**	**(20.8)**	**9.9**	**1.0**	**47.7**

[1] *Including interest, rent, education programs and subscriptions.*
[2] *Gains associated with revaluation of Lindfield and The Village North Ryde properties.*

Staff demographics

CSIRO staff are employed under section 32 of the *Science and Industry Research Act 1949*. At 30 June 2008, CSIRO had a total of 6423 staff, which has an equivalent full-time (EFT) value of 5768. Table 5.2 shows the number of staff employed in different job categories, called principal functional areas.

Consistent with CSIRO's strategy, the proportion of research staff has trended upwards in the last five years (see Figure 5.2).

The proportion of female staff in CSIRO has increased from 36 per cent to 39 per cent and the proportion of female research staff has increased from 17 per cent to 20 per cent in the last five years. Figure 5.3 shows the change in distribution of female staff in CSIRO Classification Levels 4–8 (where Level 8 is the most senior Level).

Business Enabling Technologies Replacement – BETR

CSIRO's Business Enabling Technologies Replacement (BETR) program is the implementation of the enterprise business processes and enabling technology SAP – it replaces a number of legacy systems across the enterprise – including many of those supporting budgeting and finance, contract administration, project management, finance, human resources, and health, safety and environment into an integrated single system.

BETR has been an ambitious change program that was delivered in accordance with its re-set program plan, budget and agreed scope. The system was formally activated on 1 July 2008 after an intense period of planning and development, and initial assessments are that the implementation has been successful.

Importantly, the project also developed and delivered an integrated suite of business processes that enable the Organisation to not only operate more efficiently, but they also facilitate the seamless and standardised delivery of cross-enterprise support activities. This is a fundamental capability as we continue our journey of delivering large-scale benefits to Australia through harnessing talent across and beyond the Organisation.

BETR was managed as a significant Change Program with a strong emphasis on training, communications and change management. The program was supported by a network of approximately 80 geographically dispersed 'super-users' and a network of business unit based Change Partners. While the majority of BETR training was delivered electronically there were still over 3000 people who received face-to-face training.

BETR has now migrated into transition to a 'business as usual' phase and we will utilise 2008–09 to both embed the system and processes across the enterprise and pursue further improvement opportunities.

Table 5.2: Staff numbers (headcount) as at 30 June

Principal functional area	2003–04	2004–05	2005–06	2006–07	2007–08	Female
Research Staff						
Research Scientists	1625	1623	1630	1688	1727	21%
Research Management	193	213	187	188	194	8%
Research Consulting[1]			33	28	29	17%
Project Staff						
Research Project Staff	2429	2375	2358	2199	2246	42%
Other Staff						
Technical Services	658	640	622	581	542	15%
Senior Specialists	44	41	38	25	13	8%
Communication and Information Services	409	438	439	384	402	63%
General Services	98	81	87	75	66	52%
Administrative Support	987	1047	1041	1046	1082	73%
General Management	131	118	123	117	122	27%
Total	**6574**	**6576**	**6558**	**6331**	**6423**	**39%**

[1] *The principal functional area of Research Consulting was first reported in 2005–06.*

Figure 5.2: Trend in CSIRO staff numbers by staff group (headcount)

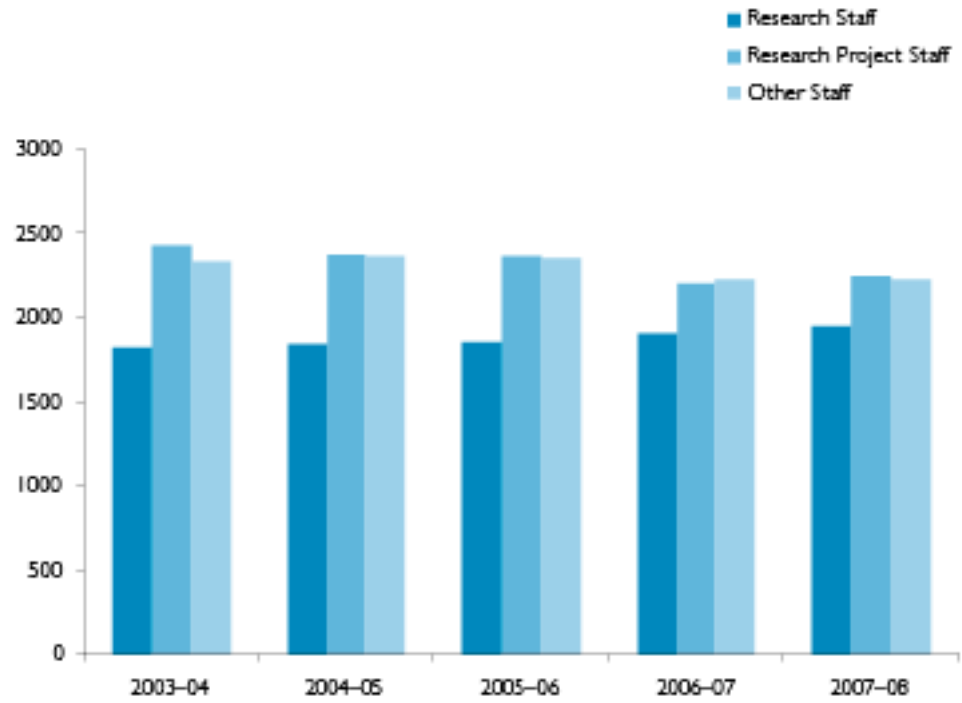
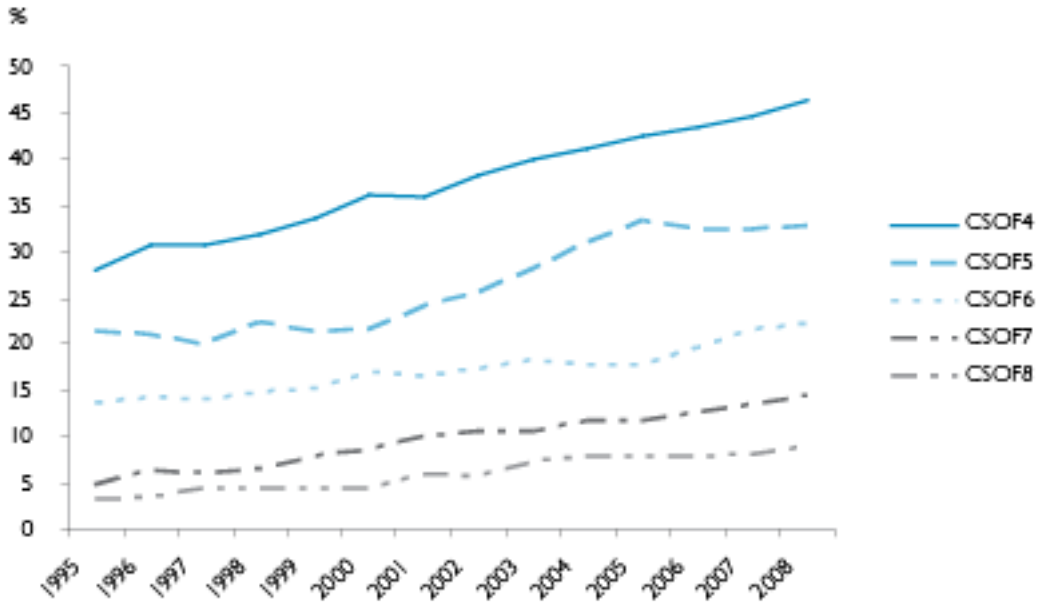
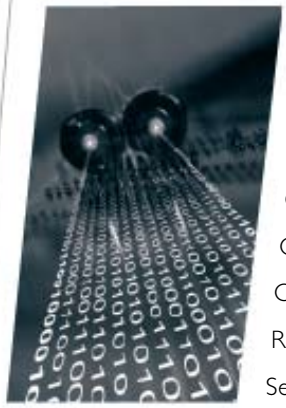


Figure 5.3: Percentage of females by CSOF level[a]



[a] *CSOF refers to the CSIRO Classification Level under the Enterprise Agreement. Level 8 is the Senior Classification Level*



Section 6 – Enterprise Governance

Enterprise Governance

Enterprise governance provides direction, control and accountability to enable CSIRO to achieve its roles in the National Innovation System.

The CSIRO governance framework ensures that appropriate processes are in place for strategic direction setting and science investment, the oversight of key management decisions and performance measurement. It assists staff to understand their roles and responsibilities and helps the Organisation to interact more effectively with external clients and partners.

In line with CSIRO's Strategic Plan 2007–2011, the Board and management have continued to promote governance practices which meet the requirements of CSIRO's complex operating environment.

In 2007–08, achievements included:

- introduction from 1 July 2007 of a matrix organisation structure and associated changes to roles, responsibilities and accountabilities for all staff based on agreed organisational design principles. The matrix structure and related changes to systems, processes and culture enables CSIRO to operate as an integrated enterprise (One-CSIRO). It also enables the Organisation to better achieve its strategy of deploying multidisciplinary teams to major challenges with national focus
- development through the BETR Program of a set of standard Enterprise Business Processes for use across all Business Units within CSIRO. The processes are supported by a SAP enterprise resource planning system which was introduced from 1 July 2008. More information on the BETR program can be found in Section 5, page 122
- revision of the CSIRO Authorities Framework to align roles with organisational design principles, providing a more consistent enterprise-wide approach to authorities and facilitate automated authority arrangements within the implementation of the BETR program
- revision of the governance framework to reflect amendments in September 2007 to the *Science and Industry Research Act 1949* (SIR Act)
- review of internal control mechanisms to assist with the annual Compliance Report to Government regarding CSIRO's financial sustainability and compliance with the *Commonwealth Authorities and Companies Act 1997* (CAC Act)
- further refinements to the Science Investment Process and the science assessment review process and performance measurement framework
- improvements to the CSIRO policy framework, policy documentation and the communication of organisational policy.

Governing legislation

Science and Industry Research Act 1949

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

CSIRO's primary functions as set out in the SIR Act are, in summary:

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

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.

The Organisation has power to do all things necessary or convenient to be done for or in connection with the performance of its functions. In particular, it may:

- arrange for research and other work to be undertaken outside CSIRO
- form partnerships or companies
- make its discoveries and inventions available for fees, royalties or other consideration
- pay bonuses to staff for discoveries or inventions
- charge fees for research, facilities or services provided to others.

Following the *Review of the Corporate Governance of Statutory Authorities and Office Holders* (The Uhrig Review), the SIR Act was amended in September 2007 to remove the requirement for Ministerial approval of contracts over a prescribed value, to enable the CSIRO Board to appoint and remove the Chief Executive following consultation with the Minister, and to clarify the powers of the Board.

CSIRO Board Charters and Directions to the Chief Executive were amended at the time to reflect these changes.

Commonwealth Authorities and Companies Act 1997

Reporting, accountability and other rules for CSIRO's operations are set out in the *Commonwealth Authorities and Companies Act 1997* (CAC Act).

In October 2007, CSIRO submitted an annual Compliance Report to the Government regarding the Organisation's compliance with the CAC Act and its financial sustainability. Internal control mechanisms were reviewed to support this declaration.

Further information on CSIRO's governing legislation is at:
www.csiro.au/governanceoverview

Responsible Minister

From 1 July 2007 to 3 December 2007 the Minister responsible for CSIRO was the Honourable Julie Bishop MP, Minister for Education, Science and Training. From 3 December 2007 to 30 June 2008 the Minister responsible for CSIRO was Senator the Honourable Kim Carr, Minister for Innovation, Industry, Science and Research.

The key powers the Minister has under the *SIR Act* are to:

- add to the purposes for which CSIRO may carry out scientific research (sub-paragraph 9(1)(a)(iv))
- 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 (section 13 (1))

The Minister did not exercise either of these powers during 2007–08.

The Minister has a number of powers under the CAC Act and may under section 28, after consultation with the Board, notify the Board of a general policy of the Australian Government that is to apply to CSIRO, with or without specified exemptions.

The Minister did not notify the Board of such a general policy during 2007–08.

Notifications to the Minister under the CAC Act, and other legislative requirements

Thirteen notifications under Section 15 and 16 of the CAC Act were made to the Minister in 2007–08. These related to participation in partnerships, joint ventures or similar arrangements, the commencement of business activity, share transactions, the disposal of a business and the modification of existing contractual arrangements.

General policies of the Commonwealth Government that applied to CSIRO in 2007–08 under Section 28 of the CAC Act are: Commonwealth Fraud Control Policy; Australian Government Foreign Exchange Risk Management Guidelines; and Outsourcing of IT Infrastructure Services. In addition, CSIRO has complied with the Commonwealth Procurement Guidelines.

Quadrennium Funding Agreement 2007–08 to 2010–11

CSIRO is funded on a four-year basis in the form of a Quadrennium Funding Agreement. The Agreement includes the principles of quadrennium funding, resourcing of outputs, performance reporting and other matters agreed by the parties. The current Agreement was signed by the Minister responsible for CSIRO, the Minister for Finance and Administration and the Chairman of the CSIRO Board in October 2007.

Statement of Expectations

In June 2007, the Minister responsible for CSIRO at that time, the Honourable Julie Bishop MP provided a Statement of Expectations to the CSIRO Board for 2007–08. The Statement outlined the Minister's expectations regarding the strategic direction, governance, communication, and monitoring and review of the Organisation.

The CSIRO Board responded with a Statement of Intent.

The Statements should be read alongside the 2007–08 to 2010–11 Quadrennium Funding Agreement and the 2007–2011 CSIRO Strategic Plan.

Minister Carr intends to establish a Charter with CSIRO which will identify a set of shared principles for the engagement of CSIRO and its researchers with the Government and community on matters related to science. CSIRO is liaising with the Department of Innovation, Industry, Science and Research on the development of the Charter.

CSIRO Board

The CSIRO Board is responsible to the Australian Government (through the responsible Minister) for the overall strategy, governance and performance of CSIRO. Under section 12(2) of the SIR Act, the Board has power to do all things necessary or convenient to be done for or in connection with the performance of its functions.

The CSIRO Board comprises a non-executive Chairman, up to eight other non-executive members and a full-time Chief Executive. All non-executive members, and the Chairperson and the Deputy Chairperson, are appointed by the Governor-General. The Chief Executive is appointed by the CSIRO Board, in consultation with the Minister.

Newly appointed non-executive Board members are informed of their responsibilities and rights through a formal induction process.

The Board meets formally every second month for one or two days. 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.

The Board Charter requires the Chairman to monitor Board performance and coordinate a

review of performance at least every 18 months. Board Committee Charters also require them to meet at least once per year to assess their performance and report the outcomes to the Board.

The CSIRO Board operates partly through three standing committees:

- The **Board Audit Committee** assists the CSIRO Board by monitoring and reporting on key governance areas of risk management, internal control and compliance including those for financial reporting, safety and environmental performance and legislative compliance.

- Under the CAC Act, the Commonwealth Auditor-General is the external auditor for CSIRO. The Board Audit Committee reviews the Australian National Audit Office (ANAO) audit plan and meets with the external auditor regularly throughout the year and specifically prior to recommending financial statements to be signed by the Board.

- The **Board Commercial Committee** (BCC) assists the CSIRO Board to fulfil its governance responsibilities in relation to CSIRO's business development and commercialisation activities and major procurement and property transactions.

  The BCC makes recommendations to the Board regarding specific transactions and is supported by management's Commercial Executive (ComEx) Committee which provides advice on internal management processes and oversees commercial activities. The ComEx Committee includes both external advisors and management members.

- The **Board Remuneration Committee** assists the CSIRO Board in relation to the Chief Executive's remuneration arrangements and in ensuring that the Organisation has an appropriate and competitive remuneration structure.

  In accordance with the Remuneration Tribunal, the CSIRO Board is the employing body for the Chief Executive, and the Board determines the terms and conditions of employment for the Chief Executive, provided that they are not inconsistent with the framework determined by the Tribunal.

  The Remuneration Tribunal determines the remuneration and allowances of non-executive Board members.

Other committees can be established from time to time to assist in the execution of the Board's duties.

The CSIRO Board Charter and Committee Charters are available at: www.csiro.au/boardoverview

Board membership 2007–08

Chairman
Dr John Stocker AO
BMedSc MBBS PhD
FRACP FTSE
Company Director
28 June 2007 – 27 June 2010

Deputy Chairman
Professor Suzanne Cory AC
BSc MSc PhD FAA FRS
Director, The Walter and
Eliza Hall Institute of Medical
Research
26 June 2002 – 25 June 2009

Chief Executive
Dr Geoff Garrett AO
BA(Hons) MA PhD
8 January 2001 –
31 December 2008

Further details of the 2007–08 Board members, including qualifications, terms of appointment, remuneration, membership of Board Committees and attendance at meetings are shown on page 199 in the Financial Statements.

Board member profiles are available at: www.csiro.au/boardoverview

Members

Dr Terry Cutler
BA(Hons) PhD FAIM FAIPA
Principal
Cutler and Company Pty Ltd
25 July 2002 – 24 July 2009

Dr Eileen Doyle
BMath(Hons) MMath
PhD FAICD
Company Director
15 February 2006 –
14 February 2011

Mr Brian Keane
FAICD
Company Director
30 July 2003 – 29 July 2008

Ms Deborah O'Toole
LLB
Company Director
16 April 2003 – 15 April 2008
1 May 2008 – 30 April 2011

Mr Douglas Rathbone AM
DipChemEng BCom
Managing Director and
Chief Executive
26 September 2007 –
25 September 2010

Professor Alan Robson AM
BAgrSc PhD FTSE FAIAS
Vice-Chancellor
University of Western
Australia
30 July 2003 – 29 July 2008

Professor Tom Spurling AM
BSc(Hons) PhD
Research Professor
Swinburne University
1 May 2008 – 30 April 2012

CSIRO Executive Management

The Chief Executive is responsible to the Board for the overall development of strategy, management and performance of CSIRO. The Chief Executive manages the Organisation in accordance with the strategy, plans and policies approved by the Board and Directions to the Chief Executive from the Board issued under the SIR Act. These Directions were reviewed in June 2008.

The Chief Executive is supported by the Executive Team and the Executive Management Council.

The Executive Team is assisted by a number of Management and Advisory Committees including the ComEx Committee, the Flagship Oversight Committee, the Health Safety and Environment Committee, the Capital Asset Management Committee, the Enterprise Risk Advisory Committee, and the Science Investment Process Science Sub-Committee.

Executive Team membership 2007–08

Dr Geoff Garrett AO
BA(Hons) MA PhD
Chief Executive

Dr Ron Sandland AM
BSc PhD AIA FTSE
Deputy Chief Executive
(retired July 2007)

Dr Alastair Robertson
BSc PhD FFSC CChem FIFST
Deputy Chief Executive and
Executive Director, Science
Strategy and Investment

Mr Mike Whelan
BEc
Deputy Chief Executive,
Operations

Dr Michael Barber
BSc PhD FAA
Group Executive, Information,
Manufacturing and Minerals
(resigned September 2007)

Dr Joanne Daly
BSc(Hons) PhD PSM
Group Executive,
Agribusiness

Dr Michael Eyles
BSc(Hons) PhD
Executive Director,
Leadership and
Organisation Development

Mr Allan Gaukroger
BA FCPA
Chief Finance Officer
(from January 2008)

Executive Team membership 2007–08

Dr Rod Hill
DSc FTSE FAICD
Group Executive, Manufacturing, Materials and Minerals (resigned November 2007)

Dr Andrew Johnson
BAgrSc(Hons) PhD MPA Group Executive, Environment

Dr Nigel Johnson
PhD, BSc (Hons1), GAIP, AFNZIM, CTextFTI
Group Executive, Manufacturing, Materials and Minerals – Acting (November 2007 to March 2008)

Dr Steve Morton
BSc(Hons) PhD
Group Executive, Sustainable Energy and Environment
Group Executive, Manufacturing, Materials and Minerals (From March 2008)

Mr Nigel Poole
LLB BCom FAICD
Executive Director, Business Services

Dr Beverley Ronalds
PhD FIEAust FICE FTSE
Group Executive, Energy

Mr Craig Roy
BSc MBA MSc GAICD
Executive Director, Strategic Change Programs

Dr Alex Zelinsky
PhD, FTSE, FIEE, FAICD, FIEAust
Group Executive, Information and Communication Sciences and Technology

Executive team profiles are available at:
www.csiro.au/executiveteam

Organisational Chart as at 30 June 2008

Minister

Innovation, Industry, Science and Research – The Hon Senator Kim Carr

CSIRO Board

Dr John Stocker AO (Chairman)
Professor Suzanne Cory AC (Deputy Chairman)
Dr Terry Cutler – Dr Eileen Doyle – Dr Geoff Garrett AO
Mr Brian Keane – Ms Deborah O'Toole – Mr Douglas Rathbone AM
Professor Alan Robson AM – Professor Tom Spurling AM

Executive Team

Dr Geoff Garrett AO (Chief Executive)
Dr Joanne Daly – Dr Michael Eyles – Mr Allan Gaukroger
Dr Andrew Johnson – Dr Steve Morton – Mr Nigel Poole – Dr Alastair Robertson
Dr Beverley Ronalds – Mr Craig Roy – Mr Mike Whelan – Dr Alex Zelinsky

Executive Management Council[1]

Agribusiness
Entomology
Food Futures[2]
Food Science Australia[3]
Livestock Industries
Plant Industry
Preventative Health[2]

Energy
Energy Technology
Energy Transformed[2]
Petroleum Resources
Wealth from Oceans[2]

Environment
Climate Adaptation[2]
Land and Water
Marine and Atmospheric Research
Sustainable Ecosystems
Water for a Healthy Country[2]

Information and Communications S&T
Australia Telescope National Facility
ICT Centre
Mathematical and Information Sciences

Manufacturing, Materials and Minerals
Exploration and Mining
Light Metals[2]
Materials Science and Engineering
Minerals
Minerals Down Under[2]
Molecular and Health Technologies
Niche Manufacturing[2]

CSIRO-wide support
Business Services[4]
Communication
Financial Services
Government Relations
People and Culture
Science Strategy and Investment

[1] *The Executive Management Council comprises members of the Executive Team, all Divisional Chiefs, Flagship Directors and a number of other Senior Managers*
[2] *National Research Flagship*
[3] *Joint venture with the Victorian Government*
[4] *Includes: commercialisation; legal; information management and technology; property*

Other Governance practices

Other governance practices in CSIRO include:

Strategic planning and science investment: The 2007–2011 CSIRO Strategic Plan sets out the Organisation's broad vision for the future. This directs the development of the annual Operational Plans. The Strategic Plan is discussed in Section 1.

CSIRO has a robust, systematic and accountable Science Investment Process to ensure that the Organisation's science and support activities are aligned with its Strategic Plan and functions. The process is informed by CSIRO's advisory mechanisms.

The outcomes of the Science Investment Process are reflected in the annual Operational Plan. The Science Investment Process is discussed in detail in Section 5.

Advisory mechanisms: The CSIRO Sector Advisory Councils provide advice on the high-level strategic directions for R&D for their sector. The Councils comprise external representatives from industry and other stakeholder interest and cover energy and transport; environment and natural resource management; health; information, communication and services; manufacturing; and mineral resources sectors.

There are also Advisory Committees for each of the National Research Flagships.

Details of the Sector Advisory Councils and Flagship Advisory Committees can be found at: www.csiro.au/SAC and www.csiro.au/FAC

Performance Measurement Framework: The CSIRO Performance Measurement Framework aligns performance and accountability with the Organisation's strategic objectives.

CSIRO's performance measures are designed to assist management and staff to understand and improve the Organisation's performance and to ensure that the requirements of external reporting and accountability are met. The Performance Measurement Framework is discussed further in Section 1.

Science Assessment Reviews: To ensure that the quality and relevance of its science base is maintained, CSIRO conducts a rolling cycle of externally-led Science Assessment Reviews of all its research Divisions. Further details of Science Assessment Reviews are provided in Section 3.

Policies: CSIRO has a comprehensive set of organisational policies to govern its activities.

In 2007–08, policies were established or updated in the following areas:

- Animal Welfare
- Emergency Management Procedures
- Contract Management Procedures
- Procurement
- IT Security

Operational policies in the Finance and People and Culture areas were also reviewed with minor amendments.

Authorities and delegations: The CSIRO Authorities Manual documents the delegations and authorities conferred by the Chief Executive, and provides information for staff on the principles for the devolution of powers within CSIRO and the policies and procedures for the responsible and accountable exercise of those powers. The Manual was revised in October 2007.

Code of Conduct: The CSIRO Code of Conduct applies to the Organisation's Board, management and staff. It provides a benchmark against which conduct can be assessed to ensure the highest ethical standards are met.

Disclosure of interests: Section 10F of the SIR Act requires written disclosure by the Chief Executive to the Board (until September 2007 disclosure was to the Minister) of all direct or indirect pecuniary interests in any business or in any body corporate carrying on a business. Sections 27F–K of the CAC Act require the disclosure of material personal interests in a matter that is being considered by the Board and prohibits a member from being present during consideration or voting on such matters, unless otherwise determined by the Board or the Minister. All of these requirements are currently being met.

Risk management

CSIRO's risk management framework aligns risk assessment to the objective setting framework within the Organisation. It integrates risk management into business planning and performance management processes to support the business objectives of the Organisation.

Accountability for identifying and managing risk rests with all individuals across all areas of CSIRO. The Executive Team, supported by an Enterprise Risk Advisory Committee chaired by the Deputy Chief Executive – Operations, is responsible for the implementation of risk management strategies at the organisational level. In appropriate circumstances, insurance is used as a method to transfer the financial impact of risk.

The Board has responsibility for ensuring an appropriate risk management framework is in place to identify and manage strategic and operational risks to the Organisation. The Board Audit Committee monitors and reviews CSIRO's policy, strategy, framework and allocation of resources to support the oversight and management of risk. The Committee ensures that management has regularly reviewed and updated CSIRO's risk profile and assesses the appropriateness of the steps management has taken to manage these risks.

In summary, CSIRO's key strategic risks have been identified as:

- risks associated with the **resourcing** of the enterprise through implementation of major organisational change initiatives, development of enterprise business processes, governance, leadership and infrastructure
- risks associated with our core **science** including broad direction setting, attracting talent and developing capabilities
- risks associated with our **relationships** in managing the expectations of key stakeholders, partnering and collaborating effectively and achieving growth through commercial relationships
- risks directly associated with the achievement of **impact** through the Flagship Program, influencing policy and demonstrating impact to the broader community.

Executive Team members are accountable for the management of each of these risks through specific strategies, supported by strategic implementation goals that are aligned to CSIRO's overall Strategic and Operational Plans.

The internal Risk Assessment and Audit unit undertakes a risk based systematic program of organisation-wide functional audits, Business Unit assurance audits and project-specific risk assessments, in accordance with a formal charter endorsed by the Audit Committee.

Safeguarding integrity in financial reporting

CSIRO's financial statements and notes are required by clause 1(b) of Schedule 1 to the CAC Act 1997.

The financial statements are prepared in accordance with the:

- Finance Minister's Orders for the reporting period ended 30 June 2008

- Australian Accounting Standards and Accounting Interpretations issued by the Australian Accounting Standards Board that apply for the reporting period.

The financial statements are accompanied by a Management Representation letter to the Australian National Audit Office (ANAO) signed by the Chairman of the Board, Chief Executive and the Chief Finance Officer declaring that the statements present a true and fair view of the financial position, the operating results and the cash flows of the Organisation for the year ended 30 June 2008.

In addition, the financial statements are supported by a Control Self-Assessment Questionnaires Checklist and a Corporate Accountability Checklist relating to compliance with policies, CAC Act and control environment signed by senior managers of the Organisation. This is a mechanism whereby specific assurances can be gained about the Organisation's financial state of affairs, compliance issues and control environment.

Fraud control and security

The Organisation has complied with Commonwealth Fraud Control Guidelines. The Organisation's Fraud Control Plan has been reviewed in compliance with the Guidelines and will be re-promulgated in the second half of 2008. As a result, appropriate fraud prevention, detection, investigation, and reporting procedures and processes are in place. Data concerning fraud has been collected and was reported to the Attorney-General's Department in September 2007 in accordance with the Guidelines.

In May 2008, a review of Security Risks was initiated to identify new and emerging risks to the Organisation's operations and to re-evaluate the security risks identified previously in 2005. The review will also take into account the changes to Government security policy and emerging threats identified by the Australian Security Intelligence Organisation and criminal threats identified by the Australian Federal Police. As a result of the review, the CSIRO Corporate Security Plan will be updated to reflect the Organisation's needs to manage risks to its operations.

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/servicecharter

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

Phone: 1300 363 400
Fax: +61 3 9545 2175
Email: enquiries@csiro.au

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.

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 126
- information about CSIRO's procedures for external consultation can be found at www.csiro.au/SAC
- 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). CSIRO administrative manuals are available from the Freedom of Information Officer.

Part V of the FOI Act confers a right to request amendment of 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 year to 30 June 2008, CSIRO received 22 requests for information under the FOI Act and no requests for amendment in relation to documents provided under the Act.

Archives, Privacy, 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 30 years old is provided in accordance with that Act.

The *Privacy Act 1988* provides for Information Privacy Principles (IPPs) and National Privacy Principles (NPPs). In the year to 30 June 2008, the Privacy Commissioner did not undertake any investigations under section 36 of the *Privacy Act 1988* in relation to CSIRO.

The *Administrative Decisions (Judicial Review) Act 1977* enables a person aggrieved by certain classes of administrative decisions made by Australian Government agencies, including CSIRO, to obtain reasons for or challenge those decisions. In the year to 30 June 2008, 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:

Freedom of Information Officer and Privacy Officer
CSIRO, PO Box 225, Campbell ACT 2602

Phone: 02 6276 6123
Fax: 02 6276 6437
Email: rosemary.caldwell@csiro.au

Section 7 –
Financial Statements

Australian National
Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Minister for Innovation, Industry, Science and Research

Scope

I have audited the accompanying financial statements of the Commonwealth Scientific and Industrial Research Organisation for the year ended 30 June 2008, which comprise: a statement by the Board members; income statement; balance sheet; statement of changes in equity; cash flow statement; schedules of commitments and contingencies; a summary of significant accounting policies; and other explanatory notes.

The Responsibility of the Members of the Board for the Financial Statements

The members of the Board are responsible for the preparation and fair presentation of the financial statements in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997* and the Australian Accounting Standards (including the Australian Accounting Interpretations). This responsibility includes establishing and maintaining internal controls relevant to the preparation and fair presentation of the financial statements that are free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. My audit has been conducted 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 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

GPO Box 707 CANBERRA ACT 2601
19 National Circuit BARTON ACT 2600
Phone (02) 6203 7300 Fax (02) 6203 7777

considers internal control relevant to the Commonwealth Scientific and Industrial Research Organisation'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 Commonwealth Scientific and Industrial Research Organisation's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the members of the Board, as well as evaluating the overall presentation of the financial statements.

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

Independence

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

Auditor's Opinion

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

(a) have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, and the Australian Accounting Standards (including the Australian Accounting Interpretations); and

(b) give a true and fair view of the matters required by the Finance Minister's Orders including the Commonwealth Scientific and Industrial Research Organisation's financial position as at 30 June 2008 and of its financial performance and its cash flows for the year then ended.

Australian National Audit Office

John McCullough
Audit Principal
Delegate of the Auditor-General

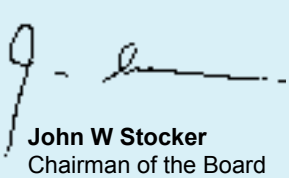
Canberra
27 August 2008

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
STATEMENT BY BOARD MEMBERS AND CHIEF EXECUTIVE

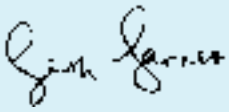
In our opinion, the attached financial statements for the year ended 30 June 2008 are based on properly maintained financial records and give a true and fair view of the matters required by the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997.*

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Organisation will be able to pay its debts as and when they become due and payable.

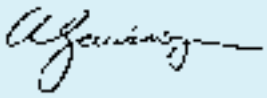
This Statement is made in accordance with a resolution of the Board Members.



John W Stocker
Chairman of the Board
20 August 2008



Geoff G Garrett
Chief Executive and Board Member
20 August 2008



Allan Gaukroger
Chief Financial Officer
20 August 2008

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
INCOME STATEMENT
For the period ended 30 June 2008

	Notes	2008 $'000	2007 $'000
INCOME			
Revenue			
Revenues from Government	4.1	663 160	610 060
Sale of goods and rendering of services	4.2	290 069	285 772
Interest	4.3	7 280	6 406
Rents	4.4	6 891	6 361
Royalties	4.5	9 726	17 135
Other revenues	4.6	27 195	30 707
Total Revenues		**1 004 321**	**956 441**
Gains			
Net gain from sale of property, plant and equipment	4.7	4 748	2 714
Net gain from sale of equity investments and intellectual property	4.8	71 945	13 442
Other fair value gain	4.9	10 817	749
Total Gains		**87 510**	**16 905**
TOTAL INCOME		**1 091 831**	**973 346**
EXPENSES			
Employee benefits	5.1	596 971	559 884
Suppliers	5.2	357 394	332 599
Depreciation and amortisation	5.3	76 794	75 731
Finance costs	5.4	3 038	3 101
Write-down and impairment of assets	5.5	6 192	1 214
Net foreign exchange losses	5.6	160	174
Other expenses	5.7	3 162	-
TOTAL EXPENSES		**1 043 711**	**972 703**
		48 120	**643**
for using the equity method	8	(436)	376
Surplus		**47 684**	**1 019**

The above Statement should be read in conjunction with the accompanying notes.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
BALANCE SHEET
As at 30 June 2008

	Notes	2008 $'000	2007 $'000
ASSETS			
Financial Assets			
Cash and cash equivalents	6	98 536	131 048
Trade and other receivables	7	70 911	57 157
Other investments	9	118 615	50 154
Total financial assets		**288 062**	**238 359**
Non-Financial Assets			
Land and buildings	10	1 324 262	998 022
Plant and equipment	11	260 688	235 131
Investments accounted for using the equity method	8	614	1 050
Investment properties	12	48 540	37 723
Intangibles	13	26 752	31 515
Properties held for sale	14	69 126	4 405
Inventories	15	1 093	1 075
Other non-financial assets	16	32 696	22 390
Total non-financial assets		**1 763 771**	**1 331 311**
TOTAL ASSETS		**2 051 833**	**1 569 670**
LIABILITIES			
Payables			
Suppliers	17	81 915	55 370
Other payables	18	87 818	71 085
Total payables		**169 733**	**126 455**
Interest Bearing Liabilities			
Leases	19	67 798	72 004
Deposits	20	11 950	16 866
Total interest bearing liabilities		**79 748**	**88 870**
Provisions			
Employee provisions	21	192 768	186 034
Total provisions		**192 768**	**186 034**
TOTAL LIABILITIES		**442 249**	**401 359**
NET ASSETS		**1 609 584**	**1 168 311**
EQUITY			
Assets revaluation reserves		1 099 423	709 411
Other reserves		10 570	6 993
Retained surpluses		499 591	451 907
TOTAL EQUITY		**1 609 584**	**1 168 311**
Current assets		**272 362**	**216 075**
Non-current assets		**1 779 471**	**1 353 595**
Current liabilities		**364 340**	**315 852**
Non-current liabilities		**77 909**	**85 507**

The above Balance Sheet should be read in conjunction with the accompanying notes.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
STATEMENT OF CHANGES IN EQUITY
As at 30 June 2008

	Retained Surpluses		Asset Revaluation Reserves		Other Reserves		Total Equity	
	2008 $'000	2007 $'000	2008 $'000	2007 $'000	2008 $'000	2007 $'000	2008 $'000	2007 $'000
Opening balance at 1 July	**451 907**	**455 478**	**709 411**	**710 476**	**6 993**	-	**1 168 311**	**1 165 954**
Adjustment for changes in accounting policies	-	(4 590)	-	-		4 590	-	-
Adjusted opening balance	**451 907**	**450 888**	**709 411**	**710 476**	**6 993**	**4 590**	**1 168 311**	**1 165 954**
Income and expenses								
Revaluation of land and buildings			390 012	-			390 012	-
Fair value gains on investment classified as available for sale					3 577	2 562	3 577	2 562
Impairment of assets recognised directly in equity			-	(1 065)			-	(1 065)
Impairment of financial assets					-	590	-	590
Realisation of fair value losses on investments (Note 4.9)					-	(749)	-	(749)
Subtotal income and expenses recognised directly in equity	**-**	**-**	**390 012**	**(1 065)**	**3 577**	**2 403**	**393 589**	**1 338**
Operating surplus for the period	**47 684**	**1 019**					**47 684**	**1 019**
Total income and expenses	**47 684**	**1 019**	**390 012**	**(1 065)**	**3 577**	**2 403**	**441 273**	**2 357**
Closing balance at 30 June	**499 591**	**451 907**	**1 099 423**	**709 411**	**10 570**	**6 993**	**1 609 584**	**1 168 311**

The above Statement should be read in conjunction with the accompanying notes.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
CASH FLOW STATEMENT
For the period ended 30 June 2008

	Notes	2008 $'000	2007 $'000
OPERATING ACTIVITIES			
Cash received			
Appropriations		663 160	610 060
Goods and services		343 663	366 899
Interest		6 897	6 572
Net GST received		10 306	10 344
Total cash received		**1 024 026**	**993 875**
Cash used			
Employees		590 445	593 058
Suppliers		360 476	316 927
Finance costs		3 038	3 101
Deposits		4 916	2 839
Total cash used		**958 875**	**915 925**
Net cash flows from operating activities	22	**65 151**	**77 950**
INVESTING ACTIVITIES			
Cash received			
Proceeds from sale of property, plant and equipment		11 779	10 870
Proceeds from sale of equity investments and intellectual property		7 605	14 635
Total cash received		**19 384**	**25 505**
Cash used			
Purchase of property, plant and equipment		110 765	107 436
Purchase of equity investments		1 489	13 961
Selling cost		588	142
Total cash used		**112 842**	**121 539**
Net cash flows used by investing activities		**(93 458)**	**(96 034)**
FINANCING ACTIVITIES			
Cash used			
Other cash used		4 205	4 196
Total cash used		**4 205**	**4 196**
Net cash flows used by financing activities		**(4 205)**	**(4 196)**
Net decrease in cash held		**(32 512)**	**(22 280)**
Cash and cash equivalents at the beginning of the reporting period		131 048	153 328
Cash and cash quivalents at end of the reporting period	6	**98 536**	**131 048**

The above Statement should be read in conjunction with the accompanying notes.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
SCHEDULE OF COMMITMENTS
For the period ended 30 June 2008

	2008 $'000	2007 $'000
BY TYPE		
Capital commitments payable		
Land and buildings[1]	9 545	25 677
Plant and equipment[2]	2 900	294
Investments[3]	1 389	3 029
Total capital commitments payable	**13 834**	**29 000**
Other commitments payable		
Operating leases[4]	354 679	377 239
Research and development commitments[5]	307 523	276 283
Other commitments	13 025	8 666
Total other commitments payable	**675 227**	**662 188**
Commitments receivable		
Research and development commitments	(236 074)	(226 430)
Other receivables	(12 403)	(13 700)
Total commitments receivable	**(248 477)**	**(240 130)**
Net commitments by type	**440 584**	**451 058**
BY MATURITY		
Capital commitments payable		
One year or less	13 262	27 067
From one to five years	572	1 933
Total capital commitments payable	**13 834**	**29 000**
Operating lease commitments payable		
One year or less	33 740	32 975
From one to five years	121 715	122 461
Over five years	199 224	221 803
Total operating lease commitments payable	**354 679**	**377 239**
Other commitments payable		
One year or less	199 224	177 385
From one to five years	121 311	107 564
Over five years	13	-
Total other commitments payable	**320 548**	**284 949**
Commitments receivable		
One year or less	(150 608)	(144 943)
From one to five years	(95 197)	(92 582)
Over five years	(2 672)	(2 605)
Total commitments receivable	**(248 477)**	**(240 130)**
Net commitments by maturity	**440 584**	**451 058**

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 commitments for additional contributions for equity investment.

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 annual increase in accordance with the terms of agreement eg. upward movements in the Consumer Price Index. The accommodation leases are still current and each may be renewed at the Organisation's option.
Leases for motor vehicles	No contingent rentals exist. There are no purchase options available to the Organisation.
Leases for computer equipment	Lessor provides computer equipment designated as necessary in the supply contract for a general period of 2–3 years.

5. Research and development commitments are Agreements Equally Proportionately Unperformed commitments payable and receivable for research and development contracts.

   Commitments are GST inclusive where relevant.

The above Schedule should be read in conjunction with the accompanying notes.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
SCHEDULE OF CONTINGENCIES
For the period ended 30 June 2008

	Notes	Guarantees		Claims for Damages or Costs		Total	
		2008 $'000	2007 $'000	2008 $'000	2007 $'000	2008 $'000	2007 $'000
Contingent assets	23						
Balance from previous period		-	-	4 817	-	4 817	-
New		-	-	-	4 817	-	4 817
Re-measurement		-	-	-	-	-	-
Assets crystallised		-	-	-	-	-	-
Expired		-	-	-	-	-	-
Total contingent assets		**-**	**-**	**4 817**	**4 817**	**4 817**	**4 817**
Contingent liabilities	23						
Balance from previous period		-	-	250	250	250	250
New		-	-	-	-	-	-
Re-measurement		-	-	-	-	-	-
Liabilities crystallised		-	-	-	-	-	-
Obligations expired		-	-	-	-	-	-
Total contingent liabilities		**-**	**-**	**250**	**250**	**250**	**250**
Net contingent assets/(liabilities)						**4 567**	**4 567**

Details of each class of contingent liabilities and contingent assets, including those not included above because they cannot be quantified are shown at Note 23: Contingent Liabilities and Assets.

The above Schedule should be read in conjunction with the accompanying notes.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
For the period ended 30 June 2008

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
For the year ended 30 June 2008

Note 1 Summary of Significant Accounting Policies

1.1 Basis of Preparation of the Financial Report

The Financial Statements and notes are required by Clause 1(b) of Schedule 1 to the *Commonwealth Authorities and Companies Act 1997* and are a General Purpose Financial Report.

The continued existence of the Organisation in its present form and with its present programs is dependent on Government policy and on continuing appropriations by Parliament for the Organisation's administration and programs.

The Financial Statements and notes have been prepared in accordance with:

- Finance Minister's Orders (or FMOs) for reporting period ending on or after 1 July 2007; and
- Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The Financial Report has been prepared on an accrual basis and is in accordance with the historical cost convention, except for certain assets 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 Report is 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 FMOs, assets and liabilities are recognised in the Balance Sheet when and only when it is probable that future economic benefits will flow to the Organisation and the amounts of the assets or liabilities can be reliably measured. However, assets and liabilities arising under agreements equally proportionately unperformed are not recognised unless required by an Accounting Standard.

Unless alternative treatment is specifically required by an accounting standard, revenues and expenses are recognised in the Income Statement when and only when the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

1.2 Significant Accounting Judgements and Estimates

In the process of applying the accounting policies listed in this note, the Organisation has made the following judgements that have the most significant impact on the amounts recorded in the financial statements:

- The fair value of land and buildings classified as 'properties held for sale' and 'investment properties' has been taken to be the market value of similar properties as determined by an independent valuer. However, land and buildings which will continue to be used for research activities have been valued by the Organisation's registered valuer using the fair value methodology.
- The fair value of plant and equipment has been valued by the Australian Valuation Office using the fair value methodology.

- The fair value of investments in unlisted companies is based on the generally accepted valuation guidelines, 'International Private Equity and Venture Capital Valuation Guidelines'. The fair value of investments disclosed in the financial statements has been reviewed and endorsed by the Board Commercial Committee of the Organisation.

No accounting assumptions or estimates have been identified that have a significant risk of causing a material adjustment to carrying amounts of assets and liabilities within the next accounting period.

1.3 Statement of Compliance

Australian Accounting Standards require a statement of compliance with International Financial Reporting Standards (IFRSs) to be made where the financial report complies with these standards. Some Australian equivalents to IFRSs and other Australian Accounting Standards contain requirements specific to not–for–profit entities that are inconsistent with IFRS requirements. The Organisation is a not–for–profit entity and has applied these requirements, so while this financial report complies with Australian Accounting Standards including Australian Equivalents to International Financial Reporting Standards (AEIFRSs) it cannot make this statement.

Adoption of new Australian Accounting Standard requirements
No accounting standard has been adopted earlier than the application date as stated in the standard. The following new standard is applicable to the current reporting period:

Financial instrument disclosure
AASB 7 *Financial Instruments: Disclosures* is effective for reporting periods beginning on or after 1 January 2007 (the 2007–08 financial year) and amends the disclosure requirements for financial instruments. In general, AASB 7 requires greater disclosure than that previously required.

Associated with the introduction of AASB 7 a number of accounting standards were amended to reference the new standard or remove the present disclosure requirements through 2005–10 Amendments to Australian Accounting Standards [AASB 132, AASB 101, AASB 114, AASB 117, AASB 133, AASB 139, AASB 1, AASB 4, AASB 1023 & AASB 1038]. These changes have no financial impact but will affect the disclosure presented in future financial reports.

The following new standards, amendments to standards or interpretations for the current financial year have no material financial impact on the Organisation.

2007–4 *Amendments to Australian Accounting Standards arising from ED 151 and Other Amendments and Erratum: Proportionate Consolidation*

2007–7 *Amendments to Australian Accounting Standards*

UIG Interpretation 11 *AASB 2–Group and Treasury Share Transactions and 2007–1 Amendments to Australian Accounting Standards arising from AASB Interpretation 11*

Future Australian Accounting Standard requirements
The following new standards, amendments to standards or interpretations have been issued by the Australian Accounting Standards Board but are effective for future reporting periods. It is estimated that the impact of adopting these pronouncements when effective will have no material financial impact on future

reporting periods.

AASB Interpretation 12 *Service Concession Arrangements* and 2007–2 *Amendments to Australian Accounting Standards arising from AASB Interpretation 12*

AASB 8 *Operating Segments* and 2007–3 *Amendments to Australian Accounting Standards arising from AASB 8*

2007–6 *Amendments to Australian Accounting Standards arising from AASB 123*

AASB Interpretation 13 *Customer Loyalty Programmes*

AASB Interpretation 14 *AASB 119–The Limit on a Defined Benefit Asset, Minimum Funding Requirements and their Interaction*

Other

The following standards and interpretations have been issued but are not applicable to the operations of the Organisation.

AASB 1049 Whole of Government and General Government Sector Financial Reporting

AASB 1049 specifies the reporting requirements for the General Government Sector. The FMOs do not refer to this standard as it contains guidance applicable to the consolidated financial statements of the Australian Government, rather than financial reports of individual Agencies or Authorities.

1.4 Consolidation

The Organisation has investments in a number of unlisted companies over which it has control. These companies have been established for the purpose of commercialisation of the Organisation's intellectual property (ie. Funnelback Pty Ltd, Intalysis Pty Ltd, Smart Storage Pty Ltd and HydroPem Pty Ltd) and the provision of specific services to owners (ie WLAN Pty Ltd). CSIRO FFP Pty Ltd and the R&D Syndication companies have not traded during the year and they will be wound up in 2008–09.

The Organisation's policy is to make an assessment each financial year as to whether these companies have a material impact on the Organisation's financial statements that would require the Organisation to prepare consolidated financial statements in accordance with AASB 127 *Consolidated and Separate Financial Statements*.

For the year ended 30 June 2008, the Organisation assessed the impact of these companies on the financial position and operating result of the Organisation as being immaterial. Consequently, the Organisation has not prepared consolidated financial statements.

The Organisation's investment in these unlisted controlled companies has been accounted for in accordance with AASB 139 *Financial Instruments: Recognition and Measurement*. Refer accounting policy Notes 1.12 and 9(b) to the financial statements.

1.5 Revenue

Revenue from sale of goods is recognised when:

- the risks and rewards of ownership have been transferred to the buyer;
- the seller retains no managerial involvement nor 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 Organisation.

Revenue from rendering of services (eg. contract research and development 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
- the probable economic benefits with the transaction will flow to the Organisation.

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 16), being the gross unbilled amount expected to be collected from clients for contract research and services performed as at 30 June 2008 or contract research revenue received in advance (Note 18), 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 allowance for impairment. Collectability of debts is reviewed at balance date. Provisions 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.*

Royalty revenue is recognised on an accrual basis in accordance with the substance of the relevant royalty agreements.

Revenues from Government
Amounts appropriated for the Organisation's outputs appropriations for the year (adjusted for additions and reductions) are recognised as revenue, except for certain amounts that relate to activities that are reciprocal in nature, in which case revenue is recognised only when it has been earned.

1.6 Gains

Resources Received Free of Charge
Services received free of charge are recognised 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.

Resources received free of charge are recorded as either revenue or gains depending on their nature.

Sale of Assets
Gains from disposal of non–current assets are recognised when control of the asset has passed to the buyer.

1.7 Research and Development Expenditure and Intellectual Property

All research and development costs, including costs associated with protecting intellectual property (eg. patents and trademarks) are expensed as incurred.

1.8 Employee Benefits

Liabilities for services rendered by employees are recognised at the reporting date to the extent that they have not been settled.

Liabilities for 'short–term employee benefits' (as defined in AASB 119) and termination benefits due within twelve months are measured at their nominal amounts. The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability.
All other 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, including the Organisation's 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 for long service leave has been determined by reference to the work of an actuary as at 30 June 2008. 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. The Organisation recognises a provision for termination when it has developed a detailed formal plan for the terminations and has informed those employees affected that it will carry out the terminations.

Superannuation
Employees of the Organisation 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 and Deregulation as an administered item.

The Organisation 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 Organisation's employees. The Organisation accounts for the contributions as if they were contributions to defined contribution plans.

1.9 Workers' Compensation

The Organisation's workers' compensation liability is covered by the premium paid to the Commission for the Safety, Rehabilitation and Compensation of Commonwealth Employees 'Comcare' and no additional provision for liability is required.

1.10 Insurance

As part of its risk management strategy, the Organisation has insured for risks through the Australian Government's insurable risk managed fund 'Comcover'.

1.11 Cash and Cash Equivalents

Cash and cash equivalents includes notes and coins held and any deposits in bank accounts with an original maturity of 5 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.

1.12 Financial Assets

The Organisation classifies its financial assets in the following categories:

- 'available–for–sale' financial assets; and
- 'loans and receivables'.

The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition.

Financial assets are recognised and derecognised upon 'trade date'.

The Organisation has investments in a number of listed and unlisted companies over which it has significant influence or joint control. These companies have been established for the purpose of commercialisation of the Organisation's intellectual property and are disclosed in Note 9(b). Under AASB 128 *Investments in Associates* and AASB 131 *Investments in Joint Ventures*, the Organisation is required to account for these investments using the equity method, unless the exemption that a parent entity that also has an interest in an associate or joint venture does not have to present consolidated financial statements in accordance with AASB 127 *Consolidated and Separate Financial Statements* applies. The Organisation has performed an assessment for the year ended 30 June 2008 as to whether consolidated accounts should be prepared and has concluded that, on the basis of materiality, consolidated financial statements are not required. Refer accounting policy 1.4.

The Organisation's investment in listed and unlisted companies has instead been accounted for in accordance with AASB 139 *Financial Instruments: Recognition and Measurement* and have been classified as '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. They are included in non–current assets unless management intends to dispose of the asset within 12 months of the balance sheet date.

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. 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 profit for the period.

For investments in listed companies disclosed in Note 9(a), the quoted market price at reporting date is used to determine fair value.

For investment in unlisted companies, including controlled entities, joint venture entities and associate entities disclosed in Note 9(b), where there is no 'active market' for these companies because they have been established to commercialise the Organisation's intellectual property, the Organisation has determined the fair values of these companies in accordance with generally accepted valuation guidelines, *International Private Equity and Venture Capital Valuation Guidelines* (AVCAL).

AVCAL valuation guidelines have been applied with preference given to recent external equity transactions. Where this has not occurred, other AVCAL methodologies such as discounted cash flow and net assets have been used based on market comparison, financial performance and financial forecasts. In addition, this activity was supplemented by independent valuations performed as at 30 June 2008 on equities that were considered to have a material impact on the equity investments portfolio.

For investments in special purpose entities disclosed in Note 9(b) including AARNet Pty Ltd, VERNet Pty Ltd, Australian Synchrotron Holding Co Pty Ltd, Provisor Pty Ltd, CO2 CRC Management Pty Ltd, Dunlena Pty Ltd and MDFRC Pty Ltd, where there is no 'active market' for these companies because they have been set up to gain access to research facilities/networks or to provide services to owners, the Organisation is a long–term shareholder and is not likely to dispose of its interest in these entities. These investments are valued at cost and tested for impairment each year.

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'. They are included in current assets, except for maturities greater than 12 months after the balance sheet date. These are classified as non–current assets. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate.

Impairment of financial assets
Financial assets are assessed for impairment at each balance date.

Financial assets held at amortised cost –If 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 Income Statement.

Available–for–sale financial assets If 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 Income Statement.

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 Property, Plant and Equipment

Asset Recognition Threshold
Purchases of property, plant and equipment are recognised initially at cost in the Balance Sheet, 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).

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.

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. The Organisation has revalued its land, buildings and leasehold improvements as at 30 June 2008 and planned to revalue its plant and equipment in 2008–09.

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 through operating result. Revaluation decrements for a class of assets are recognised directly through operating result 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.

Fair value for each class of asset are determined as follows:

Land, which will continue to be used for research activity, is valued by the Organisation's registered valuer at fair value, ie. 'existing use value'. Existing use contemplates the continued use of the asset for the same application as at the date of valuation, having regard to the asset's capacity to continue contributing to the value of the Organisation and the locations/attributes required by the Organisation, but ignoring alternative uses.

Buildings and leasehold improvements, which will continue to be used for research

activities, are valued by the Organisation's registered valuer using the fair value methodology. This valuation approach determines the depreciated replacement cost using current building prices to arrive at current gross replacement cost less accumulated depreciation having regard to the age, condition and suitability for research and development activities. Building valuations include plant, fit–outs, fixtures and fittings, which form an integral part of buildings.

Properties identified for sale and investment properties are valued by independent valuers as at 30 June 2008.

Plant and equipment were last valued by Australian Valuation Office as at 30 June 2005 using the fair value methodology.

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. Separate records for these assets are maintained and disclosed in Note 25.

Depreciation and Amortisation

Depreciable property, plant and equipment assets are written–off to their estimated residual values over their estimated useful lives to the Organisation 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.

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:

	2008	2007
Building on freehold land	30 to 50 years	40 to 50 years
Leasehold improvements	Lease term	Lease term
Passenger vehicles	7 years	7 years
Agricultural and transport equipment	3 to 20 years	3 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

Impairment

All assets were assessed for impairment at 30 June 2008. 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 Organisation were deprived of the asset, its *value in use* is taken to be its depreciated replacement cost.

1.15 Investment Properties

Investment properties, includes land and buildings held either to earn rental income or for capital appreciation or for both, but not for sale in the ordinary course of business, use in the production or supply of goods and services or administrative purposes. Investment property is measured at fair value with any change therein recognised in the operating result. They have been revalued by independent valuers as at 30 June 2008. When the use of an investment property changes such that it is reclassified as Property, Plant and Equipment, its fair value at the date of reclassification becomes its cost for subsequent accounting.

1.16 Intangibles

The Organisation's intangibles comprise 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, which are expensed in the year of acquisition. Software is amortised on a straight–line basis over its anticipated useful life. The useful lives of the Organisation's softwares are 2 to 10 years (2006–07 2 to 10 years).

All software assets were assessed for indications of impairment as at 30 June 2008.

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 Consumable Stores

Stocks of consumable stores, which are not held for resale, are expensed in the year of purchase. These stores mainly consist of fuel and lubricants, chemical supplies, maintenance materials and stationery. The total value is not considered material in terms of total expenditure or total assets.

1.19 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 non–current 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 a non–current asset is acquired by means of a finance lease, the asset is capitalised at either the fair value of the lease property 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.

1.20 Foreign Currency Transactions

Transactions denominated in a foreign currency are translated at the exchange rate prevailing at the date of the transaction. Foreign currency receivables and payables are translated at the exchange rates prevailing at balance date. Foreign currency translation gains and losses are recognised in the operating result. The Organisation has not entered into specific forward exchange contracts during the reporting period.

1.21 Taxation/Competitive Neutrality

Taxation
In accordance with Section 53 of the *Science and Industry Research Act 1949*, the Organisation is exempt from all forms of Australian taxation except fringe benefits tax (FBT) and the goods and services tax (GST). The Organisation pays applicable taxes in overseas countries.

Revenues, expenses and assets are recognised net of GST:

- except where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- except for receivables and payables.

Competitive neutrality
The Australian Government *Competitive Neutrality Guidelines for Managers* require government bodies to operate with no net competitive advantages over private sector competitors. For the Organisation, 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.

1.22 Joint Ventures

Joint venture operations–Cooperative Research Centres (CRCs)
The proportionate interest in CRCs regarded as joint venture 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 such as CSIRO and Universities for research and development work. 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 Income Statement. Details of specific 'joint venture operations' are disclosed in Note 24.

Joint venture entities–unincorporated (Refer Note 8)
Murray Darling Freshwater Research Centre (MDFRC)–The Organisation's 36.6% interest in the MDFRC is accounted for using the equity method.

Food Science Australia (FSA)– The Organisation's 85% investment in FSA was accounted for using the equity method in prior years. However, in 2007–08 the equity method was discontinued because its investment has been reduced below zero due to its share of FSA's accumulated losses.

Ensis–The Ensis joint venture was terminated effective 1 July 2007.

1.23 Borrowing Costs

All borrowing costs are expensed as incurred.

1.24 Contingent Liabilities and Contingent Assets

Contingent Liabilities and Contingent Assets are not recognised in the Balance Sheet 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 reported when settlement is probable, and contingent liabilities are recognised when settlement is greater than remote.

1.25 Comparative Figures

Where necessary, comparative figures have been adjusted to conform to changes in presentation in these financial statements.

Note 2 Economic Dependency

The Organisation was established by the *Science and Industry Research Act 1949* and is controlled by the Commonwealth of Australia. It receives approximately two thirds of its funding from Commonwealth Parliamentary appropriations. The current Quadranium Funding Agreement with the Australian Government covers the period 2007–08 to 2011–12.

The Organisation is dependent on appropriations from the Parliament of the Commonwealth of Australia for its continued existence and ability to carry out its normal activities.

Note 3 Events After Balance Sheet Date

Since balance date the fair value of the Organisation's investment in the listed company, Carbon Energy Ltd has fallen by $41.1 million, (ie. from $74.9 million as at 30 June 2008 (see Note 9(a)) to $33.8 million as at 14 August 2008). This is due to the fall in the price of the company's shares in the Australian share market since balance date. No adjustment has been made to the fair value of the Organisation's investment in that company since that date.

At the time of completion of this note, the Organisation was not aware of any other significant events occurring after reporting date.

			Notes	2008 $'000	2007 $'000
Note 4		**Income**			
		Revenue			
	4.1	**Revenue from Government**			
		Appropriations for outputs		**663 160**	**610 060**
	4.2	**Sale of goods and rendering of services**			
		Provision of goods – related entities		30	40
		Provision of goods – external parties		8 086	8 896
		Total sales of goods		**8 116**	**8 936**
		Rendering of services – related entities		103 956	110 263
		Rendering of services – external parties		177 997	166 573
		Total rendering of services		**281 953**	**276 836**
		Total sales of goods and rendering of services		**290 069**	**285 772**
		Cost of goods sold – inventories only		**1 040**	**883**
	4.3	**Interest**			
		Bank and term deposits		**7 280**	**6 406**
	4.4	**Rents**			
		Rental income		**6 891**	**6 361**
	4.5	**Royalties**			
		Royalties		**9 726**	**17 135**
	4.6	**Other revenues**			
		Vehicle contributions – staff		73	78
		Sale of primary produce		2 066	986
		FSA cost recovery, except employee costs	8	10 779	9 316
		FFP research support cost recovery		-	2 851
		FFP direct cost recovery, except employee costs		-	7 088
		Donations		1	60
		Education programs and subcriptions		3 439	2 963
		Livestock services		3 248	1 959
		Other		7 589	5 406
		Total other revenues		**27 195**	**30 707**

Note 4	Income (cont)	Notes	2008 $'000	2007 $'000
	Gains			
4.7	**Net gain/(loss) from sale of property, plant and equipment**			
	Land and Buildings			
	Proceeds from sale		10 996	9 806
	Less, Carying value of assets sold		(5 346)	(6 410)
	Selling expenses		(534)	(132)
	Net gain		**5 116**	**3 264**
	Plant and equipment			
	Proceeds from sale		783	931
	Less, Carying value of assets sold		(1 151)	(1 481)
	Net loss		**(368)**	**(550)**
	Total net gain from sale of property, plant and equipment		**4 748**	**2 714**
4.8	**Net gain from sale of equity investments and intellectual property**			
	Proceeds from sale of equity investments		69 217	1 320
	Proceeds from sale of IP		5 984	13 062
	Total proceeds from sale		75 201	14 382
	Less, Carying value of assets sold		(3 201)	(930)
	Selling expenses		(55)	(10)
	Total net gain from sale of equity investments and IP		**71 945**	**13 442**
4.9	**Other gains**			
	Fair value gain on revaluation of investment properties		10 817	-
	Realisation of fair value reserve on sale of equity investments		-	749
	Total other gains		**10 817**	**749**

			Notes	2008 $'000	2007 $'000
Note 5		**Expenses**			
	5.1	**Employee benefits**			
		Wages and salaries		461 962	433 585
		Superannuation–defined contribution plans		76 737	80 186
		Leave and other entitlements		64 626	70 584
		Separation and redundancy		14 338	9 529
				617 663	593 884
		Less, Recovery of employee expenses from Food Science Australia joint venture		(20 692)	(19 479)
		Recovery of employee expenses from Ensis joint venture		-	(14 521)
		Total employee benefits		**596 971**	**559 884**
	5.2	**Suppliers**			
		Provision of goods – related entities		461	814
		Provision of goods – external parties		73 568	71 980
		Rendering of services – related entities		9 092	18 939
		Rendering of services – external parties		258 020	225 616
		Operating lease rentals:			
		Minimum lease payments		13 486	11 962
		Workers' compensation premiums		2 767	3 288
		Total supplier expenses		**357 394**	**332 599**
	5.3	**Depreciation and amortisation**			
		Depreciation			
		Plant and equipment		29 702	29 275
		Buildings and leasehold improvements		45 931	45 295
				75 633	74 570
		Amortisation			
		Intangibles – computer software		1 161	1 161
		Total depreciation and amortisation		**76 794**	**75 731**
	5.4	**Finance costs**			
		Finance leases		**3 038**	**3 101**
	5.5	**Write-down and impairment of assets**			
		Assets write downs from:			
		Bad debts		207	80
		Increase/(decrease) in allowance for impairment		(116)	544
		Impairment of financial assets		-	590
		Impairment of intangible assets		6 101	-
		Total write-down and impairment of assets		**6 192**	**1 214**

For full disclosure on the impairment of financial instruments see Note 33.

Note 5		Expenses (cont)	Notes	2008 $'000	2007 $'000
	5.6	**Net foreign exchange losses**			
		Non-speculative		**160**	**174**
	5.7	**Other expenses**			
		Contribution to FSA losses		**3 162**	**-**
Note 6		**Cash and cash equivalents** (current)			
		Cash at bank and on hand		28 536	26 048
		Term deposits		70 000	105 000
		Total cash and cash equivalents		**98 536**	**131 048**
		Total cash includes deposits held on behalf of third parties totalling $11 950 000 (2007 $16 866 000).	20		
Note 7		**Trade and other receivables**			
		Goods and services		63 097	52 029
		GST receivable from the ATO		1 748	-
		Interest		1 303	920
		Loans		1 400	400
		Other receivables		4 245	4 806
		Total trade and other receivables (gross)		**71 793**	**58 155**
		Less, Allowance for impairment – goods and services		(882)	(998)
		Total trade and other receivables (net)		**70 911**	**57 157**
		Receivables are represented by:			
		Current		69 511	56 757
		Non current		1 400	400
		Total trade and other receivables (net)		**70 911**	**57 157**

Note 7 **Trade and other receivables** (cont)

	Notes	2008 $'000	2007 $'000
Receivables are aged as follows:			
Not overdue		59 739	47 974
Overdue by:			
Less than 30 days		9 105	5 787
30 to 60 days		1 343	1 883
61 to 90 days		632	608
More than 90 days		974	1 903
Total receivables (gross)		**71 793**	**58 155**
The allowance for impairment is aged as follows:			
Overdue by:			
61 to 90 days		89	-
More than 90 days		793	998
Total allowance for impairment		**882**	998

Reconciliation of the allowance for impairment:

Movements in relation to 2008	**Goods and services $'000**	**Other receivables $'000**	**Total $'000**
Opening balance	998	-	998
Decrease recognised in net surplus	(116)	-	(116)
Closing balance	**882**	-	**882**
Movements in relation to 2007			
Opening balance	640	-	640
Increase recognised in net surplus	358	-	358
Closing balance	**998**	-	**998**

	Notes	2008 $'000	2007 $'000
Note 8 Investments accounted for using the equity method			
Joint venture entities – unincorporated			
CSIRO's share of surplus in its equity accounted investees for the year was as follows:			
Food Science Australia		-	411
Murray-Darling Fresh Water Research Centre		614	639
Total Investments accounted for using the equity method		**614**	**1 050**

Food Science Australia (FSA)

The Orgainsation's investment in FSA has been accounted for using the equity method in prior years. However, in 2007–08 the equity method was discontinued due to its share of FSA's operating deficit during the year. In accordance with the joint venture agreement the operating surplus/(deficit) of FSA is shared 85/15 between the joint venture parties. The Organisation's investment in FSA is 85% and its share of the operating deficit was $3 570 000 (2007 $522 000 surplus).

Movements in the carrying amount of investment in/(liability to) FSA joint venture is as follows:			
Carrying amount at beginning of the financial year		411	(122)
Adjustment base on audited accounts		(3)	11
Share of FSA's operating surplus/(deficit) for the year		(3 570)	522
		(3 573)	533
Carrying amount of investment in/(liability to) FSA as at 30 June	18	**(3 162)**	**411**

Murray–Darling Fresh Water Research Centre (MDFRC)

The Organisation's 36.59% (2007 36.59%) investment in MDFRC is accounted for using the equity method. In accordance with the joint venture agreement, the operating surplus was shared by participants in the joint venture. The Organisation's share of MDFRC's operating deficit was $9 000 (2007 $56 000 surplus).

Movements of carrying amount of investment in MDFRC joint venture entity is as follows:			
Carrying amount at beginning of the financial year		639	795
Share of MDFRC's net operating surplus/(deficit) for the year		(9)	72
Adjustment based on audited accounts		(16)	(21)
Adjustment due to the admittance of a new participant in the joint venture in 2006–07.		-	(207)
		(25)	(156)
Carrying amount of investment in MDFRC as at 30 June		**614**	**639**

Note 8 **Investments accounted for using the equity method** (cont)

Joint venture entities

Name	Principal Activities
Food Science Australia	Undertakes both strategic and applied research, helping the food industry to develop, package, preserve and transport food products.
Murray Darling Fresh Water Research Centre	A collaborative joint venture for the purpose of Murray–Darling Basin freshwater research and the generation of knowledge required to ensure the sustainable management of water and associated environmental resources of the Murray–Darling Basin.
Ensis	The Ensis joint venture was terminated effective from 1 July 2007.

The following is a summary of the financial performance and position of the joint venture entities, not adjusted for the percentage ownership held by the Organisation.

	Total Revenues	Net Operating Surplus (deficits)	Total Assets	Total Liabilities	Net Assets
	$'000	$'000	$'000	$'000	$'000
2008 (unaudited)					
FSA	36 214	(4 200)	7 452	7 452	-
MDFRC	5 476	(25)	4 461	2 782	1 679
2007 (unaudited)					
FSA	41 416	614	9 938	9 938	-
MDFRC	6 301	196	3 727	1 982	1 745

		Notes	2008 $'000	2007 $'000
Note 9	**Other Investments** (non-current)			
	The following investments are classified as 'available for sale' with fair value gains or losses recognised directly in equity:	1.12		
	(a) Listed companies			
	Advanced Magnesium Ltd		1	4
	Arana Therapeutics Ltd		730	-
	Biota Holding Ltd		903	2 182
	Carbon Energy Ltd*		74 904	-
	Phoslock Water Solutions Ltd		536	980
	Prima Biomed Ltd		4	10
	Starpharma Holdings Ltd		1 242	1 693
	XRF Scientific Ltd		52	68
	Total listed companies		**78 372**	**4 937**
	(b) Unlisted companies			
	(i) Controlled entities		4 980	4 480
	(ii) Associate and joint venture entities		12 650	19 845
	(iii) Other entities		22 613	20 892
	Total unlisted companies		**40 243**	**45 217**
	Total other investments		**118 615**	**50 154**

* Previously Metex Resources Ltd.

Note 9 **Other Investments** (cont)

(b) Unlisted companies

Name	% CSIRO Interest		Controlled Entities[1]		Associate and Joint Venture Entities[2]		Other Entities	
	2008	2007	2008 $'000	2007 $'000	2008 $'000	2007 $'000	2008 $'000	2007 $'000
Start up investment companies for commercialisation of intellectual property or units in fund								
Ad Alta Pty Ltd	23.6	-					250	-
Advanced Polymerik Pty Ltd	20.5	20.5					432	767
Arista Cereal Technologies Pty Ltd	42.7	45.3			3 600	4 095		
Ausmodel Pty Ltd	16.7	16.7					-	-
Avipep Pty Ltd	50.0	50.0			1 300	1 300		
Betabiotics Pty Ltd (Wound up)	-	93.9	-	-				
Carbon Energy Pty Ltd (Sold)	-	55.6			-	2 500		
DataTrace DNA Pty Ltd	50.0	50.0			2 100	3 700		
EpiTactix Pty Ltd	20.1	21.5					-	-
Funnelback Pty Ltd	100.0	100.0	2 700	2 200				
Gene Shears Pty Ltd	50.0	50.0			-	-		
Catapult Genetic Pty Ltd (Sold)	-	4.5					-	826
HySSIL Pty Ltd	21.0	24.6					2 455	1 092
HRZ Wheats Pty Ltd	17.8	28.0					558	-
CO2 CRC Technologies Pty Ltd	11.3	16.5					-	-
Intalysis Pty Ltd	100.0	100.0	2 280	2 280				
Intellection Pty Ltd	27.1	31.9					6 675	6 675
PolyNovo Biomaterials Pty Ltd	36.1	36.1			4 900	7 500		
Skiatech Pty Ltd	33.4	-			-	-		
SciVentures Pre-Seed Fund	3.4	3.4					538	525
Smart Storage Pty Ltd	100.0	-	-	-				
T-Mag Pty Ltd	27.7	27.7			750	750		
VacTX Pty Ltd	8.5	11.6					310	310
Windlab Pty Ltd	11.1	17.8					1 160	1 160
WQI Ltd	12.8	11.3					-	-
XRT Ltd	2.6	25.1					-	-
Special purpose companies – investment made to gain access to research facilities/networks								
AARNet Pty Ltd	2.6	2.6					1	1
Provisor Pty Ltd	44.1	44.1					2 146	2 146
Australian Synchotron Holding Co Pty Ltd	2.4	-					5 000	5 000
VERNet Pty Ltd	15.2	15.0					3 088	2 390
Special purpose vehicle companies – established to provide services to owners								
CSIRO FFP Pty Ltd	100	100	-	-				
CO2 CRC Management Pty Ltd	7.7	7.7					-	-
Dunlena Pty Ltd	47	47			-	-		
HydroPem Pty Ltd	100	100	-	-				
MDFRC Pty Ltd	33.3	33.3			-	-		
R&D Syndication Companies	100	100	-	-				
WLAN Services Pty Ltd	100	100	-	-				
Total			**4 980**	**4 480**	**12 650**	**19 845**	**22 613**	**20 892**

[1] The Organisation does not prepare consolidated financial statements. Refer Note 1.4.

[2] Not accounted for under the equity method as the above associates and joint venture entities are classified at 'as available for sale' investments. Refer Note 1.12.

Note 9 **Other Investments** (cont)

Unlisted companies

Name	Principal Activities
(i) Controlled entities	
Betabiotics Pty Ltd	Develop a new class of antibiotics. Wound up during the year.
CSIRO FFP Pty Ltd	A special purpose company established to participate in the ENSIS joint venture which was terminated effective 1 July 2007.
Funnelback Pty Ltd	An enterprise search engine providing search requirements for a specific entity's website and intranet site.
HydroPem Pty Ltd	A special purpose company established by CSIRO to commercialise Proton Exchange Membrane technology.
Intalysis Pty Ltd	Commercialise Low Frequency Microwave Moisture Analyser technology that measures the moisture content in minerals.
R&D Syndication Companies	The following 7 companies were acquired when investors in the Syndication exercised their put options under the agreements. They have not traded since acquisition and are in the process of being wound up. Exsynd 1 Pty Ltd Exsynd 2 Pty Ltd Exsynd 3 Pty Ltd Exsynd 4 Pty Ltd Exsynd 5 Pty Ltd Exsynd 6 Pty Ltd Exsynd 7 Pty Ltd
Smart Storage Pty Ltd	Commercialise ultrabattery technology and associated technology stationary energy applications.
WLAN Services Pty Ltd	A not for profit special purpose service company.
(ii) Associate and joint venture entities	
Arista Cereal Technologies Pty Ltd	Develop and breed non–GM high amylose wheat varieties for food products.
Avipep Pty Ltd	Research and development of anti–body like proteins for the treatment of major diseases.
Carbon Energy Pty Ltd	Research, exploit and commercialise underground coal gasification technologies. Sold in June 2008.
DataTraceDNA Pty Ltd	Develop and commercialise Luminescent Marker Technology as an identification technology.

Note 9 **Other Investments** (cont)

Name	Principal Activities
Dunlena Pty Ltd	A trustee company for intellectual property generated by Dupont/CSIRO joint venture research.
Gene Shears Pty Ltd	Investigate licensing and development of its Ribozyme technology for commercial applications.
MDFRC Pty Ltd	A management agent company for MDFRC.
PolyNovo Biomaterials Pty Ltd	Commercialise biomaterials technology platform to improve biomedical and surgical outcomes.
Skiatech Pty Ltd	Commercialise and exploit air cargo scanner technology.
T–Mag Pty Ltd	Develop and commercialise T–Mag magnesium casting technology.
(iii) Other entities	
AARNet Pty Ltd	Provide internet services to education and research communities.
Ad Alta Pty Ltd	Commercialise a number of peptide technologies.
Advanced Polymerik Pty Ltd	A company established by the CRC for Polymers to commercialise its technology. The company holds a 65% interest in Ceram Polymerik Pty Ltd in trust for the CRC participants including CSIRO.
Ausmodel Pty Ltd	A company established by the Predictive Minerals Discovery CRC to commercialise its intellectual property.
CO2 CRC Management Pty Ltd	A Centre agent management company for a CRC.
Catapult Genetics Pty Ltd	DNA marker research, development and commercialisation for sheep and cattle.
Epitactix Pty Ltd	Develop and conduct semi–conductor business activities.
Hyssil Pty Ltd	Commercialise Hyssil technology a lightweight concrete building product.
HRZ Wheats Pty Ltd	Design profitable new milling wheat varieties for farmers.
CO2 CRC Technologies Pty Ltd	A CRC spin off company to commercialise the CRC technology. Previously, Innovation Carbon Technology Pty Ltd.

Note 9 **Other Investments** (cont)

Name	Principal Activities
Intellection Pty Ltd	Production and sale of complete systems that are used for process improvement in large mineral process operations.
Provisor Pty Ltd	Provide world–class research facilities to grape and wine industries.
SciVentures Pre–Seed Fund	A venture capital fund primarily targeting commercially promising R&D opportunities at the pre–seed stage.
Australian Synchrotron Holding Company Pty Ltd	Provide Australian Synchrotron facilities for research purposes. Previously known as Synchrotron Beamline Trust Fund.
VacTX Pty Ltd	A CRC company to commercialise peptide vaccine technologies.
VERNet Pty Ltd	A collaborative initiative between Universities and TAFE institutions in Victoria, including CSIRO to establish and implement intra–state connections for an advanced broadband network.
Windlab Pty Ltd	Develop and market '*Windscape*' technology to locate the best wind farm sites faster.
WQI Ltd	Commercialise new technologies and knowledge that improve wood quality.
XRT Ltd	Build X–ray ultra microscopes and licence imaging technology to manufacturers of X–ray imaging equipment.

		Notes	2008 $'000	2007 $'000
Note 10	**Land and Buildings** (non-current)			
	Freehold land – fair value		**367 915**	**170 145**
	Buildings on freehold land			
	– fair value		1 672 960	1 481 691
	– accumulated depreciation		(1 007 316)	(907 082)
			665 644	574 609
	– work in progress		29 714	60 238
	Total building on freehold land		**695 358**	**634 847**
	Leasehold improvements			
	– fair value		222 549	160 961
	– accumulated depreciation		(80 277)	(62 857)
	Total leasehold improvements		**142 272**	**98 104**
	Buildings under finance lease			
	– fair value		179 115	133 438
	– accumulated amortisation		(60 398)	(38 512)
	Total building under finance lease		**118 717**	**94 926**
	Total land and buildings		**1 324 262**	**998 022**

Land and buildings revaluation as at 30 June 2008 was conducted in-house by the Organisation's registered valuer. See revaluation policy at Note 1.14.

No indicators of impairment were found for land and buildings.

		Notes	2008 $'000	2007 $'000
Note 11	**Plant and Equipment** (non-current)			
	Plant and equipment			
	– fair value		598 025	572 541
	– accumulated depreciation		(369 264)	(362 064)
			228 761	210 477
	– work in progress		25 187	16 592
	Total plant and equipment		**253 948**	**227 069**
	Research vessel			
	– fair value		13 881	13 889
	– accumulated depreciation		(8 971)	(8 560)
	Total research vessel		**4 910**	**5 329**
	Plant and equipment under finance lease			
	– fair value		3 882	5 285
	– accumulated amortisation		(2 052)	(2 552)
	Total plant and equipment under finance lease		**1 830**	**2 733**
	Total plant and equipment		**260 688**	**235 131**

No indicators of impairment were found for plant and equipment.

Notes 10 – 11 Land, Buildings and Plant and Equipment (cont)

(a) Reconciliation of the Opening and Closing Balances of Land and Buildings, Plant and Equipment (2007–08)

	Land	Buildings	Total Land and Buildings	Plant & Equipment	Total
	$'000	$'000	$'000	$'000	$'000
As at 1 July 2007					
Gross book value	170 145	1 836 329	2 006 474	608 308	2 614 782
Accumulated depreciation/ amortisation and impairment	-	(1 008 452)	(1 008 452)	(373 177)	(1 381 629)
Net book value as at 1 July 2007	**170 145**	**827 877**	**998 022**	**235 131**	**1 233 153**
Additions	-	52 226	52 226	54 358	106 584
Reclassification	(67 450)	(1 689)	(69 139)	2 052	(67 087)
Revaluations and impairments through equity	265 643	124 369	390 012	-	390 012
Depreciation/amortisation expense	-	(45 931)	(45 931)	(29 702)	(75 633)
Disposals	(423)	(505)	(928)	(1 151)	(2 079)
Net book value as at 30 June 2008	**367 915**	**956 347**	**1 324 262**	**260 688**	**1 584 950**
Net book value as at 30 June 2008 represented by:					
Gross book value	367 915	2 104 338	2 472 253	640 975	3 113 228
Accumulated depreciation, amortisation and impairment	-	(1 147 991)	(1 147 991)	(380 287)	(1 528 278)
Net book value as at 30 June 2008	**367 915**	**956 347**	**1 324 262**	**260 688**	**1 584 950**

Notes 10 – 11 Land, Buildings and Plant and Equipment (cont)

(b) Reconciliation of the Opening and Closing Balances of Land and Buildings, Plant and Equipment (2006–07)

	Land	Buildings	Total Land and Buildings	Plant & Equipment	Total
	$'000	$'000	$'000	$'000	$'000
As at 1 July 2006					
Gross book value	176 620	1 820 659	1 997 279	573 485	2 570 764
Accumulated depreciation/ amortisation and impairment	-	(988 718)	(988 718)	(352 246)	(1 340 964)
Net book value as at 1 July 2006	**176 620**	**831 941**	**1 008 561**	**221 239**	**1 229 800**
Additions	-	47 607	47 607	43 591	91 198
Reclassification	(4 200)	(5 774)	(9 974)	1 636	(8 338)
Revaluations and impairments through equity	-	(486)	(486)	(579)	(1 065)
Depreciation/amortisation expense	-	(45 296)	(45 296)	(29 275)	(74 571)
Disposals	(2 275)	(115)	(2 390)	(1 481)	(3 871)
Net book value as at 30 June 2007	**170 145**	**827 877**	**998 022**	**235 131**	**1 233 153**
Net book value as at 30 June 2007 represented by:					
Gross book value	170 145	1 836 329	2 006 474	608 308	2 614 782
Accumulated depreciation, amortisation and impairment	-	(1 008 452)	(1 008 452)	(373 177)	(1 381 629)
Net book value as at 30 June 2007	**170 145**	**827 877**	**998 022**	**235 131**	**1 233 153**

(c) National Facilities

The Australian Animal Health Laboratory (AAHL), the Australia Telescope (AT), and the Research Vessel (RV) 'Southern Surveyor' have been established by the Australian Government as National facilities to satisfy an identified national research need. The term 'National Facility' denotes substantial instrumentation, equipment and costs of such magnitude that the expense can only be justified on the basis of shared use by researchers from several organisations. The primary criteria require that the facilities are specifically designated for national use and that they are made available to scientists according to the merit of their proposals. These facilities are controlled and administered by the Organisation on behalf of the Australian Government.

Details of National Facilities included in the above total of Land and Buildings and Plant and Equipment are as follows:

	AAHL $'000	AT $'000	RV $'000	Total $'000
Land	**21 600**	**-**	**-**	**21 600**
Buildings	658 079	-	-	658 079
Accumulated depreciation	(333 665)	-	-	(333 665)
	324 414	**-**	**-**	**324 414**
Plant and equipment	10 183	142 121	13 881	166 185
Accumulated depreciation	(6 329)	(77 871)	(8 971)	(93 171)
	3 854	**64 250**	**4 910**	**73 014**
Net book value as at 30 June 2008	**349 868**	**64 250**	**4 910**	**419 028**
Net book value as at 30 June 2007	**290 735**	**61 799**	**5 329**	**357 863**

		Notes	2008 $'000	2007 $'000
Note 12	**Investment Properties** (non-current)			
	Investment properties – fair value	1.15	**48 540**	**37 723**

Reconciliation of the opening and closing balances of investment property

As at 1 July	37 723	37 810
Net gain from fair value adjustments	10 817	-
Disposals	-	(87)
Net book value as at 30 June	**48 540**	**37 723**

Rental income from investment properties was $2.13 million (2007 $2.21 million). No separate record was maintained on direct operating expenses including repairs and maintenance for those investment properties.

No indicators of impairment were found for investment property.

		Notes	2008 $'000	2007 $'000
Note 13	**Intangibles** (non-current)			
	Computer software – at cost	1.16		
	Internally developed – in use		422	7 433
	Acquired software – in use		243	243
	Acquired software – in progress		4 698	4 172
	Internally developed – in progress		21 827	21 919
			27 190	**33 767**
	Accumulated amortisation		(438)	(2 252)
	Total intangibles		**26 752**	**31 515**

For disclosure on impairment on intangible assets. See Note 5.5

(a) Reconciliation of Opening and Closing Balances for Intangibles (2007– 08)

	Internally developed software $'000	Aquired software $'000	Total $'000
As at 1 July 2007			
Gross book value	29 352	4 415	33 767
Accumulated amortisation and impairment	(2 130)	(122)	(2 252)
Net book value as at 1 July 2007	**27 222**	**4 293**	**31 515**
Movements:			
Additions by purchase or internally developed	4 026	526	4 552
Transfer	(2 052)	-	(2 052)
Amortisation	(1 081)	(81)	(1 162)
Impairment	(6 101)	-	(6 101)
Net book value as at 30 June 2008	**22 014**	**4 738**	**26 752**
Net book value as at 30 June 2008 represented by:			
Gross book value	22 249	4 941	27 190
Accumulated amortisation and impairment	(235)	(203)	(438)
Net book value as at 30 June 2008	**22 014**	**4 738**	**26 752**

(b) Reconciliation of Opening and Closing Balances for Intangibles (2006–07)

As at 1 July 2006			
Gross book value	14 775	4 270	19 045
Accumulated amortisation and impairment	(1 050)	(41)	(1 091)
Net book value as at 1 July 2006	**13 725**	**4 229**	**17 954**
Movements:			
Additions by purchase or internally developed	14 730	-	14 730
Transfer	(153)	153	-
Amortisation	(1 080)	(81)	(1 161)
Disposal	-	(8)	(8)
Net book value as at 30 June 2007	**27 222**	**4 293**	**31 515**
Net book value as at 30 June 2007 represented by:			
Gross book value	29 352	4 415	33 767
Accumulated amortisation and impairment	(2 130)	(122)	(2 252)
Net book value as at 30 June 2007	**27 222**	**4 293**	**31 515**

		Notes	2008 $'000	2007 $'000
Note 14	**Properties Held for Sale** (current)			
	Properties held for sale – at the lower of carrying amount and fair value.		**69 126**	**4 405**
	Reconciliation of the opening and closing balances of properties held for sale			
	As at 1 July 2007		4 405	**-**
	Additions		-	-
	Reclassification		69 126	4 405
	Disposals		(4 405)	-
	Net book value as at 30 June 2008		**69 126**	**4 405**
	Balance at 30 June 2008 represents properties identified as surplus to the Organisation and classified as "held for sale" and they have been valued by independent valuers. These are expected to be sold in the market and settled within the next 12 months. Net gain on the sale of properties "held for sale" last year was included in Note 4.7.			
Note 15	**Inventories Held for Sale** (current)			
	Books and media products – at lower of cost and net realisable value	1.17	**1 093**	**1 075**
Note 16	**Other Non-Financial Assets** (current)			
	Contract research work in progress – at cost	1.5	26 177	15 000
	Prepaid property rentals		479	1 453
	Other prepayments		6 040	5 937
	Total other non-financial assets		**32 696**	**22 390**
	No indicators of impairment were found for other non–financial assets			
Note 17	**Suppliers** (current)			
	Trade creditors		**81 915**	**55 370**
	Settlement is usually made net 30 days.			
Note 18	**Other Payables** (current)			
	Contract research revenue received in advance	1.5	72 334	59 800
	GST payable to the ATO		-	781
	Other creditors and accrued expenses		12 322	10 504
	Amount owing to FSA joint venture	8	3 162	-
	Total other payables		**87 818**	**71 085**

		Notes	2008 $'000	2007 $'000
Note 19	**Leases**			
	Finance leases		67 798	72 004
	Total finance leases		**67 798**	**72 004**
	Payable:			
	Within one year			
	Minimum lease payments		6 943	7 138
	Deduct: future finance charges		(2 781)	(2 913)
	Total payable within one year (current)		**4 162**	**4 225**
	In one to five years			
	Minimum lease payments		24 871	25 735
	Deduct: future finance charges		(9 759)	(10 219)
	Total payable in one to five years		**15 112**	**15 516**
	In more than five years			
	Minimum lease payments		61 453	67 253
	Deduct: future finance charges		(12 929)	(14 990)
	Total payable in more than five years		**48 524**	**52 263**
	Total finance leases recognised on the balance sheet		**67 798**	**72 004**

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.The Organisation guarantees the residual values of all assets leased. There are no contingent rentals. The interest rate implicit in the leases averaged 4% (2007 4%). The lease liabilities are secured by the lease assets.

Note 20	**Deposits** (current)			
	Deposits		**11 950**	**16 866**
	Deposits represent monies held on behalf of the following third parties:			
	Cooperative Research Centres		3 271	5 867
	National Aeronautical Space Agency (NASA)		1 354	6 475
	Energy Solutions for a Sustainable Future		-	158
	Australian National Wildlife Collection Foundation		-	252
	Lower Emissions Energy Centre		5 034	3 670
	Others		2 291	444
	Total deposits		**11 950**	**16 866**

		Notes	2008 $'000	2007 $'000
Note 21	**Employee Provisions**			
	Accrued wages and salaries		7 336	4 594
	Annual leave		53 279	52 766
	Long service leave		115 639	119 256
	Severance pay		3 427	5 180
	Redundancy		13 087	4 238
	Total employee provisions		**192 768**	**186 034**
	Current		178 495	172 531
	Non-current		14 273	13 503
	Total employee provisions		**192 768**	**186 034**

The classification of current employee provisions includes amounts for which there is not an unconditional right to defer settlement by one year, hence in the case of employee provisions the above classification does not represent the amount expected to be settled within one year of reporting date. Employee provisions expected to be settled in twelve months from the reporting date are $15.1 million (2007 $16.3 million).

		Notes	2008 $'000	2007 $'000
Note 22	**Cash Flow Reconciliation**			
	(a) Reconciliation of cash and cash equivalents as per Balance Sheet to Cash Flow Statement			
	Cash and cash equivalents as per:			
	Cash Flow Statement		98 536	131 048
	Balance Sheet	6	98 536	131 048
	Difference		-	-
	(b) Reconciliation of operating result to net cash from operating activities			
	Operating surplus		**47 684**	**1 019**
	Depreciation and amortisation		76 794	75 731
	Net write down and impairment of assets		6 192	1 214
	(Gains)/loss from sale of property, plant and equipment		(4 748)	(2 714)
	(Gains)/loss from sale of investments and IP		(71 945)	(13 442)
	Realisation of fair value gain on sale of investment		(10 817)	(749)
	Unrealised foreign exchange variances		(28)	67
	(Increase)/decrease in net receivables		(11 184)	6 490
	(Increase)/decrease in inventories		(18)	(11)
	(Increase)/decrease in other receivables		178	-
	(Increase)/decrease in other non–financial assets		(10 306)	(2 501)
	(Increase)/decrease in GST receivable		(1 748)	353
	Increase/(decrease) in employee liabilities		6 734	1 361
	Increase/(decrease) in liability to suppliers		26 545	5 365
	Increase/(decrease) in other liabilities		17 515	8 606
	Increase/(decrease) in GST payable		(781)	-
	Increase/(decrease) in deposits–liabilities		(4 916)	(2 839)
	Net cash from operating activities		**65 151**	**77 950**

		2008 $'000	2007 $'000
Note 23	**Contingent Liabilities and Assets**		
	Quantifiable Contingencies		
	Contingent assets		
	Under the terms of a commercial transaction agreement, the Organisation has a receivable asset, to be received at a future date upon the conditions of the agreement being met. At this stage, it is too early to determine whether the conditions of the agreement will be met and predict when the amount will be received.		
	The Organisation's net share of the contingent asset	4 817	4 817
	Contingent liabilities		
	Estimated legal claims arising from employment, motor vehicle accidents, commercial and patent disputes. The Organisation has denied liability and is defending the claims. The estimate is based on precedent in such cases.	(250)	(250)
	Total net contingent asset/(liability)	**4 567**	**4 567**

Unquantifiable Contingencies

CSIRO's project to licence its patent holdings in wireless local area network (WLAN) technology, in order to derive significant value for Australia, continued through 2007–08. In the lead case in the US, the District Court's decision upholding CSIRO's position in relation to patent validity and infringement, and granting a permanent injunction, was the subject of an appeal that was heard during April 2008. Other cases continued in the Eastern District of Texas including a "Markman" hearing in June 2008. Whilst these cases have continued, commercial use of the technology has continued to grow around the world.

Note 24 **Joint Ventures – Cooperative Research Centres (CRCs)**

CSIRO was a party to 36 CRCs during 2007–08, of which 16 were incorporated and 20 were unincorporated. These are accounted for in accordance with AASB131 *'Interest in Joint Ventures'*.

All CRCs have been classified as joint venture 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 CSIRO's share of the new entity is treated either as subsidiary, joint venture or associate in the balance sheet as appropriate.

CSIRO's total cash and in–kind contribution (eg. staff and use of assets) to CRCs from its own resources was $51.5million (2007 $63 million). Contributions made by CSIRO are expensed as incurred and these are included in the Income Statement.

Approximately $7.6 million (2007 $8 million) of CSIRO's plant and equipment are used for CRC activities. Plant and equipment includes specialised scientific equipment and instruments and general assets such as vehicles.

Note 24 Joint Ventures – Cooperative Research Centres (CRCs)

No contingent liabilities were reported by the CRCs in which CSIRO is a participant. CSIRO's interest in the output of each CRC is determined by the individual CRC agreement. These are:

Name of CRC & Principal Activity	% CSIRO Interest	In–kind & Cash Contributions 2007–08 '$000	CRC Funding Received 2007–08 '$000	Estimated value of P&E used 2007–08 '$000	Termination date
INCORPORATED CRCs					
Advanced Manufacturing CRC aims to develop next generation technologies, processes and human resource capabilities with a focus on advanced materials, manufacturing processes and business enterprise improvement.	6.20%	–	–	–	30–Jun–14
Australian Seafood CRC aims to increase profitability and value of the Australian seafood industry.	–	555	–	16	30-Jun-14
Bushfire CRC conducts research projects that collectively aim to enhance the management of the bushfire risk to the community in an economically and ecologically sustainable way.	3.00%	1 219	464	78	30–Jun–10
CAST CRC focuses on the provision and implementation of quality research and education for light metals processing and manufacturing.	16.45%	2 715	1 769	325	30–Jun–12
Cotton Catchments Communities CRC undertakes collaborative research, education and commercialisation activities to provide innovative knowledge for of the Australian Cotton Industry.	18.30%	3 389	1 998	321	30–Jun–12

Note 24

Joint Ventures – Cooperative Research Centres (CRCs) (cont)

Name of CRC & Principal Activity	% CSIRO Interest	In–kind & Cash Contributions 2007–08 '$000	CRC Funding Received 2007–08 '$000	Estimated value of P&E used 2007–08 '$000	Termination date
INCORPORATED CRCs (cont)					
Advanced Automotive Technology CRC aims to provide the automotive industry with the opportunity to work with research providers in design, engineering and manufacturing research.	5.00%	736	956	146	30–Jun–12
Advanced Composite Structures CRC aims to focus on the development of advanced technologies which foster the growth of an efficient, globally–competitive, Australian composite industry.	6.00%	257	125	61	30–Jun–10
Forestry CRC aims to manage challenges across the forestry business chain, from site selection to delivery of wood at mill gate.	9.00%	1 278	1 116	114	30–Jun–12
Polymers III CRC conducts leading–edge polymer research to deliver technically advanced polymeric materials and polymer engineering required to transform Australian industries	9.00%	4 046	1 270	159	30–Jun–12
Cancer Therapeutics CRC aims to discover and develop new small molecule drugs for the treatment of cancer.	4.70%	442	478	844	30–Jun–14
eWater CRC builds and supports decision systems and models for total water cycle management in urban and rural catchments, integrating water quality and quantity, stream ecology and economics.	21.00%	3 244	2 549	180	30–Jun–12

Note 24 **Joint Ventures – Cooperative Research Centres (CRCs)** (cont)

Name of CRC & Principal Activity	% CSIRO Interest	In–kind & Cash Contributions 2007–08 '$000	CRC Funding Received 2007–08 '$000	Estimated value of P&E used 2007–08 '$000	Termination date
INCORPORATED CRCs (cont)					
Future Farm Industries CRC aims to transform Australian agriculture and rural landscapes by developing and applying Profitable Perennials TM technologies to innovative farming systems.	11.00%	1 888	603	50	30–Jun–14
Invasive Animals CRC aims to counteract the impact of invasive animals through the development and application of new technologies.	18.40%	1 111	1 073	89	30–Jun–12
Parker CRC for Integrated Hydrometallurgy Solutions aims to maximise returns from Australia's mineral resources derived using hydrometallurgical processes.	49.00%	5 104	3 363	3 268	30–Jun–12
Sheep Industry Innovation CRC aims to transform wool, meat and the sheep that produce them, and to provide new technologies, practices and produce to advance the profitability and sustainability of the Australian sheep industry.	10.00%	2 300	704	6	30–Jun–14
Vision CRC aims to establish Australia as a world leader in research, education and delivery of vision correction, improve international eye care and maximise commercial opportunities for the Centre.	8.61%	840	632	12	30–Jun–10

Note 24

Joint Ventures – Cooperative Research Centres (CRCs) (cont)

Name of CRC & Principal Activity	% CSIRO Interest	In–kind & Cash Contributions 2007–08 '$000	CRC Funding Received 2007–08 '$000	Estimated value of P&E used 2007–08 '$000	Termination date
UNINCORPORATED CRCs					
Australian Biosecurity CRC aims to protect Australia's public health, livestock, wildlife and economic resources through research and education that strengthens the national capability to detect, identify, diagnose, assess, predict and respond to emerging infectious disease threats on national and regional biosecurity.	40.00%	3 061	607	–	30–Jun–10
National Plant Biosecurity CRC focuses on innovative research and development, in key areas that will deliver benefits across a range of plant commodity groups.	10.30%	1 072	1 390	–	30–Jun–12
Antarctic Climate and Ecosystems CRC aims to understand the variability of Antarctica and the Southern Ocean processes and their role in regional and global climate change.	13.70%	1 483	889	327	30–Jun–10
Australian Weed Management CRC aims to enhance the sustainability of farming systems and the conservation status of natural ecosystems that targets generic control problems using integrated weed management.	13.80%	898	551	124	30–Jun–08
Construction Innovation CRC focuses on the needs of the property, design, construction and facility management sectors.	22.00%	897	739	87	30–Jun–08

Note 24 **Joint Ventures – Cooperative Research Centres (CRCs)** (cont)

Name of CRC & Principal Activity	% CSIRO Interest	In–kind & Cash Contributions 2007–08 '$000	CRC Funding Received 2007–08 '$000	Estimated value of P&E used 2007–08 '$000	Termination date
UNINCORPORATED CRCs (cont)					
Coal in Sustainable Development CRC aims to optimise the contribution of coal to a sustainable future, including control of pollutant emissions, coal in coke making and iron making.	14.00%	1 014	1 587	–	30–Jun–08
Functional Communication Surfaces CRC aims to develop new products and manufacture processes to make substrates and their coating materials 'smart' to take advantage of new computer–related technologies.	13.00%	714	374	235	30–Jun–08
Greenhouse Gas Technologies CRC focuses on carbon dioxide capture and geological storage (geosequestration).	8.70%	–	–	–	30–Jun–10
Innovative Dairy Products CRC aims to apply cutting–edge genetic research to provide diary farmers, processors and manufacturers with access to advanced technologies and products.	7.00%	625	246	98	30–Jun–08
Predictive Mineral Discovery CRC aims to shift in exploration practice and cost–effectiveness by developing a vastly improved understanding of mineralising processes and an understanding of the evolution of the geology of mineralised terrains.	16.00%	1 417	1 669	14	30–Jun–08

Note 24

Joint Ventures – Cooperative Research Centres (CRCs) (cont)

Name of CRC & Principal Activity	% CSIRO Interest	In–kind & Cash Contributions 2007–08 '$000	CRC Funding Received 2007–08 '$000	Estimated value of P&E used 2007–08 '$000	Termination date
UNINCORPORATED CRCs (Cont)					
Irrigation Futures CRC aims to deliver research, education and training which gives confidence to growers, industry, governments and communities to invest in better irrigation and a better environment.	15.50%	2 146	2 018	16	30–Jun–10
Landscape Environments and Mineral Exploration CRC aims to develop a greater understanding of Australia's terrain when applied to mineral exploration and environmental management, dry land salinity, water supply and water quality.	28.00%	546	1 280	367	30–Jun–08
Sugar Industry Innovation through Biotechnology CRC aims to combine strengths in molecular genetics, sugarcane biology, agriculture, and industrial extraction that will value–add to the sugarcane industry.	19.00%	1 977	2 240	137	30–Jun–10
Sustainable Aquaculture of Finfish CRC aims to develop technologies which will enable the sustainable and rapid growth of finfish aquaculture.	14.40%	580	339	169	30–Jun–08
Sustainable Resource Processing CRC aims at new methods to produce minerals and metals that benefits the environment and industry and find solutions for eliminating waste and emissions in the materials cycle.	23.00%	1 985	1 147	75	30–Jun–10

Note 24 **Joint Ventures – Cooperative Research Centres (CRCs)** (cont)

Name of CRC & Principal Activity	% CSIRO Interest	In–kind & Cash Contributions 2007–08 '$000	CRC Funding Received 2007–08 '$000	Estimated value of P&E used 2007–08 '$000	Termination date
UNINCORPORATED CRCs (Cont)					
Australian Poultry Industries CRC aims to enhance the competitiveness of the Australian egg and chicken meat industries.	–	1 770	1 049	37	30–Jun–10
Tropical Savannas Management CRC aims to ensure that Australia's tropical savannas are healthy and managed to provide long–term benefits.	19.00%	444	249	67	30–Jun 08
Water Quality and Treatment II CRC focuses on water quality management and health risk reduction, from catchments and reservoir management and water treatment to the distribution of drinking water.	8.00%	310	127	–	30–Jun–08
Wood Innovations CRC aims to provide the timber and wood products industries with applied technologies and training.	5.00%	240	260	12	30–Jun–08
Desert Knowledge CRC aims at linking indigenous and local knowledge with science and education to improve desert livelihoods.	8.00%	1 196	844	223	30–Jun–10
Total		**51 499**	**34 705**	**7 657**	

Note 25 Resources made available to the Organisation and not included in the Balance Sheet

	Land	Buildings	Plant and Equipment	Total
	$'000	$'000	$'000	$'000
At cost or fair value	12 075	50	28 333	40 458
Accumulated depreciation	-	-	(25 349)	(25 349)
Net value as at 30 June 2008	**12 075**	**50**	**2 984**	**15 109**
Net value as at 30 June 2007	**3 738**	-	**3 483**	**7 221**

The above assets are made available to the Organisation at little or no cost in accordance with formal agreements with contributors. They have either been purchased out of contract research monies and expensed in the year of purchase in accordance with accounting policy Note 1.6, or made available to the Organisation at little or no cost. The assets include vehicles, computers and scientific equipment.

These assets are controlled and accounted for in the contributors' books and any proceeds from their disposal are refundable to the contributors in accordance with formal agreements on equity share and there are some restrictions on how these assets are operated. The fair value of in–kind contributions of these assets could not be reliably determined and therefore is not brought to account in the Income Statement.

Note 26 Monies Held in Trust

	2008 $'000	2007 $'000
Monies held in trust represented by cash, deposits and investments for the benefit of the Organisation, which are not included in the Balance Sheet are:		
The Australia National Wildlife Collection (ANWC) established to maintain over 80 000 specimens of Australian wildlife collection, including a comprehensively documented collection of Australian-New Guinean birds in the world.	392	602
The Sir Ian McLennan Achievement for Industry Award – established to award outstanding contributions by the Organisation's scientists and engineers to national development.	271	291
The Elwood and Hannah Zimmerman Trust Fund – established to fund weevil research and the curation of the Australian National Insect Collection (ANIC) weevil collection.	2 150	2 270
The Schlinger Trust – established to research the taxonomy, biosystematics, general biology and biogeography of Australasian Diptera conducted by the Australian National Insect Collection.	1 761	1 317
Total monies held in trust as at 30 June	**4 574**	**4 480**

Movement summary of monies held in trust:

	ANWC $'000	McLennan $'000	Zimmerman $'000	Schlinger $'000	Total $'000
Balance as at 1 July 2007	602	291	2 270	1 317	4 480
Receipts during the year	-	-	-	336	336
Interest and distribution	35	(20)	243	108	366
Expenditure	(245)	-	(363)	-	(608)
Balance as at 30 June 2008	**392**	**271**	**2 150**	**1 761**	**4 574**

Note 27 Collections

The Organisation owns several collections used for scientific research. The Organisation's 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, the Organisation has not recognised them as an asset in its financial statements. The main collections held by the Organisation 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 11 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 80 000 specimens, holds land vertebrate collections, including the most comprehensively documented collections of Australian–New Guinean birds in the world.

CSIRO National Fish Collection (ANFC) – CSIRO's ANFC, also known as the 'ISR Munro Ichthyological Collection', houses more than 80 000 registered adult and 40 000 registered larval specimens of almost 3 000 species from Australasia, Asia, Antarctica, and the Sub Antarctic Islands. It is among Australia's most diverse ichthyological collections and contains one of the largest collections of sharks, rays and deepwater fishes in the Southern Hemisphere.

Other Collections – These include the Australian Tree Seed Collection, CSIRO's Dadswell wood collection, CSIRO collection of living microalgae and wood inhabiting fungi collection.

Note 28 Remuneration of Auditors

	2008 $	2007 $
Financial statement audit services are provided to the Organisation by the Auditor–General		
The fair value of the auditing services provided was	**263 000**	**266 860**

No other services were provided by the Auditor-General.

		2008 $	2007 $
Note 29	**Remuneration of Board Members**		
	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	423 153	354 060
	Payments to superannuation funds for Board Members	37 628	30 923
	Total remuneration	**460 781**	**384 983**

The remuneration of the Chief Executive Officer, who is also a Board Member of the Organisation, is reported under Note 30 Remuneration of Senior Executives.

The number of Board Members whose total remuneration fell within the following bands were:

$	Number	Number
Nil – 14 999	1	2
15 000 – 29 999	-	-
30 000 – 44 999	1	1
45 000 – 59 999	6	7
60 000 – 74 999	-	-
75 000 – 89 999	1	-
Total	**9**	**10**

		$	$
Note 30	**Remuneration of Senior Executives**		
	The aggregate amount of total remuneration of senior executives is shown below.	**11 419 198**	**11 292 456**
	The aggregate amount of separation and redundancy/termination benefit payments during the financial year to Senior Executives is shown below.	-	**216 500**

Note 30 **Remuneration of Senior Executives(cont)**

The number of Senior Executives, who received or were due to receive total remuneration of $130 000 or more.

During 2007–08 those positions were: the Chief Executive and other members of the Executive Team (12), Chiefs of Divisions (14), joint venture Chief Executive Officer (1) and Flagship Directors (9), a total of 36 positions.

$	2008 Number	2007 Number
130 000 – 144 999	-	1
145 000 – 159 999	1	-
160 000 – 174 999	1	-
175 000 – 189 999	1	-
190 000 – 204 999	-	-
205 000 – 219 999	2	1
220 000 – 234 999	1	1
235 000 – 249 999	1	1
250 000 – 264 999	1	2
265 000 – 279 999	2	6
280 000 – 294 999	2	3
295 000 – 309 999	4	2
310 000 – 324 999	4	3
325 000 – 339 999	4	3
340 000 – 354 999	5	1
355 000 – 369 999	3	-
370 000 – 384 999	-	2
385 000 – 399 999	1	2
400 000 – 414 999	-	1
415 000 – 429 999	-	1
430 000 – 444 999	-	2
445 000 – 459 999	-	-
460 000 – 474 999	-	1
475 000 – 489 999	-	-
490 000 – 504 999	2	-
520 000 – 534 999	-	1
535 000 – 549 999	-	1
595 000 – 609 999	1	-
Total	**36**	**35**

The above table is not confined to payroll expenditures only and reflects additional items that come within the definition of remuneration under AASB119, *Employee Benefits* (for example accrued annual leave).

The actual position numbers can vary from the nominal position numbers, ie in a given year more than one person may occupy the same position due to the timing of appointments (or cessations) and be in excess of the $130 000 threshold, or the exclusion of an officer below that threshold where the Senior Executive did not occupy the position for the full reporting period. In addition, the table includes changes associated with a number of promotions and/or job changes.

Note 31 Meetings of the CSIRO Board and Board Committees

During the financial year, seven Board meetings, nine Board Audit Committee meetings, two Board Remuneration Committee meetings and fifteen Board Commercial Committee meetings were held. The number of meetings attended by each of the Board member was as follows:

Board Member	Board		Board Audit Committee		Board Remuneration Committee		Board Commercial 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	Number eligible to attend as a member	Number attended
S Cory	7	7	–	–	–	–	–	–
T A Cutler	7	6	9	8	–	–	15	15
E J Doyle	7	5	–	–	1	1	15	11
G G Garrett	7	7	–	–	–	–	–	–
B F Keane	7	6	9	8	2	2	15	15
D J Rathbone	5	5	4	3	–	–	–	–
D M O'Toole	6	6	8	8	–	–	–	–
A D Robson	7	6	–	–	2	1	–	–
J W Stocker	7	7	9	5	2	2	15	13
T H Spurling	2	2	–	–	–	–	2	2

Note 32 Related Party Disclosures

Board Members – The Board Members of the Organisation during the financial year were:

J W Stocker (Chairman)
S Cory (Deputy Chairman)
G G Garrett (Chief Executive)
E J Doyle
B F Keane
D J Rathbone
D M O'Toole
A D Robson
T A Cutler
T H Spurling

Remuneration –The aggregate remuneration of Board Members is disclosed in Note 29.

Board Members' interest in contracts

Since 1 July 2007 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 29 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.

Note 32 **Related Party Disclosures** (cont)

Other transactions of Board Members – related entities

Professor S Cory is Director of the Walter and Eliza Hall Institute of Medical Research and Professor of Medical Biology at the University of Melbourne. She is also a Director of Bio21 Australia Limited and a member of the Council of the Cancer Council Victoria. 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 T A Cutler is the Principal of Cutler & Company, a consultancy in information and communications technology. He is also a Director of the Churchill Club Ltd, of Multimedia University (Universiti Telekom Sdn. Bhd.), and MSC Technology Centre Sdn Bhd, Malaysia. He is a member of the International Advisory Panel, Multimedia Supercorridor, Malaysia and Innovation Economy Advisory Board, Victoria. In 2007–08 he was also Chairman of ACID Pty Ltd (the Australasian Cooperative Research Centre for Interaction Design), a Director of Innovation Xchange Australia Limited and a member of the Council of the Queensland University of Technology. He stepped down from those positions when he was appointed to Chair the expert panel conducting the Review of the National Innovation System on behalf of the Australian Government. 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 Port Waratah Coal Services and the Hunter Valley Research Foundation. She is also a Director of OneSteel, Hunter Medical Research Institute, State Super Financial Services, Ross Human Directions Ltd and Steel & Tube Ltd, New Zealand. She is a Conjoint Professor at the University of Newcastle Graduate School of Business. 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 B F Keane is the Principal of Brian Keane and Associates, a management and insurance consulting firm. He is a Director of Medibank Private Ltd (until August 2007), NIB Holdings Ltd, Law Cover Pty Ltd (NSW Solicitors Professional Indemnity Fund), Hollard Insurance Company and Aurora Energy 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.

Ms D M O'Toole is the Chief Financial Officer of Queensland Rail and a director of Norfolk Group Ltd and Raheny Consulting Pty Ltd. She is also a member of the Queensland Biotech Advisory Council and a member of the Advisory Committee for the Banking and Finance School of the Queensland University of Technology. 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 D J Rathbone is Managing Director and Chief Executive of Nufarm Limited. He is also a Director of the Children's Cancer Centre Foundation, Royal Children's Hospital, Victoria. 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 32 **Related Party Disclosures** (cont)

Professor T H Spurling is the Chief Executive Officer of the Cooperative Research Centre for Wood Innovations and a Research Professor in the Faculty of Life and Social Sciences, Swinburne University of Technology, Victoria. He is also a Director of IWM Centre Management Ltd, Wood Shapes Pty Ltd (until 19 June 2008) and AMT 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.

Dr J W Stocker is the Chairman of Sigma Pharmaceuticals Limited. He is also a Director of Telstra Corporation Limited, Nufarm Limited, Circadian Technologies Limited and a Principal and Director of Foursight Associates Limited. 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 G G Garrett has no involvement in related entities.

Note 33	Financial instruments	Notes	2008 $'000	2007 $'000
(a)	**Categories of financial instruments**			
	Financial assets			
	Available for sale financial assets			
	Other investments	9	118 615	50 154
	Loans and receivables			
	Cash at bank	6	28 536	26 048
	Term deposits	6	70 000	105 000
	Receivables for goods and services	7	63 097	52 029
	Loans receivables	7	1 400	400
	Other receivable	7	5 548	5 726
	Carrying amount of financial assets		**287 196**	**239 357**
	Financial liabilities			
	Finace lease liabilities	19	67 798	72 004
	Trade creditors	17	81 915	55 370
	Research revenue received in advance	18	72 334	59 800
	Deposits	20	11 950	16 866
	Other creditors	18	15 484	10 504
	Carrying amount of financial liabilities		**249 481**	**214 544**
(b)	**Net income and expense from financial assets**			
	Cash at bank and term deposits			
	Interest revenue	4.3	7 269	6 406
	Interest revenue loans receivable	4.3	11	-
	Net gain from financial assets		**7 280**	**6 406**
(c)	**Net income and expense from financial liabilities**			
	Financial liabilities–at amortised cost			
	Interest expense	5.4	3 038	3 101
	Net loss from financial liabilities		**3 038**	**3 101**

(d) Fair value of financial instruments

A comparison between the fair value and carrying amount of the Organisation's financial assets and liabilities is not disclosed because the Organisation considers that the carrying amounts reported in the balance sheet are a reasonable approximation of the fair value of these financial assets and liabilities.

Note 33 **Financial instruments** (cont)

(e) Credit risk

The Organisation is exposed to minimal credit risk as the majority of loans and receivables are cash or amounts owed by the Australian Tax Office in the form of a Goods and Services Tax refund.

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 $71.8 million (2007 $58.2 million). The Organisation has assessed the risk of the default on payment and has allocated $882 000 (2007 $998 000) to an allowance for impairment account.

The Organisation manages its credit risk by undertaking background and credit checks prior to allowing a debtor relationship. In addition, the Organisation has policies and procedures that guide employees to apply debt recovery techniques. The Organisation holds no collateral to mitigate against credit risk.

Credit risk of financial instruments not past due or individually determined as impaired:

	Notes	Not Past Due Nor Impaired 2008 $'000	Not Past Due Nor Impaired 2007 $'000	Past due or Impaired 2008 $'000	Past due or Impaired 2007 $'000
Cash at bank	6	28 536	26 048	-	-
Term deposits	6	70 000	105 000	-	-
Receivables for goods and services	7	51 043	41 848	12 054	10 181
Loans receivables	7	1 400	400	-	-
Other receivable	7	5 548	5 726	-	-
Other investments	9	118 615	50 154	-	-
Total		**275 142**	**229 176**	**12 054**	**10 181**

Note 33 **Financial Instruments** (cont)

(e) **Credit risk** (cont)

Ageing of financial assets that are past due but not impaired for 2008:

	0 to 30 days $'000	31 to 60 days $'000	61 to 90 days $'000	90+ days $'000	Total $'000
Receivables for goods and services	9 105	1 343	632	974	12 054
Total	**9 105**	**1 343**	**632**	**974**	**12 054**

Ageing of financial assets that are past due but not impaired for 2007:

	0 to 30 days $'000	31 to 60 days $'000	61 to 90 days $'000	90+ days $'000	Total $'000
Receivables for goods and services	5 787	1 883	608	1 903	10 181
Total	**5 787**	**1 883**	**608**	**1 903**	**10 181**

(f) **Liquidity risk**

The Organisation financial liabilities are payables, finance leases and other interest bearing liabilities. The exposure to liquidity risk is based on the notion that the Organisation will encounter difficulty in meeting its obligations associated with financial liabilities. This is highly unlikely due to Australian Government Appropriation funding and mechanism available to the Organisation (eg. Advance to the Finance Minister (AFM)) and internal policies and procedures put in place to ensure there are appropriate resources to meet its financial obligations.

The Organisation is appropriated funding from the Australian Government. The Organisation manages its budgeted funds to ensure it has adequate funds to meet payments as they fall due. In addition, the Organisation has policies in place to ensure timely payments are made when due and has no past experience of defaults.

Note 33 **Financial Instruments** (cont)

(f) Liquidity risk (cont)

The following table illustrates the maturities for financial liabilities for 2008:

	On demand $'000	Within 1 year $'000	1 to 5 years $'000	> 5 years $'000	Total $'000
Finance lease liabilities		6 943	24 871	61 453	93 267
Trade creditors	-	81 915	-	-	81 915
Research revenue received in advance	-	72 334	-	-	72 334
Deposits	11 950	-	-	-	11 950
Other creditors	-	15 484	-	-	15 484
Total	**11 950**	**176 676**	**24 871**	**61 453**	**274 950**

The following table illustrates the maturities for financial liabilities for 2007:

	On demand $'000	Within 1 year $'000	1 to 5 years $'000	> 5 years $'000	Total $'000
Finance lease liabilities	-	7 138	25 735	67 253	100 126
Trade creditors	-	55 370	-	-	55 370
Research revenue received in advance	-	59 800	-	-	59 800
GST payable	-	781	-	-	781
Deposits	16 866	-	-	-	16 866
Other creditors	-	10 504	-	-	10 504
Total	**16 866**	**133 593**	**25 735**	**67 253**	**243 447**

Note 33 **Financial instruments** (cont)

(g) Market risk

The Organisation holds basic financial instruments that do not expose the Organisation 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 balance sheet 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 Organisation has designated as "available for sale" financial instruments. See Note 9.

Sensitivity analysis

The Organisation's listed equity investments are listed on the Australian Securities 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 $7 837 000 (2007 an increase of $493 000). An equal change in the opposite direction would have decreased equity by $7 837 000 (2007 a decrease of $493 000). The analysis is performed on the same basis for 2007.

Currency risk

The Organisation's exposure to foreign exchange risk on sales and purchases that are denominated in currencies other than Australian dollar is not considered material. At any point in time the Organisation's foreign currency risk exposure is less than 2 percent of its total sales/debtors and purchases/creditors.

In accordance with Australian Government policy, the Organisation is prohibited from entering into foreign currency hedges.

Note 34 Reporting of Outcomes and Outputs

(a) Reporting of outcome

The Organisation's outputs contribute to a single outcome:
Australia has strong capability in scientific research and development that delivers ongoing economic, social and environmental benefits and provides science and technology solutions relevant to current and emerging national challenges and opportunities.

(b) Net cost of outcome delivery

	2008 $'000	2007 $'000
Total expenses	**1 043 711**	**972 703**
Other external revenues:		
Sale of goods and rendering services – to related entities	103 986	110 303
Sale of goods and rendering services – to external entities	186 083	175 469
Interest	7 280	6 406
Net gains from sale of assets	4 748	2 714
Donations	1	60
Rents	6 891	6 361
Royalities	9 726	17 135
Net gains from sale of investments	71 945	13 442
Other fair value gain	10 817	749
Sale of primary produce	2 065	986
Other	24 693	30 037
Total other external revenues	**428 235**	**363 662**
Net cost of outcome	**615 476**	**609 041**

Note to accompany the following table:
During the 2007–08 financial year, the Organisation applied the same methodology as 2006–07 for the allocation of corporate costs to enable a more accurate pricing of outputs. This methodology involves management estimation and decision as to the most appropriate choice of cost drivers such as staff numbers, floor space and divisional function per output.

In addition, the Organisation allocates direct costs and revenues to outputs derived from the use of project codes within the Organisation project based accounting system and research support costs are allocated to projects using appropriate cost drivers such as floor space and direct labour hours.

Note 34 Reporting of Outcomes and Outputs (cont)

(c) Major Organisational Revenues and Expenses by Output Groups

	Science and Technological Solutions				Science and Technology Infrastructure and Outreach				Total	
	Output 1		Output 2		Output 3		Output 4			
	National Research Flagships		Core Research		Education and Scientific Publishing		National Facilities and Collections			
	2008 $'000	2007 $'000	2008 $'000	2007 $'000	2008 $'000	2007 $'000	2008 $'000	2007 $'000	2008 $'000	2007 $'000
Operating Expenses										
Employees	222 459	208 639	336 208	315 320	13 012	12 204	25 292	23 721	596 971	559 884
Suppliers	128 096	119 209	193 492	180 068	8 183	7 616	27 623	25 706	357 394	332 599
Depreciation and amortisation	24 874	24 529	45 626	44 995	1 080	1 065	5 214	5 142	76 794	75 731
Finance costs	1 031	1 052	1 746	1 782	45	46	216	221	3 038	3 101
Write-down and impairment of assets	1 856	394	3 975	721	81	17	280	82	6 192	1 214
Other	1 089	57	1 959	103	47	2	227	12	3 322	174
Total operating expenses	**379 405**	**353 880**	**583 006**	**542 989**	**22 448**	**20 950**	**58 852**	**54 884**	**1 043 711**	**972 703**
Funded by:										
Revenues from Government	258 617	237 910	357 304	328 694	5 621	5 171	41 618	38 285	663 160	610 060
Sale of goods and services	92 108	90 743	173 777	171 203	9 987	9 839	14 197	13 987	290 069	285 772
Royalties	435	767	9 185	16 183	105	185	1	-	9 726	17 135
Net gains from sale of assets	1 852	1 058	2 558	1 462	40	24	298	170	4 748	2 714
Gains on sale of investments, IP and realisation of fair value gain reserve	31 720	5 439	45 248	7 759	689	118	5 105	875	82 762	14 191
Other	10 044	10 761	24 052	25 768	4 465	4 783	2 369	2 538	40 930	43 850
Total operating revenues	**394 776**	**346 678**	**612 124**	**551 069**	**20 907**	**20 120**	**63 588**	**55 855**	**1 091 395**	**973 722**

The Organisation's outcomes and outputs are described in Note 34 (a).

Note 35 Appropriations

Acquittal of the Organisation to Draw Cash from the Consolidated Revenue Fund for Ordinary Annual Services Appropriations

	Departmental Outputs	
	2008	**2007**
	$'000	**$'000**
Appropriation Act 1 (2007–08)	663 160	610 060
Appropriation Act 3 (2007–08)	-	-
Total available for payment	**663 160**	**610 060**
Cash payments made during the year (GST inclusive)	**663 160**	**610 060**
Balance carried forward to next year	**-**	**-**

This table reports on appropriations made by the Parliament of the Consolidated Revenue Fund (CRF) for payment to the Organisation. When received by the Organisation, the payments made are legally the money of the Organisation and do not represent any balance remaining to the CRF.

Section 8 – Appendixes

Flagship Collaboration Clusters – as at July 2008

Round 1 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners	Launch date
Energy Transformed	National Hydrogen Materials Alliance	Dr Andrew Dicks, University of Queensland (UQ)	University of New South Wales (UNSW), University of Wollongong, University of Sydney, Queensland University of Technology (QUT), RMIT University, Australian National University (ANU), Curtin University, Monash University, Griffith University, Newcastle University, Australian Nuclear Science and Technology Organisation (ANSTO)	18 October 2006, Newcastle
Food Futures	Concentration and separation of bioactives in food science	Professor Milton Hearn, Monash University (merged) and Dr Muthupandian Ashokkumar, University of Melbourne	No other partners	12 December 2006, Melbourne
Food Futures	Learning the principles of olfactory pattern recognition from invertebrates	Professor Mandyam Srinivasan, UQ (moved from ANU)	Monash, ANU	11 August 2006, Canberra
Light Metals	Australian Partnership in Light Metals Research	Professor David St John, CAST Cooperative Research Centre (CRC) and Professor Barry Muddle, Monash University	ARC CoE, UQ, Deakin University, Swinburne University	18 August 2006, Melbourne
Preventative Health	Detecting and preventing Alzheimer's disease	Professor David Ames, University of Melbourne	Edith Cowan University, Mental Health Research Institute, Neurosciences Australia	14 November 2006, Melbourne
Water for a Healthy Country	CLAMMecology (Coorong, Lower Lakes and Murray Mouth)	Dr Mike Geddes, University of Adelaide	Flinders University, SARDI	29 August 2006, Adelaide

Wealth from Oceans	Human uses and impacts on Ningaloo reef	Professor Neil Loneragan, Murdoch University	ANU, Curtin University, Edith Cowan University, Sustainable Tourism CRC, University of Western Australia (UWA), UQ	23 November 2006, Perth

Round 2 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners	Launch date
Food Futures	Redesigning grain polysaccharides	Professor Mike Gidley, University of Queensland	University of Adelaide, University of Melbourne	25 July 2007, Canberra
Water for a Healthy Country	Advanced membrane technologies for water treatment	Professor Stephen Gray, Victoria University	UNSW, University of Melbourne, RMIT University, Monash University, University of Queensland, Curtin University, University of South Australia, Murdoch University	18 May 2007, Melbourne
Wealth from Oceans	Subsea pipelines for reliable and environmentally safe development	Professor Mark Cassidy, University of WA	Curtin University, Flinders University, Monash University, University of Sydney, UQ	31 October 2007, Perth

Round 3 clusters

Flagship	Cluster name	Cluster leader(s)	Other partners	Launch date
Energy Transformed	The 'intelligent grid' – modelling distributed generation and interruptible load	Professor Stuart White, University of Technology Sydney	University of South Australia, University of Queensland, Curtin University, QUT	19 August 2008,
Light Metals	Breakthrough technology for primary aluminium	Professor Geoff Brooks, Swinburne University	To be confirmed	To be confirmed[l]
Preventative Health	The ASPREE healthy ageing cohort biobank	Professor John McNeil, Monash University	University of Melbourne, University of Tasmania, Ludwig Institute for Cancer Research	To be confirmed[l]

[l] *Launch date of the cluster to be confirmed subject to the agreement being signed*

Appendix 2

Commonwealth disability strategy

For the purposes of the Commonwealth Disability Strategy (CDS), CSIRO's 'Role' is that of an 'Employer'. Activities relevant to the Strategy form part of CSIRO's Workplace Diversity Plan.

As a result of a major review of CSIRO's support services during 2007, many human resources activities including work on a new CSIRO Workplace Diversity were placed on hold. Increased action in the area of Diversity commenced in the latter part of 2007 leading into 2008. A new Diversity Plan is being developed which will respond to key diversity issues within the Organisation.

Between September and November 2007, Aequus Partners carried out qualitative research in the form of interviews and focus groups, and quantitative research in the form of analysis of CSIRO data and policies. The research was then aggregated to identify the diversity priorities for CSIRO along with recommendations for future action.

The report has been received and is currently under consideration by the CSIRO Executive Team. Discussions are also underway with staff and their representatives to determine priorities for inclusion in the new Plan.

Performance against the indicators issued by the Office of Disability is detailed in Appendix table 2.1.

Appendix table 2.1: Disability strategy performance

Performance indicator	Actions 2007–08
Employment policies, procedures and practices comply with the requirements of the *Disability Discrimination Act* (DDA) *1992*.	Policies and practices are now largely in a routine maintenance phase and are reviewed annually. Reviews of the CSIRO policies by Aequus Partners indicate compliance with the *Disability Discrimination Act* (DDA) *1992*.
Recruitment information for potential job applicants is available in accessible formats on request.	All web authors must comply with the Web Content Accessibility Guidelines. The establishment of a dedicated team of recruitment specialists ensures consistency of presentation and accessibility.
Agency recruiters and managers apply the principle of 'reasonable adjustment'.	CSIRO policy encourages managers to make adjustments to accommodate the needs of staff with a disability so that they can satisfy the inherent requirements of the job.
Training and development programs consider the needs of staff with disabilities.	Development programs are conducted at venues that can cater to the needs of participants with disabilities.
Training and development programs include information on disability issues as they relate to the program.	There are various CSIRO supported programs which provide information on disability issues such as Contact Officer Training courses and information sessions, programs for CSIRO conducted by Diversity@Work and information materials and presentations by the Diversity Contact Officer Network. Material on the CSIRO Intranet has recently been updated and information on Diversity issues is now more readily accessible.
Complaints/grievance mechanisms, including access to external mechanisms, in place to address issues and concerns raised by staff.	CSIRO has well-developed and publicised internal mechanisms for resolving complaints both formally and informally. In the formal stages matters involve investigation by an independent investigator. There is also scope to refer the matter to the Human Rights and Equal Opportunity Commission. There have been no instances of complaints based on disability issues.

Appendix 3

Consultancy services

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.

CSIRO engages individuals and companies to provide professional services, taking account of the skills and resources required for the task, the skills available internally and the cost-effectiveness of these options.

CSIRO spent $740 830 (including goods and services tax (GST)) on consultancies during 2007–08 ($1.23 million in 2006–07). There were 23 consultancies let during the year with the total whole-of-life value of $850 311 (including GST) ($1.59 million in 2006–07). The following table provides details of consultancy services let by CSIRO during 2007–08 with a contract value, GST inclusive, of $10 000 or more.

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy (GST inclusive)	Reason for consultancy	Procurement method
2007/07/01	OTM Consulting Ltd	Provide a marketing assessment study for wireless subsea field monitoring technologies.	$33 493	SS	EX
2007/09/01	Aequus Partners	Establish a Diversity Plan 2007–11 that responds to and addresses key issues for CSIRO and aligns with the objectives of the Strategic Plan 2007–2011.	$75 460	PA/SS	RQ
2007/09/04	L.E.K. Consulting P/L	Review TheraDel from scientific and commercial perspectives.	$24 713	IS	OT
2007/10/01	de Blonk Smith Young	Independent assistance to build collaborative consortium for funding proposal.	$29 665	SS	EX
2007/10/04	Parker & Partners Pty Ltd	Independent subject matter expertise required to assist with media issues management such as the release of the World Cancer Research Fund report on 31 October 2007 plus other media strategy issues.	$44 000	IS	EX
2007/10/05	Perseus bvba	Expert advice regarding regulatory matters related to taking GM plant-based products developed at CSIRO to market.	$45 000	SS	EX
2007/10/06	Domain One Pty Ltd	Assessment of the Strategic Plan, Engagement Framework and the 2007–08 Activity Plan.	$12 000	PA	EX
2007/11/01	L.E.K. Consulting P/L	Support CSIRO to develop a robust strategy and business plan for the Flagship which will maximise the likelihood of the Flagship achieving successful outcomes over the next several years.	$113 098	IS	EX

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy (GST inclusive)	Reason for consultancy	Procurement method
2007/11/02	Technical Strategy Advisors Pty Ltd	Provide guidance to the Director on maximising portfolio effectiveness and identifying opportunities for additions and investment.	$11 000	PA	EX
2007/11/03	Tectonex Geoconsultants Pty Ltd	Provide guidance to the Director on maximising portfolio effectiveness and identifying opportunities for additions and investment.	$11 000	PA	EX
2007/11/04	Environmental Resources Management Australia	Develop CSIRO's environmental sustainability framework.	$50 200	SS	EX
2007/12/01	IPP Consulting Pty Ltd	Undertake the review of CSIRO's projected computing accommodation requirements.	$26 950	IS	RQ
2008/01/03	Jakeman Business Solutions Pty Ltd	Advise on AAHL health and safety risks.	$47 500	IS	RQ
2008/02/02	Dr David Roberts	Develop a business plan for the Comprehensive Lifestyle Intervention Program (CLIP).	$22 000	SS	EX
2008/03/01	Consulting and Implementation Services Pty Ltd	Develop the CSIRO Molecular and Health Technologies strategic plan.	$19 360	SS	EX
2008/03/02	BioDirect Pty Ltd	Provide expert advice on FDA regulatory approval and path to market for PhotoSeal Technology.	$20 000	SS	EX

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy (GST inclusive)	Reason for consultancy	Procurement method
2008/03/03	Australian National University College of Engineering and Computer Science	Conduct a review of CSIRO's earth observation science to, *inter alia*, identify its world standing, its application for the nation's benefit, future requirements and appropriate international arrangements for managing ongoing research.	$31 733	IS	EX
2008/04/01	Environmental Resources Management Australia	Develop a business plan to support the goals and strategy of CSIRO's Environmental Sustainability Framework.	$62 096	SS	EX
2008/04/02	Organyx	Coordinate and draft the Marine/Oceans Science submission on behalf of CSIRO/Bureau of Meteorology/Australian Institute of Marine Science/ Geoscience Australia (members of Oceans Policy Scientific Advisory Group) for the Cutler Review of Australia's National Innovation System.	$20 625	SS	EX
2008/04/03	Percy Street Kensington Pty Ltd	Assist in formulating the Organisation's services strategy and support in organising consultation with business units.	$40 000	PA	RQ
2008/05/01	Roderick MacKinnon	Provide advice to the Commercial Executive (ComEx) Committee on AGP investment opportunities.	$11 500	IS	RQ

Registration number	Consultant	Nature and purpose of consultancy	Estimated total life cost of consultancy (GST inclusive)	Reason for consultancy	Procurement method
2008/05/02	RL Sandland Consulting Services	Review and advise regarding publishing and IP policy.	$12 058	IS	EX
2008/06/01	Professor Peter Lillford	Advise the Food Futures Flagship with regard to research outcomes.	$55 000	SS	EX
Total value of consultancies below $10 000			$31 860		
Total value of consultancies let during 2007–08			**$850 311**		

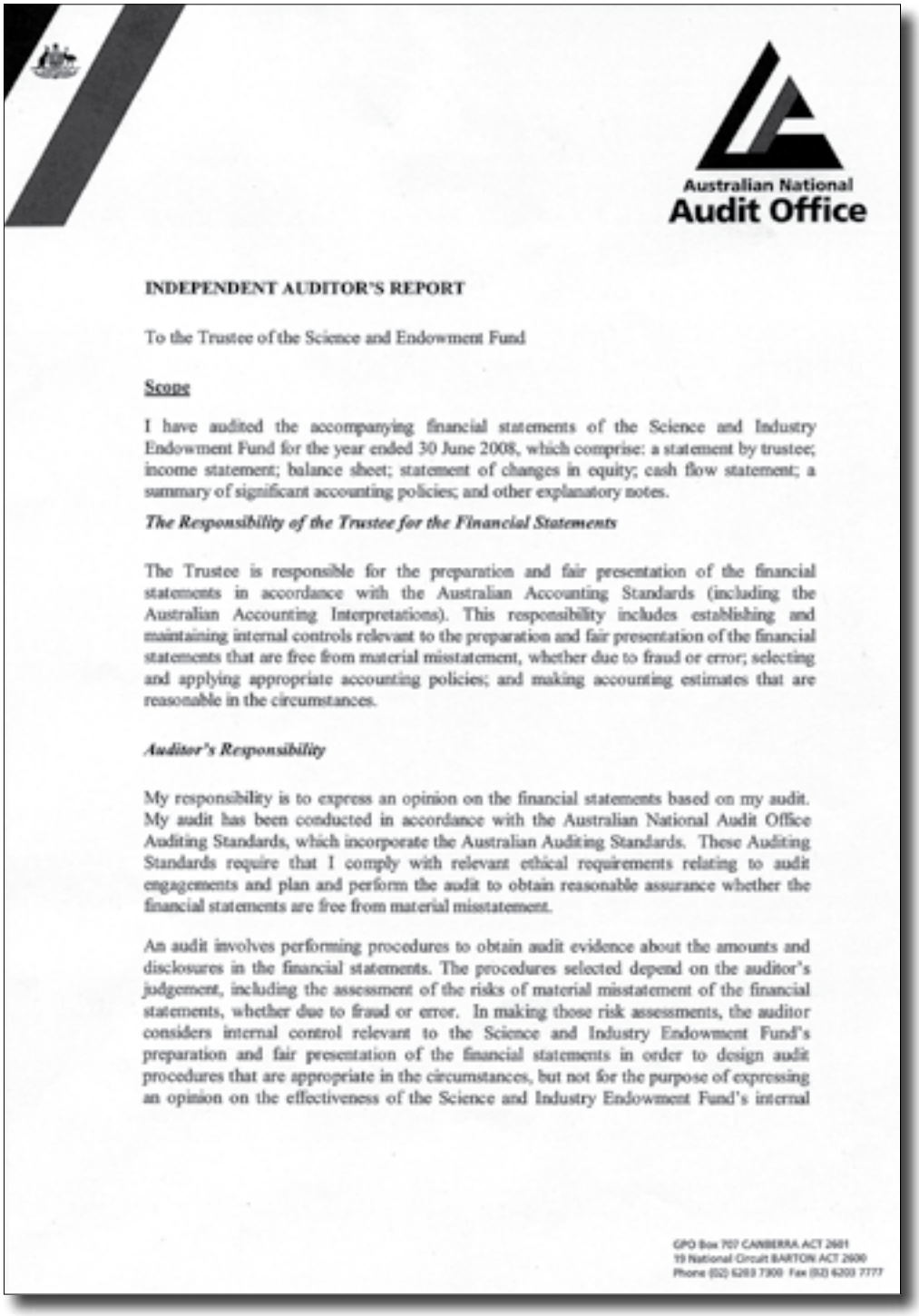
Notes to table:

Reason code	Reason for consultancy
IS	Need for independent study/evaluation.
PA	Need for professional assistance to manage and facilitate change and its consequence.
SS	Specialist skills were not otherwise available.

Procurement code	Procurement method
PM	An existing panel member – this category includes standing offers, common use arrangements and approved supplier panels.
OT	Tenders sought from the market place (Request for Proposal, Request for Tender, Expressions of Interest).
ST	Tenders being sought from suppliers who have pre-qualified through some form of previous competitive process.
RQ	Purchasing thresholds consistent with CSIRO's minimal standards.
EX	Exemption arrangement such as sole supplier, pre-eminent expertise or urgency and/or practicality.

Appendix 4

Science and Industry Endowment Fund Report



Australian National
Audit Office

INDEPENDENT AUDITOR'S REPORT

To the Trustee of the Science and Endowment Fund

Scope

I have audited the accompanying financial statements of the Science and Industry Endowment Fund for the year ended 30 June 2008, which comprise: a statement by trustee; income statement; balance sheet; statement of changes in equity; cash flow statement; a summary of significant accounting policies; and other explanatory notes.

The Responsibility of the Trustee for the Financial Statements

The Trustee is responsible for the preparation and fair presentation of the financial statements in accordance with the Australian Accounting Standards (including the Australian Accounting Interpretations). This responsibility includes establishing and maintaining internal controls relevant to the preparation and fair presentation of the financial statements that are free from material misstatement, whether due to fraud or error; selecting and applying appropriate accounting policies; and making accounting estimates that are reasonable in the circumstances.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. My audit has been conducted 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 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 Science and Industry Endowment Fund'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 Science and Industry Endowment Fund's internal

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control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the Trustee, 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 the audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the ethical requirements of the Australian accounting profession.

Auditor's Opinion

In my opinion, the financial statements of the Science and Industry Endowment Fund:

(a) have been prepared in accordance with the Australian Accounting Standards (including the Australian Accounting Interpretations); and

(b) give a true and fair view of the matters required by the Australian Accounting Standards (including the Australian Accounting Interpretations) including the Science and Industry Endowment Fund's financial position as at 30 June 2008 and of its financial performance and its cash flows for the year then ended.

Australian National Audit Office

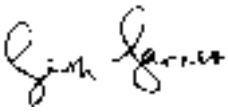
John McCullough
Audit Principal
Delegate of the Auditor-General

Canberra
10 September 2008

SCIENCE AND INDUSTRY ENDOWMENT FUND
STATEMENT BY TRUSTEE

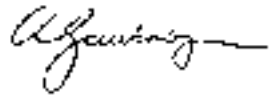
In our opinion, the attached financial statements for the year ended 30 June 2008 have been prepared based on properly maintained financial records and in accordance with Australian Accounting Standards and other mandatory financial reporting requirements in Australia, and give a true and fair view of the financial position of the Fund as at 30 June 2008 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 Fund will be able to pay its debts as and when they become due and payable.



Geoff G Garrett
Chief Executive

10 September 2008



Allan Gaukroger
Chief Financial Officer

10 September 2008

SCIENCE AND INDUSTRY ENDOWMENT FUND
INCOME STATEMENT
For the year ended 30 June 2008

	Notes	2008 $	2007 $
INCOME			
Revenue			
Interest		36 903	32 299
Total Revenue		**36 903**	**32 299**
Gains			
In-kind contributions received	4	7 782	3 454
Total Gains		7 782	3 454
TOTAL INCOME		**44 685**	**35 753**
EXPENSES			
Scientific research grants		45 666	-
Bank fees		45	24
In-kind expenses:			
– advertising and approval fees	4	3 982	-
– accounting, secretarial and audit	4	3 800	3 454
TOTAL EXPENSES		**53 493**	**3 478**
Surplus/(deficit)		**(8 808)**	**32 275**

SCIENCE AND INDUSTRY ENDOWMENT FUND
BALANCE SHEET
As at 30 June 2008

	Notes	2008 $	2007 $
ASSETS			
Financial Assets			
Cash	5	506 051	517 271
Interest Receivable	6	17 647	15 235
Total assets		**523 698**	**532 506**
LIABILITIES			
Payables			
Awards		-	-
Total liabilities		**-**	**-**
NET ASSETS		**523 698**	**532 506**
EQUITY			
Contributed equity		200 000	200 000
Accumulated surpluses		323 698	332 506
Total equity		**523 698**	**532 506**
Current assets		**523 698**	**532 506**
Non-current assets		**-**	**-**
Current liabilities		**-**	**-**
Non-current liabilities		**-**	**-**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
INCOME STATEMENT
For the year ended 30 June 2008

	Notes	2008 $	2007 $
INCOME			
Revenue			
Interest		36 903	32 299
Total Revenue		**36 903**	**32 299**
Gains			
In-kind contributions received	4	7 782	3 454
Total Gains		7 782	3 454
TOTAL INCOME		**44 685**	**35 753**
EXPENSES			
Scientific research grants		45 666	-
Bank fees		45	24
In-kind expenses:			
– advertising and approval fees	4	3 982	-
– accounting, secretarial and audit	4	3 800	3 454
TOTAL EXPENSES		**53 493**	**3 478**
Surplus/(deficit)		**(8 808)**	**32 275**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
STATEMENT OF CHANGES IN EQUITY
For the year ended 30 June 2008

	Accumulated Surpluses		Contributed Equity		Total Equity	
	2008 $	**2007 $**	**2008 $**	**2007 $**	**2008 $**	**2007 $**
Opening Balance	**332 506**	300 231	**200 000**	200 000	**532 506**	**500 231**
Net Operating surplus/(deficit)	**(8 808)**	32 275	**-**	**-**	**(8 808)**	**32 275**
Closing balance at 30 June	**323 698**	332 506	**200 000**	200 000	**523 698**	**532 506**

The above statement should be read in conjunction with the accompanying notes.

SCIENCE AND INDUSTRY ENDOWMENT FUND
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
For the year ended 30 June 2008

Note 1 **Summary of Significant Accounting Policies**

1.1 **Basis of Preparation of the Financial Statements**

The financial report is required by section 10 of the *Science and Industry Endowment Act 1926* and is a general purpose financial report that 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 are 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 Balance Sheet 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 Income Statement when and only when the flow or consumption or loss of economic benefits has occurred and can be reliably measured.

1.2 **Cash**

For the purpose of the Statement of Cash Flows, cash includes cash at bank and deposits at call. They are readily convertible to cash.

1.3 **Revenue**

Interest revenue is recognised on a proportional basis taking into account the interest rates applicable to the financial assets.

1.4 **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.

1.5 **Financial Instruments**

Accounting policies for financial instruments are stated in Note 8.

Note 2 **Contingencies and Commitments**

No contingent liabilities and commitments exist as at 30 June 2008.

Note 3 **Principal Activity**

The Fund was established under the *Science and Industry Endowment Act* 1926 with the Trustee of the Fund being the CSIRO Chief Executive. An appropriation of 100 000 pounds was received at the time the fund was established. The funds were invested and have subsequently earned interest over time.

The principal activity of the Science and Industry Endowment Fund is to provide assistance to persons engaged in scientific research and in the training of students in scientific research.

Note 4 **In-kind Contributions**	**2008 $**	**2007 $**
Estimated value of resources provided free of charge by CSIRO or ANAO are as follows:		
– accounting and secretarial services	2 700	2 554
– advertising and approval fees	3 982	-
– financial statement audit services provided free of charge by the Auditor-General	1 100	900
	7 782	**3 454**

Note 5 **Cash** (current)		
Cash at bank	4 747	17 193
Deposits - at call	501 304	500 078
	506 051	**517 271**

Note 6 **Receivables** (current)		
Interest receivable	**17 647**	**15 235**
Gross receivables are aged as follows:		
Not overdue	**17 647**	**15 235**

Note 7 **Cash Flow Reconciliation**		
Reconciliation of operating surplus to net cash from/(used by) operating activities:		
Operating surplus/(deficit)	(8 808)	**32 275**
Changes in assets and liabilities		
(Increase)/decrease in receivables	(2 412)	(2 051)
Increase/(decrease) in payables	-	-
Net cash from/(used by) operating activities	**(11 220)**	**30 224**

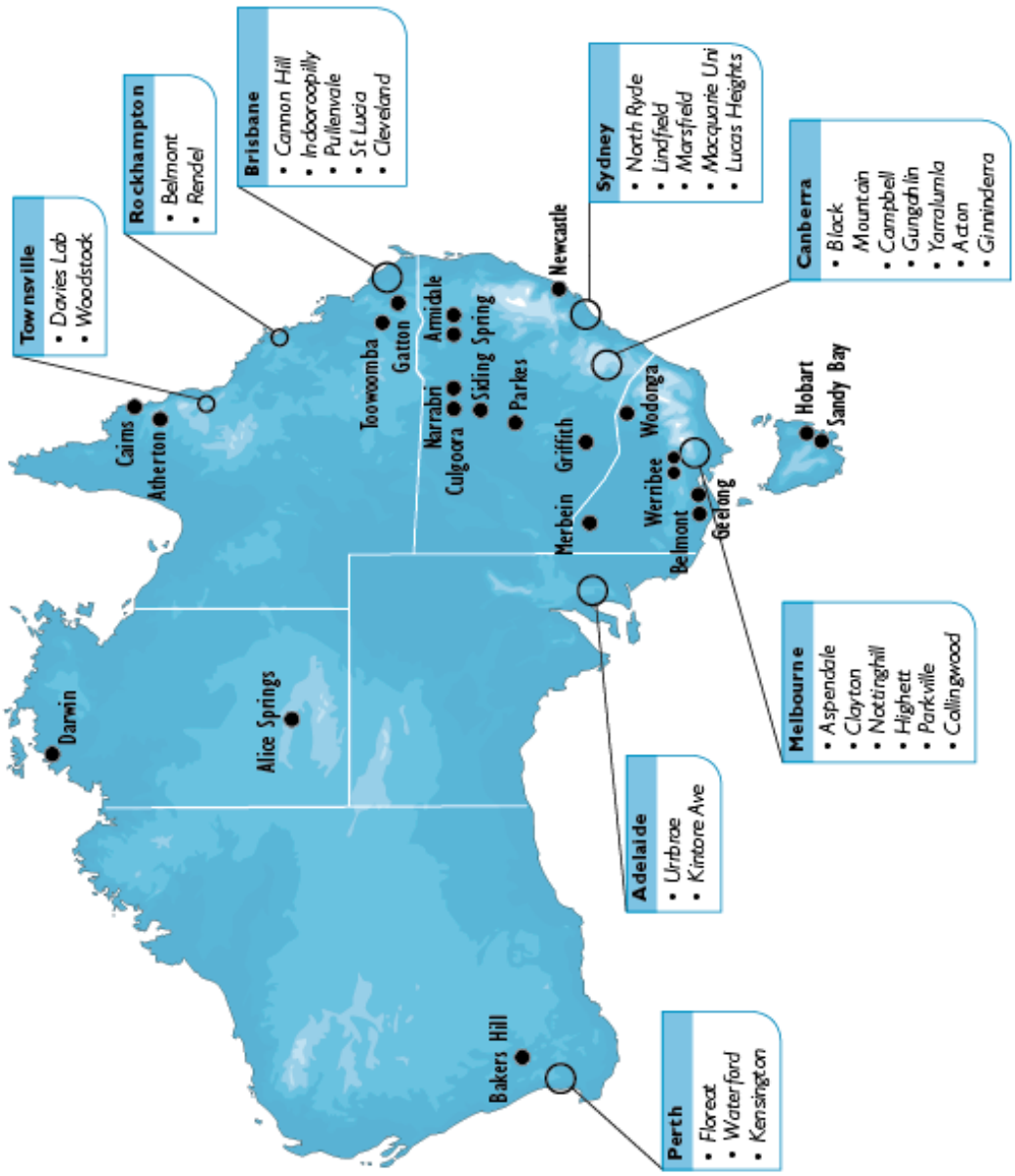
Note 8 **Financial Instruments**

The aggregate net fair value of cash, deposits at call, and receivables disclosed in the Balance Sheet are their total carrying amounts. Credit risk is minimal as all cash and deposits are held with reputable financial institutions.

Interest Rate Risk - Average rate of return on cash and short term deposits was 6.99% (2007 5.93%). A change of 100 basis points in interest rates would have increased or decreased the Trust's cash by $5,100 (2007 $5,200)

Appendix 5

CSIRO locations as at June 2008



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Acronyms

AAHL	Australian Animal Health Laboratory
ACIAR	Australian Centre for International Agricultural Research
ACT	Australian Capital Territory
ADJR Act	*Administrative Decisions (Judicial Review) Act 1977*
AEIFRS	Australian Equivalents to International Financial Reporting Standards
AGORA	Access to Global Online Research in Agriculture
AGP	Australian Growth Partnerships
AIBL	Australian Imaging Biomarker Lifestyle
ANAO	Australian National Audit Office
APP	Asia Pacific Partnership
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ATNF	Australia Telescope National Facility
BCC	Board Commercial Committee
BDS	Broad Direction Setting
BETR	Business Enabling Technologies Replacement
CAC Act	*Commonwealth Authorities and Companies Act 1997*
CDS	Commonwealth Disability Strategy
CDSCC	Canberra Deep Space Communications Complex
CDF	Capability Development Funds
CLIP	Comprehensive Lifestyle Intervention Program
ComEx	Commercial Executive
CO_2	Carbon Dioxide
CRC	Cooperative Research Centre
CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSIROSEC	CSIRO Science Education Centre
CVS	Customer Value Survey
DDA Act	*Disability Discrimination Act 1992*
EFT	Equivalent Full-Time
EI	Equine Influenza
EMC	Executive Management Council
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
ESI	Emerging Science Initiative
ETF	Energy Transformed Flagship
e-VLBI	Electronic Very Long Baseline Interferometry
EXPReS	Express Production Real-time e-VLBI Service
FOI Act	*Freedom of Information Act 1982*
GCC	Global Corporate Challenge
GHG	Greenhouse Gas Emissions
GRA	Global Research Alliance
HSE	Health Safety and Environment
ICT	Information and Communication Technologies
IP	Intellectual Property
IPCC	Intergovernmental Panel on Climate Change

IPP	Information Privacy Principles
JIVE	Joint Institute for VLBI in Europe
LTIFR	Lost Time Injury Frequency Rate
MOU	Memorandum of Understanding
MPLO	Ministerial and Parliamentary Liaison Office
MTFR	Medical Treatment Frequency Rate
NBCSP	National Bowel Cancer Screening Program
NML	National Measurement Laboratory
NCRIS	National Collaborative Research Infrastructure Strategy
NIS	National Innovation System
NRP	National Research Priorities
NPP	National Privacy Principles
NSW	New South Wales
NWS	North West Shelf
NWSJEMS	North West Shelf Joint Environmental Management Study
OARE	Online Access to Research in the Environment
OCE	Office of the Chief Executive
PCC	Post Combustion Capture
PCR	Polymerase Chain Reaction
PED	Personal Emergency Device
PMF	Performance Management Framework
PPF	Program Performance Framework
PPIs	Positive Performance Indicators
QCAT	Queensland Centre for Advanced Technologies
QLD	Queensland
SA	South Australia
SAC	Sector Advisory Council
SCCG	Sydney Coastal Councils Group
SCI	Sustainable Communities Initiative
SIEF	Science and Industry Endowment Fund
SIP	Science Investment Process
SIR Act	*Science and Industry Research Act 1949*
SME	Small and Medium Enterprise
SME-EC	Small and Medium Enterprise Engagement Centre
TED	Trust Extension Device
TCP	Transformational Capability Platforms
VIC	Victoria
WA	Western Australian
WALFA	West Arnhem Land Fire Abatement
WLAN	Wireless Local Area Network

Glossary

Customer Value Survey

CSIRO's Customer Value Survey was conducted from 2001 until November 2007. The survey covers aspects of the interaction with CSIRO that our customers have told us are important to their overall satisfaction with the value of what they have received.

CSIRO score: Survey respondents are asked to rate CSIRO's performance on a scale of 1 to 10.

Intellectual Property

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 (eg 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.

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 (Patent Cooperation Treaty) 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.

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.

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, PCT applications, and applications pending in Australia or foreign jurisdictions.

Publications

Journal articles: Includes journal articles and other items published as part of a journal (for example, an editorial or book review).

Conference papers: Includes published conference papers, abstracts or edited proceedings.

Technical reports: Includes individually authored chapters as well as whole reports that are subject to peer review and usually publicly released.

Books and chapters: Includes monographs, complete or individual chapters, usually published by a commercial publisher.

Client reports: Includes whole reports and individually authored chapters produced under collaborative or contractual arrangements. Client reports are often confidential and are not publicly released.

Student supervision and sponsorship

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.

Themes, Streams and Projects

CSIRO's research is organised into Themes, Streams and Projects. This classification has been adopted across the Organisation to ensure the alignment of individual projects with high-level strategic goals and to facilitate the monitoring of progress toward these goals.

Theme: A Theme refers to a significant area of research that is directed towards a specified outcome with a clear strategic purpose. For example, the goal for the Urban Water Theme in the Water for a Healthy Country Flagship is: '*To provide science and technology that enables the delivery of socially acceptable, affordable and environmentally beneficial management solutions for Australia's urban water infrastructure and natural water systems – to address the projected 2030 water deficit of up to 1000 gigalitres in our cities*.' Increasingly, individual Themes draw on capabilities drawn from across the Organisation and external partners.

Stream: A Stream represents a collection of related projects that address a particular aspect of the Theme goal. For example, the goal of the Urban Water Theme is pursued through five mutually supporting streams of activity: integrated water systems; demand management; recycling and diversified supply; infrastructure technologies; and urban water environments. Each Stream has an explicit medium-term stream objective supported by annual performance goals (APGs). APGs include both scientific/technical milestones and other milestones – specifically engagement with delivery partners – that are necessary for the achievement of the stream objectives and the outcomes articulated in the theme goal.

Project: A Project is the core unit of research activity and budgetary control. Individual projects are required to have a project plan in accordance with CSIRO's project management policy.

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Compliance Index – statutory reporting requirements

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Your CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.