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OPERATIONAL PLAN
2001-2002

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Foreword

The year 2001 marks the 75th anniversary of CSIRO. It is an appropriate time to look back and celebrate many remarkable achievements. CSIRO has won a place of affection and respect - not only in Australia but around the world - for the quality of the contributions it has made to the advancement of knowledge, and for the many and varied benefits it has brought to all Australians through the application of science and technology in the industries, communities and environments in which we live and work.

2001 also marks the beginning of a new millennium – reminding us how short a period of time is a mere 75 years and challenging us to set our sights on remaining a strong contributor to the nation and a vibrant organisation for our staff for many more years to come.

As a newcomer to the organisation, I am honoured and excited to have been appointed as Chief Executive to lead CSIRO at this time. To remain relevant well into the 21st Century we face the challenge of both anticipating and adapting to change – of providing leadership and remaining responsive to our stakeholders – of raising issues and providing solutions. In order to succeed as an organisation we will need to demonstrate understanding, direction, urgency and discipline (U2D2!). To this end, the senior management team met recently to consider the findings of a series of organisation-wide task groups, to review CSIRO's purpose, beliefs and mission, and to identify priorities for action. The results of those deliberations are reflected in the 'corporate overview' section of this Operational Plan. The Plan also sets out the activities and achievements planned by each of CSIRO's research Divisions in fulfilment of the Sector-based objectives summarised in the CSIRO Strategic Plan 2001-02 to 2002-03.

...

Dr Geoff Garrett
Chief Executive

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A Strategic Action Plan for CSIRO

In early May 2001 CSIRO's senior management team met for a week to develop a Strategic Action Plan for the Organisation. The meeting followed a period of extensive consultation with many key stakeholders and clients (including our Sector Advisory Committee Chairs) and with staff, and incorporates key elements of the work done by 17 Strategic Priorities Task Groups that reported in late April.

The outcome of this process was agreement on "six key messages", new (draft) statements of our purpose, beliefs and vision, and a set of eight 'strategic priorities". The "strategic priorities" focus around our people, our science base, business development, removing organisational "silos", improving our external communication and relationships management, empowering our staff and creating new business through "e-CSIRO", improving our operating discipline and introducing some new organisational arrangements to help facilitate this happening. The Strategic Action Plan will provide the foundation for a cohesive, outward-looking, and growing CSIRO founded on great people, teamwork, service and excellent science.

To drive these processes there will be a more inclusive Executive Team and a new Executive Management Council - as illustrated in the accompanying diagrams. The new Executive Team will include representation from a newly constituted CSIRO-wide Science Forum, enhancing science advocacy at the Executive level, together with appropriate representation from functional groupings including commercial/finance, business development, e-CSIRO, people development, risk management and investment planning.

At the time of preparing this Operational Plan the Action Plan is still in draft form and the full operational implications of the objectives and strategies set out in the plan have yet to be worked through. One result is likely to be a curtailment of some research deliverables as we strive to focus our efforts more strongly and to build the capacity to deliver longer-term growth. To reflect changes consequent upon this re-focusing of research effort, and the implementation of new organising arrangements, a revision to this Operational Plan is foreshadowed for release in October 2001.

Six Key Messages

This is a volatile world. There are numerous, escalating pressures on CSIRO, demanding the delivery of relevant and meaningful outcomes. We must add maximum value to the national enterprise and make an indispensable contribution. We must **look outward**. For CSIRO to realise its full potential, it is critical that we make changes.

We must pay close attention to our customers and the wider community. This demands an uncompromising customer focus—delivering **service** from excellent science.

We are currently spreading ourselves too thinly. We need to **focus** our energies and to build teams and **quality partnerships**, nationally and globally, increasing our capability to deliver creative science and innovative solutions in timely way.

We must harness the full power of a **unified CSIRO** and build multi-disciplinary teams that will address major national challenges and global opportunities. This will also enable us to move rapidly to identify and exploit new opportunities and technologies that will emerge beyond and across conventional boundaries.

If we succeed in implementing these changes, our nation will benefit and our business and impact will **grow**.

In summary, the key messages we have to live are:

- *Look out ! !*
- *Focus*
- *Service from Science*
- *"One CSIRO"*
- *Partner or Perish*
- *Go for growth*

Our Purpose: 'Why do we exist?'

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

Our Beliefs: 'What do we stand for?'

In CSIRO we believe that:

- we have great people
- we aspire to excellence in all that we do
- science can achieve great things
- integrity, honesty and openness are fundamental to the way we operate
- our customers and partners are essential to our success
- our diversity and breadth allow us to tackle complex problems and opportunities on a national and global scale
- trust is crucial in building high-performing teams.

We acknowledge that we are often:

- overly focussed on short-term revenue targets
- limited by divisional and other silos
- not fully sharing knowledge effectively across boundaries
- too internally focused
- too slow to respond
- less cooperative than we could be
- overly hierarchical and bureaucratic.

We are in the process of fixing this, and building on our beliefs.

Our Five Year Mission: 'Where are we going, and what do we want to achieve?'

We will grow our business by 50% to $1.3bn over the next five years.

We will ensure that CSIRO is a place where

- great people choose to work
- teams are responsive, energetic and communicative
- we value our people, empower them and reward their excellence
- partnership is prized.

We will help make Australia a stronger global competitor in the 21st Century through a new set of large projects that will deliver outcomes around:

- information and communication technologies to build and enhance national performance in the sector
- biotechnology to drive pharmaceutical and agribusiness developments
- sustainable natural resource industries and the building of world-class knowledge services based upon them
- practical solutions to major environmental challenges and safeguarding our biodiversity
- new and transforming manufacturing industries
- new companies to take Australian knowledge products to the world
- science and technology to help Australians live longer, healthier, more productive lives enriched by scientific discoveries
- technology to overcome the disadvantages that remote Australia suffers in communications, health and education.

We will increase CSIRO's flexibility to invest in key fields of science and emerging research areas, ramping up to an additional $40M a year across the organisation.

Australian Science, Australia's Future!

Strategic Priorities and Key Objectives

For each of the following priority areas, the Strategic Task Group reports, prepared prior to the May 2001 Management Breakaway, contained seminal discussions and recommendations and should be considered as an important resource in the development of the actions associated with these strategic priorities.

Our People

- Maximise our competitive advantage, and the delivery of quality and value-adding outputs, by:
  - attracting, retaining, rewarding and motivating the right mix of creative, highly skilled, outcome-focussed, team-oriented people; and
  - improving professional development for all of our staff.

Science Base

- Grow, and focus, our science base.
- Increase our investment in emerging science and technologies.
- Enhance CSIRO's reputation for high quality science and technology.

Business Development

- Increase revenue significantly by building our commercial engagements around a streamlined and vigorous investment model and a new approach to business development.

Death of Silos – 'One-CSIRO'

- Move towards a "one-CSIRO" culture in order to be able to respond rapidly in the best possible way using CSIRO and global networks - without being constrained by boundaries; and to identify radically new solutions through teams and research synergies across CSIRO.

External Communication and Relationship Management

- Strengthen CSIRO's position and influence in Australia's science and technology/innovation system, by constructively engaging with government, industry, academia and the public at large.

e-Csiro

- Innovative use of information and communication technology to give us a competitive advantage in everything we do and a peerless ability to do business in new and unpredictable ways.

Operating Excellence

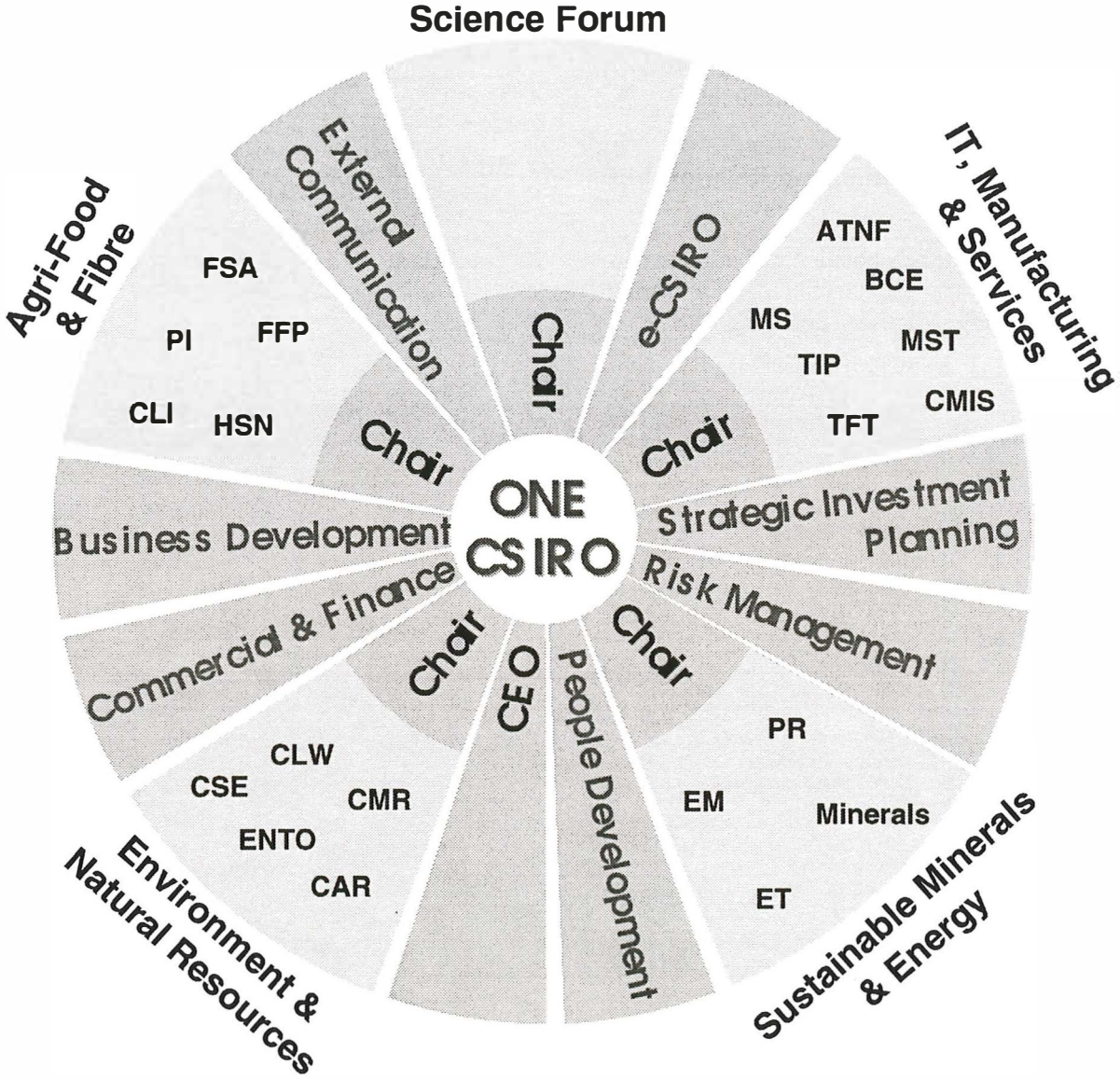
- Deliver excellent service to our customers (internal and external).
- Pursue relentlessly operating efficiencies and effectiveness.

Organising Arrangements and Processes

- Introduce organising arrangements that:
  - allow CSIRO to realise its full capability to deliver value from excellent science
  - harness the full power of our multi-disciplinary teams
  - increase CSIRO's outward focus and responsiveness
  - clarify and simplify decision-making processes.

CSIRO Executive Management Council and Executive Team Membership

Darker shading : EMC and ET
Lighter shading : EMC only



CSIRO Executive Management Council and Executive Team Membership

Executive Management Council

Agri-Food & Fibre Group	Shaun Coffey	Livestock Industries
	Michael Eyles	Food Science Australia
	Richard Head	Health Sciences and Nutrition
	Glen Kile	Forestry and Forest Products
	Jim Peacock (c)	Plant Industry
Environment & Natural Resources Group	Nan Bray	Marine Research
	Jim Cullen	Entomology
	Graham Harris	Land and Water
	Steve Morton	Sustainable Ecosystems
	Graeme Pearman (c)	Atmospheric Research
IT, Manufacturing & Services Group	Brett Bateup	Textile and Fibre Technology
	Murray Cameron	Mathematical and Information Sciences
	Annabelle Duncan	Molecular Science
	Ron Ekers	Australia Telescope National Facility
	Warren King	Telecommunications and Industrial Physics
	Larry Little (c)	Building, Construction and Engineering
	Ian Sare	Manufacturing Science and Technology
Sustainable Minerals & Energy Group	Rod Hill	Minerals
	Neil Phillips	Exploration and Mining
	Adrian Williams (c)	Petroleum Resources
	John Wright	Energy Technology

Executive Team

LL, JP, GP, AW	Four Chairs of Business Groups
Ted Cain	Corporate Secretary. Chair: Risk Management
Geoff Garrett	CEO
Bruce Hobbs	DCE. DCE: Commercial (acting). Special Adviser: Strategic Investment Planning
Ron Sandland	DCE. Director: e-CSIRO. Chair: ICT Strategy Team
Paul Wellings	DCE. Director: Business Development. Chair: Biotech Strategy Team
Vijoleta Braach-Maksvytis	CSIRO Science Forum
John Read	Executive Director: Finance & Commercial
TBA	External Communications
TBA	People Development

Financial Resources and Staff Numbers by Division *

DIVISION	Revenue				Operating Result After CUC	Capital Expenditure	Cash Balance[2]	Research Staff [3]	Total Staff [4]
	Total	Direct Approp	Research & Services [1]	Other					
	$m	$m	$m	$m	$m	$m	$m	EFT	EFT
Atmospheric Research	15.500	9.897	5.604	0.000	0.002	0.500	0.538	85	117
Australia Telescope National Facility [5]	14.216	12.445	1.471	0.300	-4.301	2.437	3.225	61	122
Building Construction and Engineering	31.158	20.171	10.987	0.000	0.019	1.600	0.791	164	221
Energy Technology	21.452	13.802	7.450	0.200	-5.084	1.300	2.122	118	165
Entomology	31.886	15.701	15.884	0.302	-0.194	1.024	-0.124	194	260
Exploration and Mining	33.480	18.213	15.067	0.200	0.000	2.230	0.395	165	240
Food Science Australia [6]	15.591	15.591	0.000	0.000	0.000	0.000	3.598	123	180
Forestry and Forest Products	25.649	16.779	8.700	0.170	0.000	1.100	2.771	152	215
Health Sciences and Nutrition	20.779	14.323	6.460	-0.004	-0.353	0.570	-0.484	132	172
Land and Water	47.646	30.789	16.300	0.557	-0.763	2.600	6.643	326	479
Livestock Industries [7]	52.612	34.563	16.509	1.540	-1.982	2.650	-6.257	293	502
Manufacturing Science and Technology	43.150	27.304	15.706	0.140	-0.321	3.000	2.270	202	270
Marine Research	34.954	23.037	11.817	0.100	-0.666	1.189	3.925	203	302
Mathematical and Information Sciences	36.923	25.003	11.620	0.300	-1.277	4.347	2.005	187	257
Minerals	33.068	20.978	12.005	0.085	0.036	2.113	0.738	189	273
Molecular Science	33.653	19.353	14.300	0.000	0.142	1.800	1.493	165	211
Petroleum Resources	17.173	9.963	7.201	0.010	0.000	1.481	2.999	71	94
Plant Industry	72.377	37.740	33.767	0.870	0.055	2.830	7.436	527	652
Research Vessel Franklin [6]	4.553	4.373	0.150	0.030	-1.372	0.107	0.693	1	8
Sustainable Ecosystems	36.007	24.336	11.430	0.241	0.000	2.276	6.059	215	300
Telecommunications and Industrial Physics [8]	55.740	38.476	17.264	0.000	0.389	2.900	5.245	278	386
Textile & Fibre Technology	23.903	12.092	11.299	0.511	2.044	2.852	9.961	108	194
Divisional Total	**701.466**	**444.927**	**250.988**	**5.552**	**-13.626**	**40.905**	**56.044**	**3,960**	**5,620**
Corporate Groups [9]	46.935	42.790	0.000	4.145	0.000	0.138	-4.182	15	254
Discovery Centre	0.607	0.300	0.000	0.307	-0.378	0.350	0.020	1	4
Corporate Funds	34.817	20.758	0.000	14.059	12.377	29.896	-16.126		
Capital Program	6.534	1.101	3.633	1.800	1.016	71.846	10.064		
Capital Use Revenue [10]	104.125	104.125	0.000	0.000	0.000	0.000	0.000		
CSIRO Publishing	7.770	0.713	6.998	0.060	0.611	0.050	2.378	0	49
Operational Total	**902.255**	**614.713**	**261.618**	**25.924**	**0.000**	**143.186**	**48.197**	**3,976**	**5,928**

* The footnotes to this table should also be read in conjunction with the resources summary at the end of each divisional Financial estimates are for 2001-02 as at 26 June 2001. Staff numbers are full time equivalents including indefinite and CSIRO Officers only as at 30 June 2001. Staff numbers for Livestock Industries, Plant Industry and Sustainable incorporate off-line estimates of staff joining from the former Division of Tropical

1. Revenue for Research and Services as defined for CSIRO's external earnings performance indicator (PI). After adjusting for Capital Use Charge *(see note 10)*, CSIRO's estimated external earnings PI ratio for 2001-02 is 33.6% (adjusted for WIP deferred revenue). The PI definition excludes 'Other' revenue from both numerator and
2. Estimated 30 June 2002 cash balance.
3. Includes Research Scientist/Engineer, Research Projects and Research Management functional
4. Includes Research Staff plus Technical Services, Communications and Information, Administrative Services, General Corporate Management and Senior Specialist functional
5. A National Facility managed by CSIRO on behalf of the
6. Through the Division of Food Science and Technology, CSIRO has entered a joint venture (Food Science Australia) with Australian Food Industry Science Centre (Afisc). CSIRO's direct contribution to the joint venture is $15.6m for 2001-02. this table represent an estimate of CSIRO's operational activities in the joint venture which differ from the legal
7. Includes the Australian Animal Health Laboratory - a National Facility managed by CSIRO on behalf of the
8. Includes the Australian National Measurement Laboratory - a National Facility managed by CSIRO on behalf of the
9. Corporate Groups includes all the Corporate Units, CSIRO Executive, the LIPI Project and the Magnesium
10. A Capital Use Charge (CUC) is part of the Governments new accrual framework. It is funded by increasing the appropriation by 11% of the opening net asset position. This is received as part of the Organisation's appropriation during year, and paid to the Commonwealth as a dividend in June.

CSIRO DIVISION - SECTOR MATRIX

DIVISIONAL GROUPS	ALLIANCES and SECTORS: Agribusiness						Environment & Natural Resources				Information, Manufacturing & Service Industries								Minerals & Energy Industries			
	Field Crops	Food Processing	Forestry, Wood & Paper Industries	Horticulture	Meat, Dairy & Aquaculture	Textiles, Clothing & Footwear	Biodiversity	Climate & Atmosphere	Land & Water	Marine	Built Environment	Chemicals & Plastics	Information & Communication Technologies	Integrated Manufactured Products	Measurement Standards	Pharmaceuticals & Human Health	Radio Astronomy	Services	Energy	Mineral Exploration & Mining	Mineral Processing & Metal Production	Petroleum
Agri-Food & Fibre																						
Food Science Australia	●	●		●	●							●										
Forestry & Forest Products			●				●	●	●		●								●			
Livestock Industries		●			●	●	○	●		○						○						
Plant Industry	●	●	●	●	●	●	●	●														
Environment & Natural Resources																						
Atmospheric Research								●											○			
Entomology	●		●	●	●	●	●	●	○		●	●				●						
Land & Water	●			●	●		●	●	●		●								●	●	●	○
Marine Research					●		●	●		●						●					○	○
Sustainable Ecosystems	●		●		●	●	●	●	●	●								○	○	○		
IT, Manufacturing & Services																						
Australia Telescope National Facility																	●					
Building Construction & Engineering							○	●	○		●	●		●							●	●
Health Sciences and Nutrition	●	●			●											●						
Manufacturing Science & Technology											●	●		●				●	●	●	●	
Mathematical & Information Sciences	○	●	●	○	●	○	●	●	●	●	●		●	●			○	●		●	●	●
Molecular Science											●	●				●					●	●
Telecommunications & Industrial Physics								●			●		●	●	●			●	●	●	●	
Textile & Fibre Technology						●																
Sustainable Minerals & Energy																						
Energy Technology								●	●	●									●	○	●	
Exploration & Mining																			●	●		●
Minerals																			●		●	○
Petroleum Resources																			●			●

● and ○ indicate Sectors to which a Division plans to contribute in 2001-02. An open circle indicates a contribution of less than $300,000

CSIRO PARTICIPATION IN COOPERATIVE RESEARCH CENTRES

Cooperative Research Centres (CRCs) bring together researchers and research groups from universities, state government agencies, business enterprises and commonwealth research organisations such as CSIRO.

CRCs undertake collaborative research and education programs in the fields of natural sciences and engineering, with a strong focus on commercial and other applications. The Commonwealth Government provides up to fifty per cent of the cost of establishing and operating a centre. The participating organisations contribute the balance of required resources in cash or kind. CSIRO accounts for approximately 19 per cent of resources committed to centres by participating organisations over the contract period ($4.3B).

The CRC Program was launched in May 1990 and successful applicants in the seventh round of funding were announced in January 2001. CSIRO is a participant in 13 of the 19 new centres. At 30 June 2001 CSIRO was a core participant in the centres listed below.

Further information on the CRC Program and individual Centres can be found at the following internet address: www.isr.gov.au/crc.

Manufacturing Technology

- **CRC for Bioproducts**
- **CRC for CAST Metals Manufacturing**
- **CRC for Intelligent Manufacturing Systems and Technologies**
- **CRC for International Food Manufacture and Packaging Science**
- **CRC for Microtechnology**
- **CRC for Polymers**
- **CRC for Welded Structures**

Information and Communication Technology

- **CRC for Advanced Computational Systems**
- **CRC for Enterprise Distributed Systems Technology**
- **CRC for Satellite Systems**
- **Australian Telecommunications CRC**

Mining and Energy

- **A J Parker CRC for Hydrometallurgy**
- **Australian Geodynamics CRC**
- **CRC for Australian Mineral Exploration Technologies**
- **Australian Petroleum CRC**
- **CRC for Black Coal Utilisation**
- **CRC for Clean Power from Lignite**
- **G K Williams CRC for Extractive Metallurgy**
- **CRC for Landscape Evolution and Mineral Exploration**

Agriculture and Rural Based Manufacturing

- **CRC for Aquaculture**
- **Australian Cotton CRC**
- **CRC for Cattle and Beef Quality**
- **CRC for Food Industry Innovation**
- **CRC for Legumes in Mediterranean Agriculture**
- **CRC for Premium Quality Wool**
- **CRC for Quality Wheat Products and Processes**
- **CRC for Sustainable Production Forestry**
- **CRC for Sustainable Rice Production**
- **CRC for Sustainable Sugar Production**
- **CRC for Tropical Plant Protection**
- **CRC for Viticulture**

Environment

- **CRC for Antarctica and the Southern Ocean**
- **CRC for Biological Control of Pest Animals**
- **CRC for Catchment Hydrology**
- **CRC for Coastal Zone, Estuary and Waterway Management**
- **CRC for Freshwater Ecology**
- **CRC for Southern Hemisphere Meteorology**
- **CRC for Sustainable Development of Tropical Savannas**
- **CRC for Greenhouse Accounting**
- **CRC for Tropical Rainforest Ecology and Management**
- **CRC for Waste Management and Pollution Control**
- **CRC for Water Quality and Treatment**
- **CRC for Weed Management Systems**

Medical Science and Technology

- **CRC for Cellular Growth Factors**
- **CRC for Diagnostic Technologies**
- **CRC for Eye Research and Technology**
- **CRC for Tissue Growth and Repair**
- **CRC for Vaccine Technology**

Focus

CSIRO Atmospheric Research conducts world-class research into the atmospheric environment and provides advice and applications for the benefit of Australia. The Division serves the community through outcomes that benefit industry, the economy and the environment, provide social benefit and support national and international objectives. Specifically, the Division addresses issues such as urban and regional air pollution, the enhanced greenhouse effect, ozone depletion, climatic variability and severe weather. Research tools include computer-based climate and atmosphere models as well as remote sensing and other atmospheric monitoring instruments. Key stakeholders include Commonwealth and State Environment Departments, and energy and mineral resource companies.

Outlook and Strategies

There is great demand nationally and internationally for data and information about changes to the atmospheric environment and for solutions to related environmental issues and problems. Climate change and ozone depletion are major global atmospheric environmental issues. Air pollution and climate variability continue to affect our prosperity and welfare.

Research advances, underpinned by sophisticated computing and information technology, are allowing development and application of climatic and air quality models of increasing realism, allowing for better accuracy and greater detail of predictions.

The Division is a major user of the joint supercomputing facility, shared by CSIRO and the Bureau of Meteorology. The facility supports the Division's climatic and air quality modelling.

The Division receives significant external support from the Australian Greenhouse Science Program of the Australian Greenhouse Office. The Australian Greenhouse Office is the Division's foremost external funding agency, but there is increasing support from resource industries.

The Division makes scientific contributions to development of government policy through briefings, submissions and environmental reports. The Division contributes about half of CSIRO's total effort in the Climate and Atmosphere Sector.

Planned Activities and Achievements

Climate and Atmosphere

- Significant interactions with Commonwealth and State environment agencies on air quality characterisation, modelling and health risk assessment. An increasing emphasis on aerosol monitoring and characterisation and linking aerosol exposure with health risks.
- National and overseas consultancy studies including a project to characterise haze in Malaysia.
- Research on the changing composition of the atmosphere using the Cape Grim Baseline Air Pollution Station, in Tasmania. The Bureau of Meteorology and CSIRO jointly manage the Station.
- Research on greenhouse gases, ozone-depleting substances and other trace gases, making a major contribution to national and international assessments of global atmospheric change, its causes, and the opportunities for remedial action.
- Developments in greenhouse gas monitoring technology, involving international partnerships. Investigations of the viability of satellite-based measurements of greenhouse gas concentrations.
- Three-dimensional carbon transport modelling of the atmosphere and oceans, global and regional inverse modelling and multi-decadal modelling, of relevance to policy advice on issues relating to changing global greenhouse gas concentrations, and to design of measurement strategies.
- Field experiments to provide Australia-wide validation of satellite-based measurements of atmospheric radiation and aerosol.
- Ongoing collaboration with the Australian company, Integrated Avionic Systems, to develop and commercialise airborne hazard technologies.
- Continued development and use of sophisticated climate models to assess likely future regional changes to climate, and testing of model-based multi-seasonal predictions. Outputs will be supplied to agencies such as the Bureau of Meteorology and the Queensland Department of Natural Resources, and international institutions.
- Development of weather products for specific commercial markets.
- Assessment of likely regional impacts of climate change for a number of State Governments. Studies of rainfall fluctuations in the south-west of Western Australia.

Energy

- Atmospheric modelling in support of site assessments for wind farms.

Planned Investment Profile by Sector	(%)
Climate & Atmosphere	98.7
Energy	1.3

Resource Summary 2001-2002	
Total Revenue ($'000)	15,500
- Direct appropriation ($'000)	9,897
- Research & Services ($'000)	5,604
- Other	0
Earnings Performance Indicator (%)	36.2
Operating Result ($'000)	2
End of Year Cash Balance ($'000)	500
Research Staff (EFT)	85
Total Staff (EFT)	117

Focus

Australia is ranked among the top five countries in optical and radio astronomy, and the CSIRO's Australia Telescope National Facility (ATNF) is Australia's pre-eminent radio astronomy institution. It is dedicated to the advancement of knowledge and providing a showpiece for Australian technology, and is the only facility in the world that can make high-resolution images of the southern sky at radio wavelengths. The current foci of the ATNF are to upgrade its observing facilities to maintain its operation as a prestigious world-class national research facility, and to develop the technology for the next generation radiotelescope - the Square Kilometre Array.

Outlook and Strategies

The critical overall objective of the ATNF is to remain at the forefront of world radio astronomy, by providing facilities that enable its users to carry out leading edge research. The ATNF is approaching completion of a major upgrade of observing facilities supported by the Commonwealth Government's Major National Research Facility (MNRF) funding program. This upgrade will provide Australia with one of the world's leading millimetre-wave observatories for a window of about 8-10 years.

Australia is well positioned to play a key role in the development of the Square Kilometre Array. Strong participation in the project will increase the possibility of Australia hosting the instrument. The ATNF is leading an Australian consortium to start developing the technology for the SKA, and is also working to identify and safeguard potential SKA sites in Australia.

CSIRO and ATNF activities are promoted through information and educational resources and a public outreach program - a principle aim being to encourage young people to take an active interest in science.

Planned Activities and Achievements

- Operate the Parkes, Narrabri and Mopra Observatories, the Long Baseline Array network, and the Marsfield facilities, as National Facilities.
- Provide access to ATNF's facilities for both Australian and overseas users on the basis of scientific merit.
- Provide at least 70% of available time for astronomy on the Compact Array (ATCA) and Parkes radio telescope, keeping time lost due to equipment failure during scheduled observing periods below 5%.
- Conduct world-class astrophysics research.
- Complete the Parkes HIPASS, and ZOA, and Northern Extension multi-beam surveys of atomic hydrogen gas, and continue the "Northern Bulge Extension survey". Extract and publish results.
- Start astronomical commissioning of the new millimetre receivers on the ATCA and start producing new astrophysical results from them.
- Continue the MNRF supported upgrade of the Narrabri Compact Array, including installing 12/3 mm receiver systems on five antennas on the ATCA, and commission at least three for use; complete the ATCA local oscillator distribution system upgrade; and install the new Antenna Control Computers on all ATCA antennas.
- Optimise the performance of the optics and reflecting panels of the 22-m diameter Narrabri and Mopra antennas for operation at 3-mm wavelength, using holographic measuring techniques.
- Complete the evaluation of electronics devices developed in the joint ATNF/CTIP project on *Advanced Millimetre-Wave Integrated Circuits*, and continue developing new devices.
- Complete the broadband 1 GHz correlator system, and the 10/50-cm dual frequency receiver for pulsar research, at the Parkes Observatory.
- Test a prototype wideband analog correlator for the ATCA; commence deep surveys at short wavelengths.
- Participate in commissioning and promotion of the new Astronomical Image Processing System (AIPS++), and start using it for ATCA data reduction.
- Contribute to SKA technology development - including Luneberg lens development and radio frequency interference mitigation studies - and to strategic planning at national and international levels.
- Continue activities related to radio-spectrum management, continue SKA site surveys, and participate in establishing Australian radio-quiet reserves.
- Collaborate with the Academia Sinica Institute of Astronomy and Astrophysics, Taiwan, to design and develop mm-wave receiving systems for its Array for Microwave Background Anisotropy (AMiBA) and construct a prototype 4GHz correlator for evaluation.
- Contribute to scientific and regulatory organisations such as IAU, URSI, CODATA, OECD, and ITU.
- Upgrade the Parkes Visitors Centre.
- Annually publish at least 70 scientific papers in refereed journals, and provide an effective public outreach program, measurable in terms of media appearances, talks to schools and community groups, Visitors Centres numbers, and web hits.

Planned Investment Profile by Sector	**(%)**
Radio Astronomy	100

Resource Summary 2001-2002	
Total Revenue ($'000)	14,216
- Direct Appropriation ($'000)	12,445
- Research & Services ($'000)	1,471
- Other ($'000)	300
Earnings Performance Indicator (%)	10.3
Operating Result ($'000)	-4,301
End of Year Cash Balance ($'000)	3,225
Research Staff (EFT)	61
Total Staff (EFT)	122

Focus

CSIRO Building, Construction and Engineering operates to support, advance and improve the operation of industries relating to the Built Environment and other related Sectors. Strategic research is focused in life cycle performance of materials, buildings and infrastructure; intelligent design and construction systems; new process technologies, waste recycling and reactivation, new composite materials and infrastructure network optimisation with particular focus on ITS and urban water technologies. These key areas will provide substantial advantage to Australia in the 21st century.

Outlook and Strategies

The Division is responding to several issues identified by industry and government as priorities for R&D: development of new industry processes and new design technologies to reduce energy consumption and greenhouse gas emissions; application of IT in construction; a new multi-Divisional Intelligent Transport Systems initiative; an expanded multi-Divisional initiative to reduce the economic and environmental cost of managing urban water, wastewater and stormwater and improve the quality of water services (WSAA); new material products and processes developed to utilise waste streams; and redesigning indoor environments (integrated noise, air quality, ventilation and thermal comfort modelling).

The Division's management structure is based around its three core science capabilities (Thermal and Fluids Engineering, Sustainable Materials Engineering and Infrastructure Systems Engineering), and its business development activities are aligned to the marketing of each of the three core capabilities across the full spectrum of Built Environment applications.

Facilities are being upgraded and expanded in Sydney with construction of a new Fire Laboratory and offices. Staff presence in Brisbane is increasing via a CRC in Construction Innovation (in partnership with QUT). The Structures Laboratory in Melbourne has recently been extended, and significant capital expenditure has also been made on the Materials Engineering Laboratories to support research linked to a new CRC for Innovative Wood Manufacturing and the commercial spin-off of SICOR.

Planned Activities and Achievements

Built Environment

- New energy appraisal models for design of dwellings, commercial and industrial buildings linked to new national energy codes and standards (ABCB).
- Research on indoor environments that incorporates hybrid ventilation and thermal performance with acoustics performance (new urban noise initiative).
- Expanded Urban Water Technologies project undertaking WSAA national priority projects plus urban water strategies for several capital cities in Australia and Asia Pacific.
- Continued leadership in developing a performance-based Fire Code for the Building Code of Australia, and increased consulting in Asia.
- National technical leadership in the International Alliance for Interoperability – a revolutionary system to integrate information flows in the sector.
- Development of microwave curing of cementitious composites, new kiln technologies and new technologies for waste re-processing and re-activation.
- Condition monitoring and service life prediction research that underpins performance-based approaches to design and construction. BCE has a major role in APEC harmonisation; is a designated testing centre for timber building products; and undertakes contract materials durability studies in South East Asia.
- Technology to reactivate solid construction wastes for use as alternative construction materials and products and provide entry into the $300 billion fast growing global waste management market.

Chemicals and Plastics

- Additional development and further commercialisation of a novel process for surface treatment to improve adhesion to plastics.

Mineral Processing and Metal Production

- Research on optimisation of the mixing process – with application to swirling flow technologies, multi-phase flows in pipelines and pumps, and behaviour of dry granular materials. Extension of the technology platform in the bio-medical and food processing areas.

Integrated Manufactured Products

- Developing innovative treatments to protect metallic surfaces (Al and Mg) in transport and aerospace.

Climate and Atmosphere

- Research focussed on urban air quality models and climate change-infrastructure impacts.

Planned Investment Profile by Sector	(%)
Built Environment	75.2
Mineral Processing & Metal Production	10.9
Chemicals & Plastics	6.3
Climate & Atmosphere	4.0
Integrated Manufactured Products	1.9
Petroleum	1.1
Biodiversity	0.6
Land & Water	0.1

Resource Summary 2001-2002	
Total Revenue ($'000)	31,158
- Direct Appropriation ($'000)	20,171
- Research & Services ($'000)	10,987
- Other ($'000)	0
Earnings Performance Indicator (%)	35.3
Operating Result ($'000)	19
End of Year Cash Balance ($'000)	791
Research Staff (EFT)	164
Total Staff (EFT)	221

Focus

The Division's focus is on the sustainability of Australia's energy industry and its energy exports. The main activities are coal preparation, clean coal power, distributed energy using advanced gas technologies, renewable energy and energy storage, CO2 capture and emissions control. The Division also contributes to CSIRO's environmental sectors through its expertise in air and water quality, solid residues and sludge treatment.

Outlook and Strategies

Managing the move of the Division's headquarters to Newcastle during 2002-03:will include: energy efficient building construction; HR strategy for relocation, redeployment and redundancy issues; financial and risk management programand advanced energy supply options secured.

Increase efforts in shifting appropriation investment into newer areas Distributed Energy and Power and Energy End Use Efficiency

Maintain a commitment to established areas (coal preparation, utilisation, OHS and GHG mitigation) and work with ACARP and CRC for Coal in Sustainable Development (CCSD) on strategic directions for coal industry R&D.

Planned Activities and Achievements

Energy Sector

Energy Modelling

- Evaluate and publish estimates of the future market penetration of existing and new energy technologieswith assessment of impact on GHG emissions.

Coal Preparation

- Optimise the performance of the large-scale (600m3/h) TurboFlotation™ unit and dewatering technologies and prepare for commercialisation.
- Commission and support the 5 tonne/d pilot plant to produce ultra clean coal for direct fired gas turbine trials in Japan and Australia.
- Produce large tonnages (10,000 tonne) of binderless briquettes from bituminous and sub-bituminous coals for customer trials

Clean Coal Power (Reporting through CCSD)

- Complete coal pyrolysis, gasification reactivity, slag viscosity and gasification process models
- Complete entrained flow coal gasification conversion measurements for a wide range of Australian coals.
- Develop and deliver to new air/environment programs

Distributed Energy (Gas Utilisation)

- Establish business plan for CenDEP;.widen industry and government support.
- Initiate projects and facilities in gas engines, microturbines and/or fuel cells.

Energy Storage

- Develop battery/supercapacitor technology and operating strategies for use in RAPS and vehicles.
- Initiate the 1.0 MWh battery energy storage system for the Newcastle Energy Laboratory.

Renewable Energy

- Consolidate operating data on solar/fossil fuel hybrid facility for high energy efficiency and zero GHG.
- Secure commercial and/or joint development projects in biomass energy and biomass fuel characterisation.

Direct Mitigation of Greenhouse Gas Emissions

- Evaluate chemicals and solid substrates for capture of CO_2 from industrial sources to reduce capture costs.
- Report on new methodologies for estimating fugitive methane emission rates from open cut coalmines.

Energy End Use Efficiency

- Liaise widely to establish overall thrusts for the EEUE component; develop specific projects in energy-intensive industry areas

Land and Water and *Marine*

- Provide reliable assessment of bioavailability and toxicity - underpinning new regulatory guidelines - in estuarine waters and sediments.
- Assist ecological risk assessment of the impact of mining and industrial activities on aquatic systems.

Climate and Atmosphere

- Provide guidance on the management of urban air pollution through the measurement and modelling of: selected air toxics produced from photochemical smog, gases and particles produced from motor vehicles, and
  emissions from biogenic and industrial sources.

Mineral Processing and Metal Production

- Within CCSD develop strategic projects to predict coke behaviour to aid conventional cokemaking

Planned Investment Profile by Sector	(%)
Energy	73.9
Land & Water	9.3
Climate & Atmosphere	7.9
Marine	4.5
Mineral Processing & Metal Production	4.1
Mineral Exploration & Mining	0.3

Resource Summary 2001-2002	
Total Revenue ($'000)	21,452
- Appropriation Revenue ($'000)	13,802
- Research & Services ($'000)	7,450
- Other ($'000)	200
Earnings Performance Indicator (%)	34.7
Operating Result ($'000)	-5,084
End of Year Cash Balance ($'000)	2,122
Research Staff (EFT)	118
Total Staff (EFT)	165

Focus

CSIRO Entomology's research is focused on three key areas: supporting Australian rural industries, working with manufacturers to develop innovative agrichemical products, and understanding and managing environmental issues.

Outlook and Strategies

Rural: Management and ecology of pests and weeds, reducing dependence on synthetic insecticides, and technologies for the storage of grains.

Agrichemicals: Insect pathogens (bacteria, fungi, nematodes and viruses) as environmentally safe new pesticides; insects as a source of new chemicals.

Environment: Knowledge and practice essential for the preservation and management of Australia's biodiversity and for sustainable agriculture and development.

Planned Activities and Achievements

Biodiversity

- Study the interactions between insects and their host plants; improve the efficiency and accuracy of host specificity testing of biocontrol agents
- Establish and monitor biocontrol agents against bridal creeper and bitou bush
- Build global network of invasion biologists to study relative invasibilities of ecosystems around the world
- Complete a number of monographs, catalogues and taxonomic revisions of important Australian invertebrate fauna categories
- Develop electronic and web identification tools for keyAustralian invertebrates; expand BioLink to include the management of morphological data
- Develop approaches to ecosystem sustainability, focusing on the involvement of invertebrates

Chemicals and Plastics

- Develop platform patents on receptors for use in high throughput screens for insecticides and on target validation for transgene & insecticide discovery

Field Crops

- Provide maps to WA farmers which show regional risk of aphid damage to each of five grain legume species
- Identify compounds in lupins that can be used as markers for natural plant resistance to aphids
- Carry out new research including ethyl formate as a fumigant, 'fumigation' to control dormancy in malting barley, and a survey of mites of stored products
- Commercialise adaptive discount control method for aeration of bulk grain stores for insect control

Textiles, Clothing and Footwear

- Evaluate the role of refuge crops in the management of resistance to Bt cotton
- Quantify the effectiveness of trap crops for cotton pests; determine the feasibility of using trap crops to disseminate virus for improved pest control
- Continue research on insect predators of *Harmigera*, especially coccinellid species found in cotton

Meat, Dairy and Aquaculture

- Compare the performance of herbivorous invertebrates on various pastures to enhance the TIMERITE® package to control redlegged earth mite
- Prospect for natural enemies in South America against serrated tussock and blue heliotrope, and in South Africa against Cape Tulip weeds
- Ensure biocontrol agents against temperate pasture weeds are widely distributed across southern Australia
- Prospect for natural enemies of belly-ache bush Mexican poppy. Complete the testing and release of the first agent against belly-ache bush

Horticulture

- Determine key factors in enhanced biodegradation of metham sodium, and identify relevant bacteria
- Commercialise a mating disruption system for clearwing borer in persimmons
- Complete field trial to assess the use of Metarhizium as a control for cerambycid borer
- Progress systematics research on a range of insect pests of horticulture, especially on native Australian parasitoids as potential biological control agents

Forestry, Wood and Paper Industries

- Develop effective risk management strategies for invertebrate pest species of plantation forestry

Climate and Atmosphere

- Finalise the development of the Biological Modelling Toolkit climate models DYMEX and CLIMEX

Built Environment

- Improve termite bait systems by enhancing bait attraction, understanding termite foraging behaviour

Planned Investment Profile by Sector	(%)
Biodiversity	23.3
Chemicals & Plastics	22.2
Field Crops	20.7
Meat, Dairy & Aquaculture	8.5
Textiles, Clothing & Footwear	8.4
Horticulture	8.0
Other Sectors	9.0

Resource Summary 2001-2002	
Total Revenue ($'000)	31,886
- Direct Appropriation ($'000)	15,701
- Research & Services ($'000)	15,884
- Other	302
Earnings Performance Indicator (%)	49.8
Operating Result ($'000)	-194
End of Year Cash Balance ($'000)	-124
Research Staff (EFT)	194
Total Staff (EFT)	260

Focus

CSIRO Exploration and Mining's research supports the Australian mining industry's need to maintain its international position among the lowest cost mineral suppliers, simultaneously combining safe production with high community acceptability. The Division spans the full spectrum of mining activities from primary exploration through to mine safety and site rehabilitation. Core science areas include: processes governing mineralisation, rock alteration and landscape evolution; advanced instrumentation systems and interpretation of data for exploration, mining and environmental engineering; mechanics of geological excavation, extraction and materials handling processes; and control and optimisation of mining equipment and its interaction with the mining process.

Outlook and Strategies

Exploration and mining still produces a large share of Australia's exports. There are some indications of an upturn in the market assisted by improved commodity prices in local terms. Spending on exploration for base metals has begun to increase, coal prices are strong, but gold exploration remains depressed.

The mining industry continues to be a strong user of technology and the decision by some major companies to outsource R&D has provided additional opportunities for CSIRO. The continuing pressure to increase output and lower costs puts pressure on R&D providers to produce packaged or turnkey solutions to ensure industry uptake. Extensive strategic analysis resulted in the "Glass Earth" concept, which has received strong support from industry and additional appropriation funding. Glass Earth projects are designed to make the top kilometre of the Australian continent, and the processes operating within it, transparent, with the aim of aiding the discovery of the next generation of giant ore deposits. In parallel, the Division will be developing the science and technology needed for safe, economic and sustainable access to these new resources.

Commissioning of the Australian Resources Research Centre (ARRC) in Perth will ensure the Division has access to state of the art research facilities in WA.

The Division will increase its involvement in the CRC Program over the next 12 months and will be a core participant in the CRC for Landscape, Environment and Mineral Exploration and the CRC for Predictive Mineral Discovery from July 2001.

Planned Activities and Achievements

Mineral Exploration and Mining

- With collaborators, finalise Stage I of a Glass Earth project on the Broken Hill area to develop enhanced exploration models and strategies using new geochemical, geophysical, visualisation and predictive modelling capabilities.
- Complete the first laboratory measurements of gravity gradients as a key element of the industry funded airborne gravity gradiometer system.
- In collaboration with CSIRO Telecommunications and Industrial Physics, complete Stage I of a project to develop an airborne tensor gradient gradiometer.
- Develop new spectroscopic methods for mapping of alteration and host rock mineralogy from remotely sensed data at all exploration and mine scales.
- Compilation of case history volumes on "Regolith-landform evolution in Australia" and "Regolith expression of Australian ore deposits".
- Successful commissioning of the CSIRO/Curtin University node of the Interactive Virtual Environments Centre at the ARRC.
- In collaboration with CSIRO Manufacturing Science and Technology, develop automation systems for existing mine equipment such as load haul dump vehicles, underground trucks and coal shearers.
- Demonstrate to industry and potential commercial partners the application of SMARTCUT technology to hard rock excavation, drilling and sawing.
- Develop the application of hyperspectral remote sensing technologies to the mapping and characterisation of wind blown dust contaminants associated with iron ore piles.
- Develop the application of geophysical exploration technologies in defining appropriate and cost effective management options to address dryland salinity.

Energy

- Complete a geological, geophysical and geotechnical supermodel for the western limb of the Bowen Basin.
- Develop techniques to map the surface topography of development drives and voids in underground mines in 3D to determine mass block structure for underground mining.
- Develop mine engineering tools and technologies for the enhancement of coal and minerals extraction with particular emphasis on longwall mining operations.
- Undertake proof of concept demonstrations of mine methane/waste coal power generation using indirectly fired turbine technology and employ in a mine rescue vehicle using energy stored in a salt heat cell.

Planned Investment Profile by Sector	(%)
Mineral Exploration & Mining	78.1
Energy	20.5
Petroleum	1.4

Resource Summary 2001-2002	
Total Revenue ($'000)	33,480
- Direct Appropriation ($'000)	18,213
- Research & Services ($'000)	15,067
- Other ($'000)	200
Earnings Performance Indicator (%)	45.0
Operating Result ($'000)	0
End of Year Cash Balance ($'000)	395
Research Staff (EFT)	165
Total Staff (EFT)	240

Focus

Food Science Australia(FSA) is an unincorporated joint venture between CSIRO and the Australian Food Industry Science Centre. FSA's multidisciplinary skill base and infrastructure are unique in Australia. It works closely with a wide range of industries, including the dairy, meat, milling, baking, snack and fruit and vegetable processing industries, as well as with service providers to those industries, such as packaging, transport and storage companies. In association with CSIRO Divisions in the Food Processing Sector, FSA offers research and technical services which solve problems for the food industry at every stage of the processed food business system. FSA also contributes to other Sectors, particularly Meat, Dairy and Aquaculture; Chemicals and Plastics; Field Crops; and Horticulture.

Outlook and Strategies

The key areas of science focus will be food safety, the molecular basis of food functionality, functional foods and nutraceuticals, value chain and process improvement and market understanding.

FSA will continue to develop long-term relationships with companies in Australia through strategic alliances and seek enhanced collaboration with Australian research agencies, particularly in Queensland, to ensure efficient public investment in food R&D.

New buildings at North Ryde and Werribee will be completed and remaining Highett operations relocated to Werribee (all Melbourne operations on a single site).

A comprehensive Marketing Plan will be developed to support our corporate strategy and improve the strategic/applied balance of our science portfolio, focusing particularly on improving key account management and expanding our international business. The existing relationships in Japan will be supplemented by alliances with food companies and research organisations in other parts of the world.

Planned Activities and Achievements

Food Processing

- Development of a prototype system based on superconducting principles for the detection of foreign bodies in foods and raw materials.
- Design and development of an acoustic soft sensor for the detection and control of food quality attributes during extrusion.
- Design, development and commercialisation of new separation technologies ('platform technologies') for isolation of protein and peptide ingredients, carbohydrates and antioxidants.
- Establishment of an 'Innovative Foods Centre' to develop novel alternatives to thermal processing of foods and beverages.
- Development of mathematical models to predict the quality of stone fruit at outturn in Asian markets.
- Development of flow injection techniques for the rapid analysis of food components, and of the rapid visco analyser for bench-scale process simulation.
- Selection and characterisation of cheese starter and non-starter bacteria suitable for tailored cheese variety production in bulk production plants.
- Globally commercialise the patented oxygen scavenging technology through links with local and multinational resin manufacturers and converters.
- Continued development and commercialisation of dairy proteins as functional food ingredients.
- Develop control strategies for critical flavour attributes in complex natural food systems.
- Development of methods for detection of naturally occurring toxins in foods.
- Development of new molecular based methods to track food borne pathogens through the food chain.
- Development of safe process criteria for non-thermal processes such as ultra high pressure.
- Development of risk based food safety objectives and control mechanisms for emerging microbial pathogens throughout the food chain.

Meat Dairy and Aquaculture

- Development of microbiologically safe strategies for accelerated processing of beef carcasses.
- Development of protection systems and management procedures to reduce on-farm contamination of cattle with food pathogens.
- Development of a commercial prototype carcass auto splitter for process mechanisation in abattoirs.

Horticulture

- Development of an alternative 'shell-cracking' technique to enhance the quality of pecan and other nuts for export to Asian markets.
- Develop an understanding of black aspergillus in the formation of ochratoxin in grapes.

Field Crops

- Commercialisation of biocontrol technology for aflatoxin production in peanuts.

Planned Investment Profile by Sector	(%)
Food Processing	75.9
Meat, Dairy & Aquaculture	16.1
Chemicals and Plastics	4.5
Horticulture	2.2
Field Crops	1.3

Resource Summary 2001-2002 *	
Total Revenue ($'000)	15,591
- Direct Appropriation ($'000)	15,591
- Research & Services ($'000)	0
- Other ($'000)	0
Earnings Performance Indicator (%)	0
Operating Result ($'000)	0
End of Year Cash Balance ($'000)	3,598
Research Staff (EFT)	123
Total Staff (EFT)	180

Focus

CSIRO Forestry and Forest Product's mission is to increase economic and environmental benefit to Australia by improving the management and productivity of the nation's forests, and the quality and value of forest products. The Division delivers research outcomes across the industry value chain and assists policy makers, development assistance agencies, and the community. Research also addresses environmental aspects of forestry and forest products, waste management and utilisation, management of land and water resources, biological diversity, bioenergy and carbon sequestration. Skills encompass genetics, silviculture, ecophysiology, soil science, modelling, wood and other materials sciences, and chemical and process engineering.

Outlook and Strategies

Key influences on Divisional strategy in 2000-01 include: Growth in Asian wood and paper consumption; Demand for environmental services and solutions from forests including carbon sequestration, amelioration of salt-affected land, improved water quality and quantity and bio-energy; Demand for environmental accreditation and sustainable production; Foreign investment in Australian forest industries; Shift in timber consumption away from natural forest sources to plantation forests; Australia's 2% renewable energy target; Competition in the supply of research services in Australia.

Our strategic responses include: Improve structure and management processes to ensure effective customer interactions and the right research balance; Strengthen capabilities in contract management, marketing and customer relations; Science Leaders Development Program to enhance management skills of research leaders; Maximise collaboration opportunities; Improve information flows and data management via Intranet tools and initiatives, process synchronisation and training; Strengthen scientific skills to meet challenges.

Planned Activities and Achievements

Forestry, Wood and Paper Industries

- Development of improved germplasm of hardwood and softwood species for Australia's low rainfall zone.
- Quantitative trait loci for disease resistance and wood properties incorporated into breeding programs.
- Accelerated flowering and seeding in *E. grandis.*
- Assessment of soil based criteria and indicators of forest sustainability.
- Assessment of impacts of plantation forests on water resources in the Green Triangle region.
- Partner, CRC for Plant Based Management of Dryland Salinity.
- Reviews of partitioning of forest biomass and change in soil carbon after afforestation, and calibration and testing of the FullCAM model for carbon accounting in Australian forests.
- Models that quantify relationships between weather conditions, fuel characteristics and fire behaviour in dry eucalypt forests. *[also Climate & Atmosphere]*
- *Heartlands* catchment inventories conducted, plantings designed and impacts monitored.
- GPS to evaluate economic and environmental trade-offs of harvesting strategies. *[also Land and Water]*
- Remote sensing assessments of forest productivity, structure, health and fauna habitat. *[also Biodiversity]*
- Initiation of collaborative research applying 'precision forestry' concepts to Australian plantations.
- New guidelines for safe work practices in forest fires.
- Commercial development of SilviScan-3.
- Extend use of NIR for assessing solid wood properties.
- Hardwood DryTech Group established.
- Commercialisation of pilot plants for integrated energy and carbon products and wood gasification for distributed energy generation. *[also Energy Sector]*
- Durable composites suitable for use in all Australian climates developed and tested.
- Novel, environmentally sound preservatives and treatment processes. *[also Built Environment Sector]*
- Paper coating technology for enhanced print response.
- Partner, CRC for Functional Communication Surfaces.

Biodiversity

- Potential distribution of Eucalyptus rust in Australia mapped and diagnostic capacity for identification and germplasm screening developed.
- Native soil fungi selected to improve sustainability of woodland revegetation.

Planned Investment Profile by Sector	**(%)**
Forestry, Wood & Paper Industries	82.8
Biodiversity	8.7
Climate & Atmosphere	2.9
Land & Water	2.3
Energy	2.1
Built Environment	1.3

Resource Summary 2001-2002	
Total Revenue ($'000)	25,649
- Direct Appropriation ($'000)	16,779
- Research & Services ($'000)	8,700
- Other ($'000)	170
Earnings Performance Indicator (%)	33.9
Operating Result ($'000)	0
End of Year Cash Balance ($'000)	2,771
Research Staff (EFT)	152
Total Staff (EFT)	215

Focus

CSIRO Health Sciences and Nutrition performs a key role in CSIRO's involvement in life sciences research in the human health arena. The drivers of health related R&D include globalisation of markets, urbanisation, changing health priorities as a consequence of an aging population, trends in national and international regulations, domination of new technologies and technology transfer. The Division works with the Australian food processing and pharmaceutical industries to promote nutritional strategies for good health and conducts pre-clinical research in the area of novel therapeutics. Our research programs focus on improvement of human well-being and community health, through prevention of disease, diagnosis and treatments. The Division offers both nutritional clinical and pre-clinical laboratory based facilities, including a sensory evaluation facility and research skills in structure-based drug design, fermentation, structural biology, molecular and cellular biology, nutrition, biochemistry, pharmaceutical chemistry, diagnostics, pharmacology, physiology, psychology and consumer science.

Outlook and Strategies

The Division is responding to two key drivers: the outcome of CSIRO priority setting in which attention was drawn to the need for careful consideration and restructuring of our activities in molecular biology and human health; and the dramatically changing external environment with respect to R&D in pharmaceuticals and food and nutrition.

A sharpening of focus on approaches to diagnostic research has been achieved by creating a program of diagnostic and therapeutic technologies which aims to develop technologies and reagents for improved clinical diagnosis and improved health care. This program has a major commitment to the CRC for Diagnostic Technologies. Another new program focuses on structural biology and aims to determine the three dimensional structure of proteins involved in disease processes in order to design new pharmaceuticals.

Greater focus in the nutrition area has been achieved by merging the functional foods program into the program on gastrointestinal health and colon cancer. The Starplus™ short-chain fatty acid delivery system has been progressed through the development of IP and the appointment of a business/project manager to oversee commercial development. Additional funding through the Food Processing Sector has led to the formation of a Nutrition Enhancement Program (NEP) with strong indications of support from industry. NEP will focus on analysis of resistant starch and bioavailability of minerals in the diet. The Consumer Science Program has established a new sensory testing unit which will meet the needs of this area of growing interest to industry.

The Division aims to capture its investment in intellectual property positions in both the food and pharmaceutical areas using a range of commercial technology transfer processes.

Planned Activities and Achievements

Food Processing

- Commercial development and further IP generation for Starplus™.
- Commissioning of NEP to establish methodologies for nutrient bioavailability and resistant starch to substantiate health benefits of foods.
- Identification of methodologies and strategies to assess the effect of dietary factors on cognition in children.
- Effects of food constituents and processing by-products on biomarkers of bowel health, including novel methods for enumeration of gut bacteria, and vascular and gut function.
- Identification of sensory and psychosocial factors affecting food choice and risk perception in consumers.
- Investigation of the ability of various combinations of macronutrients, especially protein, to aid weight loss, improve insulin-sensitivity and help maintain weight loss and improve glucose control in the long term.

Pharmaceuticals and Human Health

- Development of an internationally acceptable scoring method to standardise the micronucleus assay for genome stability and develop a rigorous protocol for assessment of cancer radiosensitivity.
- Development of new proteins and mutation strategies for high-sensitivity reagents, including in vitro and in vivo evaluation for clinical diagnosis.
- Continuation of studies to determine the structure of insulin receptor and IGF-1 receptors and their complexes with insulin or IGF.
- Continue development and efficacy testing of pharmaceutical agents, based on IGF-1 and EGF receptor structures, for modulating cell growth.
- Develop and test novel bioactive agents isolated from natural products or produced as synthetic analogues for their ability to enhance tissue growth and repair.

Planned Investment Profile by Sector	(%)
Pharmaceuticals & Human Health	71.8
Food Processing	20.6
Meat, Dairy & Aquaculture	4.7
Field Crops	2.9

Resource Summary 2001-2002	
Total Revenue ($'000)	20,779
- Direct Appropriation ($'000)	14,323
- Research & Services ($'000)	6,460
- Other ($'000)	-4
Earnings Performance Indicator (%)	31.1
Operating Result ($'000)	-353
End of Year Cash Balance ($'000)	-484
Research Staff (EFT)	132
Total Staff (EFT)	172

CSIRO Land & Water — Chief: Dr Graham Harris

Focus

CSIRO Land and Water's research is focused on the ecological, economic and social issues that underpin sustainable development and the long-term management of the Australian landscape. A unique interdisciplinary science capability that addresses national land and water management issues makes the Division a key provider of strategic science and innovation. CSIRO Land and Water has positioned itself to provide integration across disciplines and systems understanding. To ensure adoption, the Division has developed strategic links to environmental policy bodies, local, State and Commonwealth governments, industrial, urban, agribusiness, mining and manufacturing industries, and community-based land management groups.

Outlook and Strategies

The Division will provide timely advice - based on quality science - to ensure the development of sound natural resource management policies. This will be achieved by improving the understanding of biophysical, social and economic processes of Australian landscapes and water resources, and through continuing dialogue with Commonwealth, State and Territory agencies, private companies with the mandate for natural resource management, and other Divisions. The Division has partnerships in thirteen CRCs.

To deliver outcomes described in the Sector Plans the Division will redirect some research activities; acquire some specific additional skills; strengthen capabilities in innovation and commercialisation; and increase the use of web based technologies to distribute national datasets and decision support tools developed by the Division.

Planned Activities and Achievements

National Land and Water Resources Audit: Delivery of outputs to four of the seven Audit themes (dryland salinity; land use productivity and sustainability; costs of land and water degradation; capacity for change in land use and river, estuarine, and catchment health). *[Land and Water]*

Salinity and Water Quality Strategy: Develop the capability required to maintain and re-establish native vegetation in recharge areas with a salinity risk. Develop the means to link changes in salt loads to groundwater dynamics and develop changes to land management practices that are economically feasible and sustainable. *[Land and Water]*

Adelaide Coastal Waters Study: Conduct a major investigation of the ecological health and sustainability of Adelaide's coastal waters on behalf of the South Australian Government. Work closely with South Australian state agencies to study a wide range of chemical, physical and biological processes in the water systems. *[Land and Water and Marine]*

Ord-Bonaparte Program: Undertake a comprehensive regional assessment of biophysical, social and economic factors in the Ord-Bonaparte region of north-west Western Australia in partnership with key agencies, stakeholders and other CSIRO Divisions. This program aims to provide the data and knowledge that will underpin the future sustainable development of the region. *[Land and Water, Marine, Climate, Biodiversity, Field Crops]*

Heartlands Project: Conduct biophysical, social and economic analyses of planned large-scale revegetation in four NSW and Victorian catchments in accordance with a five year work plan developed after extensive community, agency and science consultation. *[Land and Water; Biodiversity; Forestry, Wood and Paper]*

Redesigning Agriculture for Australian Landscapes: Undertake Phase II of the program (with Land and Water Australia) to deliver capacity to analyse/design production systems that are benign to the environment, yet produce high-quality products and maintain farm incomes. *[Field Crops, Land and Water, Biodiversity]*

Cockburn Sound: Quantify the impacts of groundwater on the marine environment and develop on-ground remediation strategies to remove nutrients prior to discharge to the marine environment. Assist in the preparation of environmental quality criteria, an Environmental Management Plan and a Water Quality Management Strategy for Cockburn Sound. *[Land and Water]*

Climatic Modelling: Develop improved understanding of the impact of climate change and variability on water availability for south-west Western Australia and the Murrumbidgee Catchment. *[Land and Water]*

The Division will also contribute outputs to the National Dryland Salinity Program Phase II, the National Irrigation Science Network, the National Rivers R&D Consortium, and the Gippsland Lakes Study.

Planned Investment Profile by Sector	(%)
Land & Water	69.7
Field Crops	8.0
Built Environment	4.5
Mineral Exploration & Mining	4.5
Biodiversity	4.0
Climate & Atmosphere	2.4
Other Sectors	6.9

Resource Summary 2001-2002	
Total Revenue ($'000)	47,646
- Direct Appropriation ($'000)	30,789
- Research & Services ($'000)	16,300
- Other ($'000)	557
Earnings Performance Indicator (%)	34.2
Operating Result ($'000)	-763
End of Year Cash Balance ($'000)	6,643
Research Staff (EFT)	326
Total Staff (EFT)	479

Focus

CSIRO Livestock Industries (CLI) works in the major temperate, Mediterranean and tropical production zones of Australia. CLI comprises highly-trained staff, and specialised field and laboratory facilities at Armidale in New South Wales, Rockhampton and Brisbane in Queensland, Floreat Park in Western Australia and the Australian Anima Health Laboratory (AAHL) in Geelong, Victoria. We assist livestock and allied industries to be economically viable ecologically sustainable and capable of contributing to the social an natural resource objectives of the nation in maintaining Australia's freedom from the major epidemic diseases of livestock. We aspire to be global leaders in research, creativity and innovation in all aspects of livestock production systems.

Outlook and Strategies

CSIRO Livestock Industries was formed on 1 July 2000 through amalgamation of the former CSIRO Divisions of Animal Health and Animal Production and parts of Tropical Agriculture. We create, develop, and commercialise technologies for novel products, new production options, improved production efficiency, disease control and product quality throughout the livestock industry value chain. In many cases we provide advances through allied industries such as breeding services, feed companies, veterinary product manufacturers and other service providers.

The Division will participate in 3 new CRCs this year and aims to spin-off a biotechnology company to commercialise some of its intellectual property. The Prospect site will close at the end of 2001, and a major redeployment and recruitment program will increase staff numbers at Armidale, Brisbane and Rockhampton.

Planned Activities and Achievements

Meat, Dairy and Aquaculture

- Develop research capabilities in functional genomics and systems approaches to cattle production value.
- Improve control of meat quality through breeding plans based on advanced genetic technologies.
- Genetic information delivered to industry via innovative spin-off and licensing mechanisms.
- Continued development of improved freshwater crayfish for profitable aquaculture.
- Swift diagnosis and investigation of exotic diseases and rapid, efficient participation in managing animal and fish disease outbreaks of national significance.
- Advise Government and related agencies on livestock industry policy development and implementation.
- License prototype vaccines for cattle, pigs and poultry to partners for evaluation. Negotiate new research contracts for vaccine and therapeutic development.
- Evaluate recombinant antigens from *Mycobacterium paratuberculosis* in gamma interferon assay to provide a more specific test for Johne's disease.
- Complete validation of remote sensing technology, and conduct pilot trials on farms in WA. *(also Textile, Clothing and Footwear)*
- Complete commercial-version of AUSPIG for Microsoft Windows platform.
- Transfer to a commercial partner technology for novel delivery system for porcine growth hormone.
- Formulate diets based on agricultural by-products and wastes that achieve liveweight gains >1kg/d in cattle.

Textiles, Clothing and Footwear

- Develop a project on profitable animal production on saline soils, with emphasis on the role of new pasture plants. *(also Meat, Dairy and Aquaculture)*
- With industry partners continue development of an ultra-fine strain of Merino sheep.
- Based on existing software begin developing web-based decision support tools for Merino breeders.
- Test long-term effectiveness of a novel procedure to prevent breech strike in sheep.
- Commercial evaluation of a novel technique for formulation and delivery of bioactives to livestock. *(also Meat, Dairy and Aquaculture)*
- Field-test technology for biological control of free-living stages of parasitic worms on pasture. *(also Meat, Dairy and Aquaculture)*

Food Processing

- Conduct preliminary toxicity studies for tunicamycin to determine the no observable effect limit for corynetoxin toxicity and assess corynetoxin levels in grain and fodder samples

Climate and Atmosphere

- Complete field-testing in sheep of a vaccine against methanogenic organisms and commence development of a cattle vaccine. *(also Meat, Dairy and Aquaculture)*

Marine

- Conduct a trial to test the effect of Omega2 enrichment of milk on pasteurisation, product development and shelf life. *(also Meat, Dairy and Aquaculture)*

Planned Investment Profile by Sector	(%)
Meat, Dairy & Aquaculture	69.2
Textiles, Clothing & Footwear	27.4
Climate & Atmosphere	1.8
Food Processing	1.1
Marine	0.5

Resource Summary 2001-2002	
Total Revenue ($'000)	52,612
- Direct Appropriation ($'000)	34,563
- Research & Services ($'000)	16,509
- Other ($'000)	1,540
Earnings Performance Indicator (%)	31.4
Operating Result ($'000)	-1,982
End of Year Cash Balance ($'000)	-6,257
Research Staff (EFT)	293
Total Staff (EFT)	502

Focus

CSIRO Manufacturing Science and Technology supports Australian manufacturing industry through the development and utilisation of innovative materials, processes, products and services. Its science and technology foci range from materials development, processing and characterisation, electrochemical technologies, micromanufacturing, laser processing, joining and cutting technologies, and surface engineering through to pervasive technologies like automation and real time systems, photonics and intelligent manufacturing systems which are broadly important to many industry sectors. The Division aims for a balanced research portfolio enabling quality commercial outcomes for industry while maintaining a strong scientific base.

Outlook and Strategies

Optical Engineering Associates Pty Ltd, formed in July 2001 from the Optical Systems Engineering group, will take their technology into a commercial venture. InMag Pty Ltd has been formed as a CSIRO spin-off company; initially to establish a comprehensive business plan, then to realise international commercialisation of a high yield magnesium die casting technology. The optimum route for commercialisation of the mature EXELGRAM technology is being investigated with expected release in early 2002.

A Continuous Improvement Program is targeting more effective and efficient business operations and a responsive commercial interface with customers.

International and local partnerships and alliances are being sought. Dialogue with Oxford University Materials Department aims to establish formal research links. A joint venture strategy with Monash University School of Physics and Materials Engineering will be pursued. Technologies arising from the International Food Manufacture & Packaging Science CRC, which concludes in 2002, will be taken forward by CSIRO and others under newly formed relationships.

Planned Activities and Achievements

Integrated Manufactured Products

- Development of cold spray technologies for applications in mining and health.
- Development with the CAST CRC, of a system for cover gas use in magnesium diecasting furnaces to reduce operating cost and environmental impact.
- Development of industry support for the production of higher strength, light-weight alloys.
- Successful pilot scale manufacture of direct cast magnesium sheet with industry partners.
- Development of phase contrast x-ray imaging technologies for industrial applications.
- Development of new metal finishing processes for corrosion prevention and adhesive bonding uses.
- Optically variable device microstructures for direct print anti-counterfeiting applications.
- Biomedical microstructures for tissue interface and pathology device applications.
- Development of visualisation and demonstration systems with furnishing companies, delivered as educative and productivity showcases.
- Implementation of VIEWBID proof of concept software for bidding or tendering documents for engineered products.
- Development of enhanced processing methods and performance for aluminium/scandium alloys.
- Development of functionally graded materials, using powder processing and forming procedures to develop products with controlled porosity, composition or structure.
- Development of catalytic processes for treatment of industrial stream and effluents for pulp and paper, aluminium and dairy industries.

Chemicals and Plastics

- Applications development with commercial partners, of a range of tailored nano materials for plastics, personal care products and electronic ceramics.
- Production of self assembled systems for applications in membranes, templating and microfluidic devices.

Mineral Exploration and Mining

- Demonstration of digital terrain mapping and assessment of the financial benefits of swing automation for dragline operation in open cut mines.

Mineral Processing and Metal Production

- Development of models and methods for predictive maintenance for improved operational efficiency and enhanced asset utilisation.

Services

- Commercialisation of RoadCrack and development of a new generation of Safe-T-Cam.

Planned Investment Profile by Sector	(%)
Integrated Manufactured Products	75.6
Chemicals & Plastics	9.0
Mineral Processing & Metal Production	5.3
Energy	5.0
Built Environment	1.8
Mineral Exploration & Mining	1.7
Services	1.6

Resource Summary 2001-2002	
Total Revenue ($'000)	43,150
- Direct Appropriation ($'000)	27,304
- Research & Services ($'000)	15,706
- Other ($'000)	140
Earnings Performance Indicator (%)	36.4
Operating Result ($'000)	-321
End of Year Cash Balance ($'000)	2,270
Research Staff (EFT)	202
Total Staff (EFT)	270

Focus

CSIRO Marine Research (CMR) programs provide a scientific basis for ecologically sustainable development of Australia's marine resources. CMR also investigates the ocean's role in predicting climate change and variability, and potential climate impacts on marine and terrestrial resource productivity. An international-calibre science capability and a diverse skill base allows CMR to play a key role in achieving the government's vision of "Healthy oceans cared for, understood and used wisely for the benefit of all, now and in the future" (Australia's Oceans Policy).

Outlook and Strategies

The challenges facing Australia as the custodian of the world's largest and most diverse Exclusive Economic Zone are daunting. CMR's research responds to national priorities articulated in *Australia's Ocean Policy,* particularly regional marine planning, ecologically sustainable marine industries, and ecosystem integrity and biological diversity.

CMR's research is based on a fundamental analysis of ecosystem function, and oceanic and coastal environments. We provide advice and decision-making tools direct to industry managers and government to assist them to make scientifically based judgements on resource use, production practices and policy issues.

Collaboration and co-investment are key strategies we employ to improve outcomes and remove obstacles in the path to adoption of our research by government and industry. In 2001 CMR will implement a 6-year $20m strategic research initiative with the WA government to enable collaborative work between WA agencies, CSIRO, universities and other research providers. This will involve a significant increase in CMR staff in WA.

CMR's coastal management R&D will be delivered through the Coastal CRC, the WA research initiative, and the Ord-Bonaparte study. We will work closely with the fishing and aquaculture industries, play a significant role in establishing the CRC for Sustainable Aquaculture of Finfish, develop a closer relationship with the Royal Australian Navy and remain active in international ocean data and climate research programs.

Planned Activities and Achievements

Marine

- Maps and interpretation of habitats and ecosystems, and evaluation of rapid mapping techniques for regional planning in the SE, NW Shelf, GBR, Torres Strait and Timor Box.
- Prototype models linking the biophysical dynamics of the NW Shelf ecosystem and the impacts of selected uses, and a protoype decision support tool-box.
- Improved stock assessment and catch predictions in the Northern Prawn, Southern Bluefin Tuna and Tropical Snapper fisheries. National framework for reporting ESD performance for fisheries.
- Management scenario models and strategies to minimise environmental impacts of trawling on ecosystems and evaluation of bycatch management strategies in selected trawl and longline fisheries.
- Assessment of potential to reseed brown tiger prawn in Exmouth Gulf by developing high-density production systems, harvest and transport protocols, genetic tags and habitat surveys.
- Assessment of the impact of catchment activities on tropical and subtropical estuaries.
- Assessment of the environmental effects of salmon aquaculture on coastal environments.
- A commercialisation plan for technology to eliminate or prevent establishment of aquatic pests. *(also Biodiversity)*
- Analysis and prediction of the physical and chemical structure of ocean environments through assimilation of satellite and *in situ* data in models for application to fisheries and defence. *(also Climate and Atmosphere)*
- Production of unique polyunsaturated fatty acids from microalgae and assessment for use in nutraceuticals. *(also Pharmaceuticals and Human Health)*

Meat, Dairy and Aquaculture

- Low protein diets and efficient feeding regimes to minimise effluent from prawn farms. *(also Marine)*
- Commercial scale domestication and selective breeding of Kuruma prawn and Pacific oyster. Simulated commercial trials of new diets for prawns.

Climate and Atmosphere

- Improved projections of human-induced climate change and sea level rise using oceanographic data, theoretical analyses and model results.
- Seasonal climate predictions and applications in farm management, emphasising connections to eastern equatorial Pacific, Indian and Southern Oceans.
- Improved estimates of carbon dioxide present in the Southern Ocean due to human activity and use of estimates to validate carbon uptake in climate model.

Planned Investment Profile by Sector	**(%)**
Marine	75.6
Climate & Atmosphere	9.5
Meat, Dairy & Aquaculture	9.0
Biodiversity	3.5
Pharmaceuticals & Human Health	1.0
Mineral Processing & Metal Production	0.7
Petroleum	0.6

Resource Summary 2001-2002	
Total Revenue ($'000)	34,954
- Direct Appropriation ($'000)	23,037
- Research & Services ($'000)	11,817
- Other ($'000)	100
Earnings Performance Indicator (%)	33.8
Operating Result ($'000)	-666
End of Year Cash Balance ($'000)	3,925
Research Staff (EFT)	203
Total Staff (EFT)	302

Focus

CSIRO Mathematical and Information Sciences carries out and deploys research to generate world-class applications, for the benefit of Australia. This research is based on expertise in information technology, mathematical and statistical sciences, integrated with a sound understanding of the business and scientific/technological context. The principal Sectors in which we work are Information and Communication Technologies and Services. We also work actively with the Integrated Manufactured Products, Mineral Processing and Metal Production, Marine, Land and Water and Petroleum Sectors and are responsive to the needs for our expertise that arise in other Sectors.

Outlook and Strategies

The growth of the Internet and its role in business will continue to accelerate, with a number of implications for the Division, including:

- Growth in interest in many of our research areas, including interfaces between people and e-commerce sites and the easy accessibility of data across heterogeneous virtual corporations.
- An increase in the number of groups working in these research areas and increased need for collaboration.
- A greater expectation that Intellectual Property will be packaged for commercialisation through licensing and creation of companies.

In response, the Division will:

- Establish the CSIRO Internet Innovation Centre (CIIC) on the Macquarie University site as part of an Innovation Centre planned by the University. The CIIC will showcase CSIRO internet technologies and provide a facility where CSIRO researchers, and their counterparts from industry and Macquarie University, can collaborate on the development of innovative internet related technologies.
- Identify intellectual property which is able to be commercialised immediately or after a defined additional R&D effort and seek investors for commercialising the intellectual property.

CMIS, together with CTIP, has been negotiating with a number of Universities, to develop a recruitment programme involving three years employment combined with funded study of technology and enterprise management courseware leading to a Masters degree. There will be an initial trial enrolment in 2001 leading to the development of a programme supporting the generation of entrepreneurial technologists.

The major activity for the Division's recently established internal Science and Engineering Research Council is the initiation and co-management of a mentoring program.

The Division will implement new Key Performance Indicators addressing the following Key Result Areas for the Division: high impact outcomes; high quality science; strategic external relationships; commercialisation strategies; people, performance and capabilities; and internal process improvement.

Planned Activities and Achievements

Information and Communication Technologies

- Build and deliver search, web delivery, web record capture and email capture components of corporate memory systems.
- Provide advice to government and vendors on the effective capturing of electronic records using the VERS model.
- Build information delivery systems that deliver digital information in a variety of media.
- Perform research on the benefit of tailored delivery.
- Use Haptic workbenches for realistic surgical training and the objective testing of trainee surgeons.
- Design and development of a Rural-Online demonstrator system that makes use of new networking and enterprise distributed computing technologies.
- Establishment of a Product Research Unit (PRU) in middleware technology evaluation. to help 6 organizations with technology evaluations, and produce 6 major commercial reports on middleware technology. Develop a strategic plan for commercialisation of the PRU.
- Develop and trial mobile information systems that facilitate data delivery as well as data collection to devices and equipment in the field.
- Be a major contributor to the development of a new international standard for graphic content over the Web and develop tools and technologies to support the standard.
- Develop technologies for federated information systems to facilitate the exchange of information and services across organisational boundaries. Initiate plans for a start-up company to develop and market this core technology.

Services

- Development of techniques for risk management including continued development of software for pricing complex options and other financial derivatives and models for operational risk.
- Develop an extended data mining toolkit to handle large administrative data sets (Medicare, PBS and demonstrate increased efficacy in health outcomes research for the Commonwealth Department of Health and Aged Care.

- Development of algorithms for rhetorical analysis of text documents.
- Develop of algorithms for multi-attribute reverse auctions resulting in commercial deployment and a patent.
- Completion of CSIRO work on a START grant to Time and People Australia (TPA) for the development of an advanced rostering system, along with a commercialisation plan for its global adoption.
- Develop image analysis methods to support high throughput secondary screening in drug discovery, including contract research to develop understanding of technical challenges and the business domain; evaluate options for market entry and develop relationships with leading global players.
- For emerging molecular diagnostics develop algorithms and software for high dimensional data analysis. Establish market position in bio chip informatics and develop collaborations with at least two companies in that market.
- Develop and market bio chip informatics for discovery projects and generate commercial relationships to provide market access

Land & Water

- Significant contribution to the Australian Greenhouse Office's efforts to estimate Australia's greenhouse emissions.
- Industry capability building for mapping and monitoring change in remnant vegetation using Landsat satellite data.
- The *Pesticide Impact Ranking Index* (PIRI) will be applied to the protection of water supplies in Syria's Al-Ghab plain and will also be adapted for use in the Adelaide hills.
- New techniques for monitoring sewer overflows in space and time will be implemented through the CRC for Coastal Zones

Marine

In collaboration with Marine Science:

- Take an inventory and map by-catch and seabed biota in the Great Barrier Reef region. This will support conservation of biodiversity and management for ecological sustainability of the Queensland East Coast Trawl Fishery.
- Find surrogate physical variables for important environmental variables, as a prelude to devising a system of Marine Protected Areas
- Conduct joint modelling of effort and catch for Southern Bluefin Tuna.

Built Environment

- Construction and implementation of models for predicting service life performance of distribution systems with an emphasis on urban water pipelines.

Integrated Manufactured Products

- Construction and implementation of models for manufacturing applications including for filtration, dewatering and drying; for rolling, coating and coiling in steel production; for surface optimisation relating to the design of spectacle lenses.
- Development of numerical models based on Smoothed Particle Hydrodynamics for modelling the filling of dies in high pressure die casting.

Mineral Processing and Metal Production

- Formulation of models for particle simulations including models for interpretation of acoustic and other signals for mill monitoring; inclusion of fluids in models; incorporation of breakage in models; and analysis of mineral sampling.

Climate & Atmosphere

- New seasonal climate forecasting tools for Southwest Australia to be benchmarked against existing approaches.

Research Support

- In December 2001, Carlton based CMIS staff will move to the Division's site at Clayton.
- Implementation of specialised in-house training for new Group Leaders in response to a needs analysis and focus on training for leadership at an earlier stage in the careers of new staff.

Planned Investment Profile by Sector	(%)
Information & Communication Technologies	38.0
Services	18.5
Land & Water	10.0
Integrated Manufactured Products	5.5
Marine	5.0
Built Environment	4.9
Mineral Exploration & Mining	3.4
Petroleum	3.1
Climate & Atmosphere	3.0
Mineral Processing & Metal Production	2.3
Other Sectors (8)	6.2

Resource Summary 2001-2002	
Total Revenue ($'000)	36,923
- Direct Appropriation ($'000)	25,003
- Research & Services ($'000)	11,620
- Other ($'000)	300
Earnings Performance Indicator (%)	31.5
Operating Result ($'000)	-1,277
End of Year Cash Balance ($'000)	2,0051
Research Staff (EFT)	87
Total Staff (EFT)	257

Focus

CSIRO Minerals provides research, development and commercialisation support for Australia's mineral processing and metal production, energy generation, and petroleum industries to assist them to remain globally competitive and improve their environmental and social performance. It achieves this through the innovative application of mineral processing, pyrometallurgical, hydrometallurgical, mineralogical, chemical, physical, engineering and mathematical skills and experience, and its leading-edge facilities for mineral characterisation, reaction and process modelling, diagnosis and engineering, laboratory scale process investigation, and pilot plant design and operation.

Outlook and Strategies

The minerals industry operates against a backdrop of amalgamation, reorganisation and uncertainty resulting from increasing globalisation, erosion of technical capability and the need to process more complex and lower grade ore bodies. At the same time, there is increasing public scrutiny of the environmental and social impact of mining and minerals processing and of the life cycle of metal-containing products.

These pressures require Minerals to provide a rapid response to short-term productivity issues and develop new technologies and strategies that will sustain the industry in the long term. Increasing research costs within CSIRO, in the face of declining industry expenditure on R&D, in turn, drive the need for increased efficiency and a carefully targeted project portfolio.

The strategic research base of the division is being enhanced through new initiatives in biomineral processing, on-line analysis and control technologies, computer simulation at the molecular level, titanium metal production and technologies for sustainability. Overhead costs are being reduced by consolidation of the iron ore processing activities at QCAT and closure of the North Ryde site late in 2001. Key account management has been improved through a planned program of interaction with senior industry personnel and establishment of Industry Technical Panels. Better utilisation of the Division's intangible assets and improvements in knowledge flows and storage is being empowered through the appointment of a Knowledge Assets Manager. Research in ore dressing and process mineralogy has been reviewed and, as a result, these activities will be better targeted to industry needs. There will be an increased focus on commercialisation of existing and emerging technologies, including possible spin-off of some routine service activities.

Planned Activities and Achievements

Mineral Processing and Metal Production

- Develop greater understanding and application of the concept of sustainability as it relates to the minerals industry.
- Apply thermal fluid mechanics to improve reactor design and operation, and reduce the environment and OH&S impact of thickeners, cyclones, flotation cells, precipitators, fluidised beds, kilns and flue ducts.
- Continue the development and commercialisation of a range of on-line instruments, and develop techniques for rapid analysis of individual ore particles using sensors based on infra red, LIBS, microwave and X-rays. Develop on-line integration of multi-sensor data using artificial neural net and expert systems.
- Complete an assessment of the technical and market opportunities and impediments for an Australian titanium metal production industry.
- Apply mathematical modelling capabilities to industrially important problems, particularly flowsheets, interfacial phenomena, and crystallisation.
- Provide a whole-of-process R&D capability to industry through a combination of plant audit and diagnostics supported by laboratory and pilot plant development work.
- Provide support to industry to achieve commercial production of magnesium.
- Improve understanding of the relationships between ore characteristics and metallurgical performance of raw materials to predict and optimise their down stream processing performance.
- Improve the environmental acceptability of mineral products and of mineral processing operations.
- Assemble a collection of naturally occurring organisms suitable for bio-mineral processing at high temperatures and develop an understanding of their physiology, with a focus on the bio-leaching of chalcopyrite.
- Develop and apply understanding of particle technology to improve agglomeration and crystallisation processes.

Energy

- Establish a fluid dynamics laboratory to provide data for validation of computational fluid dynamics models of "greener" combustion and gasification of lignite (CRC for Clean Power from Lignite).

Planned Investment Profile by Sector	(%)
Mineral Processing & Metal Production	94.9
Energy	4.7
Petroleum	0.4

Resource Summary 2001-2002	
Total Revenue ($'000)	33,068
- Direct Appropriation ($'000)	20,978
- Research & Services ($'000)	12,005
- Other ($'000)	85
Earnings Performance Indicator (%)	36.3
Operating Result ($'000)	36
End of Year Cash Balance ($'000)	731
Research Staff (EFT)	189
Total Staff (EFT)	273

Focus

CSIRO Molecular Science helps to develop high technology manufacturing industries for Australia. The Division develops products and processes for domestic and global industry through the application of chemical and biological sciences. Research is carried out in a number of strategic areas: life science technologies including biomaterials, pharmaceuticals and human health; agrochemicals and industrial microbiology; environmental technologies which includes cleaner chemical processing, and water, waste water and industrial sludge treatment; engineered polymers; and functional fluids, security devices and nanotubes. The Division works with a broad range of local and multinational business and research collaborators to develop and exploit innovative materials, products, processes, and services.

Outlook and Strategies

The Division has restructured its research under three strategic areas – Molecular Engineering, Applied Chemistry, and Biotechnology – to generate operational efficiencies and to better serve industry. A further initiative is the appointment of dedicated business staff to each of the Research Programs. Their role is to provide commercial advice to Program staff, and be involved in specific commercial projects identified by the Division.

We have recently completed an internal communication review and developed an action plan to address the issues raised. New initiatives include: a broadening of the Division's seminar program to include non-science presentations; a review of the project planning process; improved use of IT infrastructure and tools; and a Divisional Conference planned for mid-September 2001. The Conference will bring together, for the first time, staff from all programs based at each of the three sites. The agenda will promote focused discussion around our science, our roles, how the Division functions, and a broader range of corporate and local issues that are affecting both CSIRO and the Division.

Planned Activities and Achievements

Chemicals and Plastics

- Negotiate and support commercialisation of RAFT polymer technology to maximise return.
- Assist Orica Australia Pty Ltd in commissioning a MIEX resins plant. Provide support in trouble-shooting, analysis of production samples, and further research into factors affecting commercialisation.
- Discovery of veterinary parasiticides through a collaborative research project with Schering-Plough.
- Development of applications of carbon nanotubes.
- Negotiation with SICPA Security Products regarding the development of non-banknote security devices.
- Commercialisation of high-melt strength polypropylene technology (with CRC for Polymers).
- Commercialisation of proprietary organoboron technologies for chemical synthesis.
- Establishment of a microbial bioprocessing facility at the Clayton site.

Pharmaceuticals and Human Health

- Selection of a pharmaceutical company to advance the glycosidase inhibitors to preclinical development for the treatment of Hepatitis B and C.
- Commercialisation of Ovine Adenovirus technology in gene therapy.
- Finalise the selection of polymers that will be scaled up for the beginning of regulatory studies relating to: (i) an artificial corneal onlay and (ii) an injectable polymer suitable for an intraocular lens.
- Interim analysis of a clinical survey evaluating a new gene-based assay for the detection of prostate cancer.
- Establish new commercial linkages to further exploit diagnostic opportunities due to gene methylation.
- Support AorTech in the further development polyurethane-based materials suitable for a fully synthetic tri-leaflet heart valve.
- Extend our activities in biomaterials into the burgeoning field of tissue engineering with a focus on cartilage, ligament and bone repair.

Built Environment

- Determination, development and demonstration of alternative technologies and processes for optimum configurations of urban water systems.
- Better characterisation of water and wastewater sludges for cost-effective handling and disposal.
- Development of a high rate process for particle removal from sewer overflows.
- Completion of pilot plant field trials of novel hybrid membrane process for water treatment.

Petroleum

- Identify collaborative opportunities to exploit expertise related to improved water-based drilling fluids.

Mineral Processing and Metal Production

- Establishment of molecular biological approaches to improving bioleaching by *Bacteria* and *Archaea*.

Planned Investment Profile by Sector	(%)
Chemicals & Plastics	45.7
Pharmaceuticals & Human Health	42.9
Built Environment	8.9
Petroleum	1.3
Mineral Processing & Metal Production	1.1

Resource Summary 2001-2002	
Total Revenue ($'000)	33,653
- Direct Appropriation ($'000)	19,353
- Research & Services ($'000)	14,300
- Other ($'000)	0
Earnings Performance Indicator (%)	42.5
Operating Result ($'000)	142
End of Year Cash Balance ($'000)	1,493
Research Staff (EFT)	165
Total Staff (EFT)	211

Focus

CSIRO Petroleum Resources provides research capabilities and technology directed at maintaining an internationally competitive and sustainable Australian oil and gas industry. It focuses on exploration, field appraisal and production. Multidisciplinary skills in geology, geophysics, mathematical modelling, geomechanics and petroleum / production engineering are applied to four underlying themes: improving exploration and appraisal performance, reducing costs with innovative technology, minimising the industry impact on marine environments, and maximising the value to Australia from its oil and gas resources. The results of our research are applied in the Petroleum and Energy Sectors.

Outlook and Strategies

Australian oil and gas production is currently worth $8b and net exports are $1b. The industry currently satisfies 54% of Australia's energy needs, including 70% of oil and 100% of gas. Gas is forecast to increase its share of Australia's energy mix, largely at the expense of coal.

The outlook for oil suggests self sufficiency will decline to about 60% within 10 years, with a significantly increased import requirement. This is driving a focus on oil exploration, especially in the north west. The gas supply outlook is strong, based on major developments like the North-West Shelf and Gorgon projects.

CSIRO has established itself as the major Australian R&D provider addressing Australian priorities, but operating on a global stage. The Division maintains strategic relationships with the Australian Petroleum CRC, with other national and international research agencies, and with service and operating companies.

The Division's existing disciplinary base is being complemented by the development of new capabilities in geophysics, decision making, data management and heuristics, gas processing and geothermal energy.

The completion of the new Australian Resources Research Centre (ARRC) at Bentley in July 2001 will focus Australia's petroleum R&D capacity in Perth.

Planned Activities and Achievements

Petroleum

- Quantify petroleum generation processes, including expulsion efficiencies, to define source potential and thermal histories of source rocks as a basis for more effective exploration.
- Improved prediction of petroleum migration and accumulation histories and improved reservoir estimation through a better understanding of the evolution of reservoir fluids over geological time.
- Technology to improve the appraisal of fault conductivity and its impact on seal integrity and reservoir compartmentalisation.
- Develop capabilities in chemostratigraphy and geochemical modelling for high resolution correlation and the prediction of regional diagenetic patterns
- Continue to improve and apply capabilities in numerical forward stratigraphic modelling and demonstrate its use in an integrated hydrocarbon exploration and development environment.
- New technologies to increase the quality of appraisal and the efficiency of field development emphasising high resolution definition of reservoir properties and production parameters.
- Quantify the processes involved in using hydraulic fracturing to pre-condition ore and induce caving in mining. Improve prediction of hydraulic fracture growth in naturally fractured rock.
- Technology for pore pressure prediction in advance of drilling.
- Develop a geophysical capability integrating theoretical rock physics with numerical and analog modelling focused on a quantitative seismic description of reservoir dynamics.
- Development of new drilling technologies and data management systems aimed at reducing costs.
- Apply numerical simulations of coupled flow and geochemistry to potential Australian sites for geological sequestration of CO_2.
- Enhance and convert wellbore stability and drilling fluid optimisation technology into products useful to the wider petroleum industry.
- Develop drilling fluid and waste management technology to meet advanced drilling requirements and marine environmental regulations.
- Develop and apply software incorporating state of the art concepts in risk assessment and decision making under conditions of uncertainty.
- Establish experimental facilities for the conversion of natural gas to liquids, focused initially on the cost efficient production of synthesis gas.
- Conduct feasibility studies on the technology requirements for extracting geothermal energy from deeply buried sources in the Cooper Basin.

Energy

- Develop reservoir models to promote economic gas flows and improved resource recovery from low permeability coals and sandstones in eastern Australia.

Planned Investment Profile by Sector	(%)
Petroleum	96.8
Energy	3.2

Resource Summary 2001-2002	
Total Revenue ($'000)	17,173
- Direct Appropriation ($'000)	9,963
- Research & Services ($'000)	7,201
- Other ($'000)	10
Earnings Performance Indicator (%)	41.9
Operating Result ($'000)	0
End of Year Cash Balance ($'000)	2,999
Research Staff (EFT)	71
Total Staff (EFT)	94

Focus

CSIRO Plant Industry carries out research in the plant sciences to make Australia's agri-food, fibre and horticultural industries more profitable and sustainable. A major focus is on improving production efficiency and reliability while maintaining the natural resource base. We are placing increasing emphasis on product quality related objectives for the processing and manufacturing sectors and the development of novel plant products. Our research also contributes to conservation of biodiversity in the Australian flora and the implications of global climate change for natural and agricultural ecosystems.

Outlook and Strategies

Following a review of all its major projects in early 2001, a number of cross-Divisional initiatives will result in the coming year, particularly in sugar metabolism, and plant fungal disease resistance. Strengthening of research in flowering, developmental biology and abiotic stress will also emerge during 2001-02.

Efforts to enter the international rice genome effort are finally bearing fruit, with support anticipated from both government and industry. While it is too late to be involved in sequencing the genome, the next critical step is determining the function of the genes identified.

Having been the successful tenderer for $1.5M (over 5 years) from AusHort to carry out gene discovery research in molecular biology for fruit and vegetable crops, we will see a significant shift in this effort by the two horticultural Programs in the Division.

We have enhanced our capabilities in marker assisted plant breeding in wheat, and are negotiating a position in an Australia-wide wheat improvement program.

In our agricultural management programs our principal focus will remain on key profit drivers that underpin development and security of sustainable production systems.

We continue to address our natural ecosystems research in triple bottom line context, and to explore bridging the agendas of rural production sustainability with natural resource management in the environmental Sectors.

Planned Activities and Achievements

Field Crops

- Identify gene expression patterns that correlate with sucrose accumulation in sugarcane.
- Commence molecular and physiological characterization of plant height and early growth of wheat genetic stocks containing different alternative dwarfing genes.
- Generate robust PCR markers to follow specific nematode and rust resistance genes in cereal breeding.
- Make final selection of new Linola varieties for commercial release in Australia and Argentina.

Field Crops and pasture-based Sectors

- Investigate strategies to overcome yield limiting factors in conservation cropping systems including root-inhibitory bacteria associated with no-till wheat and the impacts of retained stubble on canola.
- Define the management strategies that maximise the reliability of lucerne removal treatments prior to cropping in phase farming systems canola.

Horticulture

- Identify new genes and characterise genes involved in grape berry quality and disease resistance through a genomics research program.
- Quantify grape berry skin structural parameters and mechanical properties in relation to dried fruit susceptibility to processing damage.

Textiles, Clothing and Footware

- Develop a user-friendly OZCOT crop simulation model and support its release to extension personnel of the Australian Cotton CRC.
- Print and probe a microarray containing 10,000 cotton cDNA clones to determine the suite of genes specifically expressed during the early stage of fibre initiation.

Other Sectors

- Characterise the composition and nutritional characteristics of novel high amylose barley lines in conjunction with CSIRO Health Sciences and Nutrition. *(Food Processing)*
- Clone key regulatory genes that control flowering in eucalypts. *(Forestry, Wood and Paper Industries)*
- Construct a multigene phylogeny of the Mimosaceae (Mimosoid Legumes) as the final stage in a multinational collaborative effort. *(Biodiversity)*
- Evaluate how *Pinus radiata* trees and *Themeda australis* grass each affect the soil aggregate stability and soil carbon sequestration in the short term. *(Climate and Atmosphere)*

Planned Investment Profile by Sector	(%)
Field Crops	32.6
Horticulture	21.5
Textiles, Clothing & Footwear	17.2
Food Processing	10.5
Biodiversity	9.3
Meat, Dairy & Aquaculture	6.1
Climate & Atmosphere	1.6
Forestry, Wood & Paper Industries	1.3

Resource Summary 2001-2002	
Total Revenue ($'000)	72,377
- Direct Appropriation ($'000)	37,740
- Research & Services ($'000)	33,767
- Other ($'000)	870
Earnings Performance Indicator (%)	46.7
Operating Result ($'000)	55
End of Year Cash Balance ($'000)	7,436
Research Staff (EFT)	527
Total Staff (EFT)	652

Focus

The RV Franklin is a world-class ocean-going research platform capable of supporting research in physical, chemical and biological oceanography and marine geosciences. It is managed by CSIRO on behalf of the marine science community of Australia. Ship time is available to Australian marine researchers and agencies through a competitive process, with the major costs of operation funded by the National Facility. Specialised electronic, data processing, chemical analysis and other scientific and technical services are provided by CSIRO Marine Research, as part of the National Facility.

Outlook and Strategies

Australia's Oceans Policy identifies the need for exploration and information about the Exclusive Economic Zone, to support the sustainable development of the marine environment and its resources as well as climate and weather services, defence and safety at sea. The *RV Franklin* conducts deep ocean surveys in support of outcomes articulated in *Australia's Ocean Policy*. Marine geoscience is an area of increasing activity, with specialised equipment needs.

An independent Steering Committee oversees the operation and strategic planning of the Facility, and is supported by a Scientific Advisory Committee. The Steering Committee includes members from marine industries to foster greater involvement in the strategic management of the National Facility.

A Scientific Advisory Committee, comprising experienced researchers from major marine research agencies and universities with marine programs, provides technical and scientific advice to the Steering Committee, and reviews proposals for usage of the National Facility.

To improve the effectiveness of the National Facility in meeting increased research demand the Steering Committee will seek funds from the Major National Research Facilities program, to achieve 360 sea days per annum and the use of more versatile vessels than *Franklin*. If the bid is unsuccessful, an option is to transfer the current National Facility role (180 sea days) from *RV Franklin* to *RV Southern Surveyor*, a larger multi-disciplinary vessel owned by CSIRO.

Equipment enhancements will be made in accordance with the Strategic Acquisition and Replacement Plan for 2000/2001 – 2002/2003, modified to take account of possible vessel changes.

Planned Activities and Achievements

- *RV Franklin* will operate for 180 days during 2001/2002. Five approved cruises support the research objectives of CSIRO Divisions (Marine Research, Exploration and Mining), Australian National University (ANU) and Australian Geological Survey Organisation (AGSO).
- Approved cruises will occur east from New Zealand, north to Western Samoa and back to Brisbane, to study Tasman Sea mass and heat transport, and to monitor ocean climate change around Australia. Geoscience cruises will study the palaeoclimatic history of the New Caledonian region, seafloor hydrothermal activity near Vanuatu and the geophysics, geochemistry and sedimentology of a large gas hydrate deposit on the Eastern Lord Howe Rise.
- Applications for the first half of 2002 are in the final stage of assessment and exceed available sea-time by a factor of two. These proposals are from CSIRO Exploration and Mining, Australian Nuclear Science and Technology Organisation, AGSO, and ANU. The proposals are to investigate marine particulate pathways in the SW Pacific Ocean, sediment transport in Torres Strait and hydrothermal and petrogenesis activity off Tonga, the Solomon Islands, PNG and North East Australia.

Planned Investment Profile by Sector	**(%)**
Marine	100

Resource Summary 2001-2002	
Total Revenue ($'000)	4,553
- Direct Appropriation ($'000)	4,373
- Research & Services ($'000)	150
- Other ($'000)	30
Earnings Performance Indicator (%)	3.3
Operating Result ($'000)	-1,372
End of Year Cash Balance ($'000)	693
Research Staff (EFT)	1
Total Staff (EFT)	8

Focus

Making a useful contribution to the national goal of achieving ecological, social and economic sustainability in the management of Australian landscapes is the common thread that binds together the various research programs conducted within Sustainable Ecosystems. The scope of our research ranges from conservation to crop production, from ecological monitoring to farm system modelling, from managing pest animals to minimising grazing impact in rangelands. Researchers in the Division, which has eight laboratories around Australia, strive to gain knowledge of the nation's diverse ecosystems and to apply this knowledge in developing methods and strategies to ensure sustainability of these ecosystems and the regional communities that depend on them.

Outlook and Strategies

The new Division, CSIRO Sustainable Ecosystems (CSE), was formed in October 2000, by merging Wildlife and Ecology and the systems groups of Tropical Agriculture. This brings together expertise in conservation biology, biodiversity and farming systems, positioning us to tackle the challenges facing both natural and modified ecosystems in Australia and to contribute to a future with a diversity of healthy landscapes, viable industries and vital communities.

The six themes identified for development of new work and for the re-direction of some existing activities are:
- Resilient Regional Communities;
- Prosperous Rural Economies;
- Maintenance and Enhancement of Biodiversity and Ecosystem Function;
- National Options for Sustainable Futures;
- Biotechnology Solutions for Ecosystem Management;
- Healthy Urban Environments.

A key challenge is to form the partnerships that will ensure we ask the right questions and deliver useful outcomes to the people who make the decisions – those who will implement changes in policies and practices.

Following the recent merger, 2001-02 will be a year of consolidation. There will be additional focus on developing strategic business capability and emphasis on linking both financial and human resource planning to research and commercial development needs and to overall business strategy. The Division is also implementing the *CSE Development Framework* aimed at improving the way the Division functions as an organisation in order to meet its strategic objectives.

Planned Activities and Achievements

Ten key activities and achievements are planned for development in 2001-02. Due to the multi-disciplinary nature of work in CSE, they are shared across the Sectors listed in the investment profile.

- Improve the management of vertebrate pests and conservation of native fauna through better knowledge of biological and ecological processes — including use of biotechnological solutions.
- Change the thinking and behaviour of Australians in regard to the services and values society receives from, and places on, natural ecosystems and have this reflected in natural resource policy and management.
- Develop strategies — based on a predictive understanding of rainforest dynamics — for sustainable utilisation, conservation and management of Australia's unique tropical rainforests.
- Provide communities and natural resource and regional development managers with information and decision-making tools which allow trade-offs between ecological, economic, social and institutional considerations — so helping regions plan their future.
- Develop principles, management guidelines, computer models and scenarios which contribute to a balance between production and conservation in Australia's rural lands and assist in targeting public investment in natural resource management.
- Model long-term changes in relation to land use — including climate change scenarios, grazing impacts, landscape health and fire management.
- Use participative approaches — interact with communities and other stakeholders — to link research analysis with farming practice and with natural resource management and policy.
- Monitor and model the economic and ecological performance of farming systems.
- Formulate and test new designs for Australia's physical economy and the sectors therein, so leading to more sustainable levels of population size, lifestyle, consumption, urban function, industrial development, energy and material flows, physical trade and environmental impact.
- Build Divisional staff capacity and strengthen external relations in new areas of research and commercial development through the *CSE Development Framework*.

Planned Investment Profile by Sector	(%)
Biodiversity	33.4
Field Crops	21.9
Land & Water	19.7
Meat, Dairy & Aquaculture	10.0
Climate & Atmosphere	6.0
Textile, Clothing & Footwear	4.4
Marine	2.4
Other Sectors	2.2

Resource Summary 2001-2002	
Total Revenue ($'000)	36,007
- Direct Appropriation ($'000)	24,336
- Research & Services ($'000)	11,430
- Other ($'000)	241
Earnings Performance Indicator (%)	31.7
Operating Result ($'000)	0
End of Year Cash Balance ($'000)	6,059
Research Staff (EFT)	215
Total Staff (EFT)	300

Focus

CSIRO Telecommunications and Industrial Physics (CTIP) provides innovative commercial solutions for industry in the information technology and telecommunications, security, health, manufacturing, mining and energy areas and provides national standards of measurement and traceability supporting product development, testing and trade. CTIP is responsible for the National Measurement Laboratory (NML) - a National Facility - and NASA's Deep Space Operations at Tidbinbilla.

Outlook and Strategies

In 2001-2002, the drivers for change in the Division's scientific field of view continue to be the influence of information and communications technology, coupled with the emergence of nano-scale technologies. Research areas of the Division that are expected to grow in capabilities and resource allocation in response to these drivers include telecommunications networking; optical component fabrication and coating; selected areas of nanotechnology.

The Division will continue to play a major role in the proposal to form an independent National Measurement Institute centered on the National Measurement Laboratory.

The Division has a number of activities that currently produce specialized products in limited quantities; these will be assessed over the next year to establish whether there are viable business plans for the formation of one or more new enterprises.

Planned Activities and Achievements

Information and Communications Technologies

CTIP is exploiting linkages with Australian and overseas companies to solve national problems and create commercial opportunities using its skills in wireless systems, mobile communications, broadband telecommunications, networking and defence sub-systems.

- Develop next-generation Internet technologies for guaranteed quality of service provision.
- Pursue the commercial exploitation of our recently developed precision position - location technology.
- Commercially exploit CSIRO's multibeam earth station antenna technology.
- Continue development of antenna and signal processing solutions for the proposed square-kilometre array radio telescope.

Integrated Manufactured Products

CTIP's major goal is to generate returns to Australia by raising the capacity of local manufacturers to compete globally in instrument manufacture and process control, and by transfer of technology through start-up ventures.

- New international contracts will be sought as a marketing tool in the development of a major facility for production of small volume, high quality optics.
- New contracts will be sought for the application of smart sensing and measurement technologies in the metals and plastics industries.
- Develop equipment for quality control in food manufacture using superconducting technology.
- Novel super-hard materials based on nano-structures will be developed for use as wear-resistant coatings on tools and wear surfaces.

Measurement Standards

The sector has responsibility for the realisation, maintenance and dissemination of the national standards of measurement.

- Establish a continuously operating microwave frequency standard based on buffer-gas cooled trapped ytterbium ions.
- Complete the installation of Internet Network Time Protocol servers in all state capitals.
- Prepare standard gas mixtures and participate in an international key comparison of gas mixtures.
- Complete the development of a portable ultrasonic power standard for the therapeutic ultrasound industry.
- Complete the development of a new Australian primary pressure standard for pressures in the range 5 - 250 MPa .

Services

Developments in communications technology and the expansion of e-commerce drive change in this Sector.

- Conduct field trials of CSIRO's SQIS™ face recognition technology, and seek to commercialise products based on this technology.
- Continue development and trial of telehealth systems.
- Exploit advanced image analysis to develop aids for diagnosis and treatment planning.

CTIP participates in six Cooperative Research Centres.

Planned Investment Profile by Sector	(%)
Information & Communication Technologies	33.7
Integrated Manufactured Products	25.0
Measurement Standards	22.8
Services	10.3
Mineral Exploration & Mining	3.0
Climate & Atmosphere	1.9
Built Environment	1.8
Energy	1.0
Mineral Processing & Metal Production	0.5

Resource Summary 2001-2002	
Total Revenue ($'000)	55,740
- Direct Appropriation ($'000)	38,476
- Research & Services ($'000)	17,264
- Other ($'000)	0
Earnings Performance Indicator (%)	31.0
Operating Result ($'000)	389
End of Year Cash Balance ($'000)	5,245
Research Staff (EFT)	278
Total Staff (EFT)	386

Focus

CSIRO Textile and Fibre Technology services the Textile, Clothing and Footwear Sector and provides social and economic benefits to Australia through research into, and the development of, advanced technologies for the Australian wool, cotton, technical textiles and leather industries. Research areas range from the specification of raw wool, to technical textile products, to production of hides, skins and leather. Emphasis is on the development of innovative textile and clothing products, integrating all elements of the processing pipeline and sustainable production at all levels. The Division has a wide range of multidisciplinary skills capable of servicing wool, cotton, technical textiles and leather at national and international levels. We are recognised as the world's leading wool research laboratory supporting Australia's eighth largest earner of export revenue.

Outlook and Strategies

Wool prices have recovered strongly with demand fuelled by reduced production and a weak Australian dollar. Fine wool continues to perform strongly. Cotton prices are low but production is stable despite inclement climatic conditions. The sheepskin and leather segments are still finding economic conditions difficult. Technical textiles continue to grow strongly.

Industry restructuring continues with some large commodity companies failing. Many companies are beginning to access the Strategic Investment Program for capital expenditure but not for R&D which has limited the opportunities to the Division.

Several new staff have been appointed with engineering and technical textile expertise. Two Centres of Excellence in Technical Textiles and Advanced Wool Products will be established with funding from Victorian and Federal Governments.

Key strategic partners in Australia and overseas have signed memoranda of understanding for joint R&D.

The outcomes from the woolgrower vote have culminated in three new private companies, Australian Wool Services, Australian Wool Innovation Pty Ltd and The Woolmark Company Pty Ltd. A key activity will be in establishing new relationships.

Planned Activities and Achievements

Textiles, Clothing, Footwear and Leather

- A new sliver washing development will be evaluated in industry.
- The important role of fibre crimp in wool breeding strategies and the consequences for textile processing and products will be defined and the outcomes communicated to targeted wool bodies.
- A new lubricant - anti static compound for high speed processing of wool will be developed in collaboration with an international group. Potential application in cotton processing will also be evaluated.
- Fibre quality specifications will be developed for Australian cotton destined for clients using the recently introduced air vortex spinning technology.
- Processing conditions which maximise the strength of kangaroo leathers will be established.
- A project, in collaboration with the Commonwealth and Victorian Governments, to establish Centres of Excellence in Technical Textiles and Advanced Wool Products will be completed.
- A new concept for the measurement of cotton fibre maturity will be proven at a prototype stage.
- An industry funded project to investigate the feasibility of measuring scoured wool entanglement using optical or image analysis methods will commence.
- With an industry partner, the feasibility of a new concept in cotton carding will be investigated.
- A new method for on-line measurement of non woven web uniformity, as part of the development of a smart (self optimising) card, will be developed and tested.
- The benchmarking and process improvement phases of an ACIAR funded project now underway with mills in China and India will be completed.
- An international project to develop an intelligent garment which monitors physiological parameters such as heart and respiration rate for safety and medical applications will commence.
- The development of an instrument for the rapid conditioning of fabric samples to improve colour matching processes in dyehouses will be completed.
- The production and properties of intelligent textiles will be investigated, with special emphasis on functionalisation by applying conducting polymers.
- The Woolmark Company will be assisted in the commercialisation of the Optim technology.
- Natural biopolymers will be investigated as a pretreatment for cotton in order to substantially reduce the amount of salt used in dyeing.

Planned Investment Profile by Sector	(%)
Textiles, Clothing, Footwear & Leather	100

Resource Summary 2001-2002	
Total Revenue ($'000)	23,903
- Direct Appropriation ($'000)	12,092
- Research & Services ($'000)	11,299
- Other ($'000)	511
Earnings Performance Indicator (%)	47.3
Operating Result ($'000)	2,044
End of Year Cash Balance ($'000)	9,961
Research Staff (EFT)	108
Total Staff (EFT)	194

Corporate Units

Focus:

The role of CSIRO's Corporate Units is to promote organisational cohesion and facilitate the research and development activities undertaken by CSIRO's Divisions in an efficient manner. The specific role of each unit is described below, together with a statement of activities and achievements planned for 2001-02.

Corporate Executive Office

The Corporate Executive Office provides integrated support to the Board, Chief Executive, Deputy Chief Executives and Chiefs/Divisions to assist them in the efficient conduct of their business in the areas of policy development, interaction with Ministers and government departments/agencies, international matters, public awareness and promotion of science, school education activities and provision of an enquiry service for the public and industry. The Office provides briefing and action advice on meetings, correspondence and activities involving the Chairman, Board members and Chief Executive, and is responsible for the coordination and management of Board and Executive meetings. In 2001-2002, central tasks will include further refining the corporate governance framework and assistance with the integration of the new Chief Executive into the Organisation. The Corporate Executive Office encompasses the following Corporate Units: Government Business, International Scientific Liaison, CSIRO National Awareness Program, CSIRO Education Programs, CSIRO Enquiries and the Administrative Law Unit (responsible for FOI etc).

Government Business serves as a central contact point, providing coordination, analysis and quality control for CSIRO's corporate interactions with the Minister for CSIRO, other Ministers as appropriate, Government Departments and some other parts of the Australian R&D system. Specific activities and outcomes include:

- Coordination of or contribution to CSIRO's corporate level negotiations on Government policy issues, including those in 2001 associated with the 2003/4 – 2005/6 Triennium Funding Output Purchasing Agreement and associated performance issues, and the Pricing Review scheduled for 2001. Coordination of CSIRO contacts with Government Departments and agencies and some direct liaison (including direct responsibility for committees with ISR, AFFA and DSTO), enabling input on issues relevant to CSIRO and collaboration when appropriate. Similar function with respect to the AVCC, FASTS, and the Academies. Research and analytical support for CSIRO's representations to Government on the importance of R&D and appropriate levels of funding. Maintenance of *CSIRO Connections*, a document presenting the broad picture of CSIRO's linkages and contributions to the Australian innovation system. Organisation associated with Workshops with Government as part of the CSIRO strategic planning process.
- Provision of briefings for the Chief Executive, particularly for participation on high level councils and committees (Prime Minister's Science, Engineering and Innovation Council, the Standing Advisory Committee for PMSEIC, the Coordination Committee on S&T – attending as the CCST alternate] and facilitation of CSIRO's contributions in those fora. Representation of CSIRO on working groups and interdepartmental committees as appropriate. Provision of briefings for meetings with portfolio Ministers. Provision of quarterly summaries of a wide range of policy issues and inquiries to alert senior staff to opportunities for input relevant to their areas. Preparation or coordination of corporate submissions and other input to external inquiries which arise during 2001 - 2002. Awareness of national and international developments in S&T policy and programs and provision of briefing and advice to senior staff when relevant to CSIRO.
- Coordination and provision of Ministerial briefings and correspondence, including briefing of Ministerial staff in portfolios with a major interest in R&D; briefings for other Parliamentarians on CSIRO; coordination of briefings for Senate Estimates hearings and follow up questions; coordination and preparation of CSIRO responses and contributions to Questions on Notice and Question Time Briefs; coordination of Parliamentarians' visits to CSIRO sites; advice to Chief Executive and Deputy Chief Executives on matters raised in Parliament affecting CSIRO; advice to senior CSIRO staff on protocols and processes associated with Parliament. Responsibility for obtaining and securing Cabinet documents and acquiring/drafting coordination comments. Maintenance of database of Ministerials, particularly Ministerial approvals required under the Science and Industry Research Act 1949.

CSIRO International supports CSIRO's corporate and statutory responsibilities in relation to international matters, with emphasis on international scientific liaison. Specific activities and outcomes include:

- Provision of advice and support for the development of corporate policy on international matters. Preparation of submissions and coordination of CSIRO representation for Government inquiries on international matters. Administration and review of CSIRO's international S&T agreements and facilitation of activities under them. Strengthening of CSIRO's liaison on international matters with Departments, agencies and external bodies such as specific country business councils and embassy staff. Monitoring of developments in international fora such as APEC, to enable CSIRO input.

- Fostering of CSIRO's contributions to international scientific and technical cooperation. Briefing of the Chief Executive and Deputy Chief Executives for high level international meetings and seminars. Representation of CSIRO and coordination of CSIRO's interface with visiting delegations. Representation of CSIRO on the Australian Steering Committee on Collaboration for S&T Australia/Indonesia and representation of Australia on the Commonwealth Science Council, focussing on practical ways to achieve effective collaboration.
- Provision of a corporate focus for development of activities with selected countries, particularly Indonesia, China, Italy, France and other countries/institutions for which CSIRO provides corporate funding. Support for the development of strategies and activities associated with the CSIRO Indonesia Committee. Fostering of CSIRO's interactions with the World Bank and the Asian Development Bank in collaboration with Divisions and the Commercial Network. Assistance for Divisions in identifying and facilitating international opportunities and sources of support; assistance with Divisional presentation overseas of corporate as well as Divisional information. Maximisation of the benefits of aid-related activities, including through provision of training placements.
- Management and enhancement of the CSIRO International website and a CSIRO International display for the Discovery Centre, annual updating of the CSIRO internal information document *Funds for International Scientific Activities*, management of a comprehensive database on CSIRO's international activities, and presentation of an annual report on CSIRO's international activities to the Board, with subsequent release as a public document.

CSIRO National Awareness Program assists adoption and commercialisation of CSIRO research through increased public awareness via the media; improved industry awareness of the benefits of research; and enhanced political awareness of the importance of science and the contribution of CSIRO. Planned activities and achievements include:

- Enhancement of national and overseas media coverage of CSIRO scientific achievements, particularly via the "Australia Advances" and "Sci Files" television and radio series, and international email lists.
- Provide high quality science briefings in Federal and State Parliaments and development of the Parliamentary Information Program.
- Further development and consolidation of a program for industry and national media using a network of professional science writers delivering major articles to influential publications.
- Preparation and delivery of the CSIRO Annual Report to Parliament.
- Consolidation of the Gene Technology Information Program, established to convey factual information to the public about CSIRO's gene technology research.
- Monitoring of public opinion about scientific issues and CSIRO.

CSIRO Education aims to alert school students, their families and teachers to the contribution of CSIRO and other scientific research to our community, encourage students to participate in scientific activities, especially those related to the applications of science, and encourage students to take up science careers. Planned activities and achievements include:

- 150,000 students/teachers attending CSIROSEC sessions, 11,000 members of CSIRO's Double Helix Science Club, an audited circulation of 15,000 for The Helix magazine, circulation of 7,000 for Scientriffic magazine, 300 students completing CSIRO Student Research Scheme projects, 4,500 students achieving CREST Awards, 750 student entries in the BHP Science Awards and 35 half-hour science programs on Totally Wild national TV program.
- Introduction of Science by Email. This will provide a web-based service to Double Helix members and Scientriffic subscribers.
- CSIRO Education web pages updated to make them more appealing to our target audiences. Retention of recently gained external funding for a number of the programs including support from Members Australia Credit Union, Alcoa World Alumina Australia and Ian Potter Foundation.

CSIRO Enquiries provides a reactive information and referral service for the Organisation by responding to enquiries received from Australian and international communities. The unit is a corporate service, that is, CSIRO Enquiries operates on behalf of all CSIRO Divisions and units, with capacity to handle over 40,000 enquiries per year from the general public, industry, students and teachers, the media, government and researchers, and other CSIRO staff.

The current structure is similar to a typical call-centre, utilising up-to-date telecommunications and IT technologies to service clients' needs. The unit offers a personal service, ensuring that every enquirer interacts with an experienced professional who handles his or her enquiry through to completion. Recognising the importance of e-information for students, a series of Education Resource Units has been posted on CSIRO Enquiries' web site, with titles directly linked to the Australian Senior Science Curricula. These units replace Student Information Packs, products which were formerly sold to students. New initiatives for 2001/2002 include:

- A comprehensive survey of CSIRO Enquiries' stakeholders. Enquirers will be asked to comment on the level of service, the speed of information delivery and the value of the information provided. This survey will be undertaken independently of the CSIRO Enquiries' office.
- The introduction of a new Enquiry Recording System. The Enquiry Management System currently used for recording enquiries is being redesigned to include standard scripts, recording of different information for each enquirer type, prompts for follow-up and more detailed reporting.

Corporate Finance

Corporate Finance provides advice and services to support financial planning and financial management within CSIRO. It also specifies and implements financial systems to meet line management and statutory reporting requirements. Planned activities and achievements include:

- Support for the Chief Executive and Board in the development of strategies to ensure that, within Government parameters, CSIRO's appropriation funding is sustained and enhanced.
- Development and promulgation of financial policies and procedures relevant to CSIRO's business and statutory requirements.
- Continuously improve financial planning and management in CSIRO by working with Divisions to enhance budgeting, accounting and management practices, especially in the areas of costing, pricing and project accounting.
- Preparation of the Organisation's financial data for Federal Budget documentation. In partnership with the Government Business Unit, negotiate the related triennium funding and pricing agreement with DoFA.
- Development of strategic options and advice on financial management, including preparation of financial performance reports for Executive Committee and the Board. Production of CSIRO's statutory financial reports, including facilitation of Audit Committee review and Board approval.
- Support and development of UNIBIS and financial reporting systems.
- In partnership with CSIRO Information Technology Services and users, development, implementation and subsequent support of PSS and UNIBIS to meet the needs of project managers in Divisions and the Organisation's sector planning and reporting process.
- Implement a GUI version of UNIBIS.
- Investigate possible e-commerce applications to support financial processes.
- Undertake needs and feasibility study of "Business Intelligence" reportings from all data bases.

Corporate Human Resources

Corporate Human Resources provides strategic leadership through the provision of advice and the development of processes and policies that will maximise the contribution of staff to the achievement of CSIRO goals. Planned activities and achievements include:

- Continued development of an effective CSIRO-wide HR Network focusing on collaborative implementation of a revised delivery strategy for the HR function, exploiting technological advances to improve efficiency and minimise routine processing activities.
- Commencement of a review of HR policy and conditions with a view to simplifying principles and rules to reduce interpretive and processing complexities. This is critical to making the best use of the technology now available as well as reducing the scope for misinterpretation.
- Implementation of the remaining recommendations from the review of CSIRO's performance management, salary, classification and reward systems. These include, introducing a Career Management Portfolio (to encourage more effective career planning) and a range of "employer of choice" initiatives to make CSIRO a more attractive employer to current and potential staff.
- Extension of the use of employee self-service technology to eliminate high-frequency, routine, processing activities and liberate the resources currently dedicated to those activities.
- Undertake a review of Occupational Safety, Health and Environment structures and service delivery to ensure that these support the Organisation's needs.
- Consolidation and extension of improved HR planning processes linked to business priorities to optimise resource use and support Divisions and the Organisation to achieve their objectives.
- With the involvement of staff, development and negotiation of a new Enterprise Agreement, consolidating outstanding changes flowing from the previous agreement and simplifying terms and conditions policy to enable greater use of self-serve technology and consideration of other delivery options.
- Develop and implement a strategy for polling staff, which provides frequent and reliable feedback about staff satisfaction. Tracking reactions to key decisions affecting staff will inform future change management strategies to accelerate and improve effectiveness of change initiatives.

- Development and implementation of a new Workplace Diversity Plan that enhances CSIRO's management of its diverse workforce and eliminates discriminatory policies and practices, creating a more productive and supportive workforce.
- Pilot and evaluate the Chief Executive's mentoring program, a program tailored to each participant's needs and designed to develop leadership and commercial skills in a select group of potential future leaders.

Corporate Property

Corporate Property provides a property management and facility development service that ensures CSIRO has appropriate and functional accommodation and facilities at the most effective cost. Corporate Property also seeks to maximise the utility of CSIRO's sites and enable the Organisation to apply cost effective and efficient practices. Planned activities and achievements include:

- Implementation of the Board approved Property Management Plan 1997-2000 and development of the 2001-2005 Property Management Plan to include strategies such as rationalisation and consolidation of specific sites; the development of joint State or University / CSIRO initiatives; and evaluating industry and other research establishment capital investment benchmarks.
- Development and management of the CSIRO's Capital Investment Plan in recognition of emerging sectoral priorities.
- Management of CSIRO's Internal Leasing Scheme for cost effective use of premises.
- Management of major CSIRO development initiatives, such as North Ryde (Riverside Corporate Park) NSW; CSIRO Energy Centre (Newcastle), Clayton East Development and Bentley, WA (Stage 1) and remediation and development of Bradfield Park, NSW.
- Participation on the Organisation's Environmental Committee, to develop and implement a CSIRO Environmental Policy and Management System together with developing strategies to audit and remediate all contaminated sites.
- Implementation of planning and "value adding" strategies for the disposal over the next 1 to 3 years of Ryde, (NSW), Syndal (Vic), and Samford (Qld). An accommodation review / site review is to occur for Highett (Vic), Yarralumla (ACT) and parts of Black Mountain (ACT), Floreat Park (WA) and Clayton (Vic).
- Implementation of a CSIRO Site /Regional Management System for the Repairs and Maintenance Program to achieve greater effectiveness.
- Implementation of the Organisation's Security Policy with the development of localised security expertise.
- Implementation of the Organisation's Fraud Control Policy.
- Monitoring of the Organisation's energy usage with associated development of strategies/advice to effectively utilise energy usage.
- Corporate Property will assist the Sub-Committee of the CSIRO Board with the disposal and leaseback of the assets identified during a recent independent review of CSIRO's property holdings.

Information Technology Services

Information Technology Services provides and maintains CSIRO's corporate information infrastructure. This includes: transmission of voice, data and image Australia wide; support of the Unix and NT operational environments for corporate applications; maintenance and development of corporate systems such as CSIRO's website, the payroll, human resources, finance, contracts and project support systems; coordination of IT Security across the Organisation: and support of the provision of library and records management systems and services both corporately and in Divisions. In keeping with these functions, ITS develops corporate strategic plans for information technology, networks, telecommunications and integrated information management. Planned activities and achievements include:

Information Systems and Delivery

- Develop customer focused extranets for major customers and collaborators, including standards and common infrastructure.
- Continue development, support and enhancement of the Unibis financial system, the Project Support System, the Commercial Information System and the Human Resources System (including Employee Self Service, CSFOServe).
- Implement business intelligence tools across financial and human resources databases.
- Proceed with a pilot e-procurement system and evaluate the cost/benefits of a full-scale rollout.
- Examine the requirements for an e-commerce framework, including business planning, implementation and delivery.
- Provide online e-voting services for Enterprise Bargaining and other staff votes.
- Enhance the current e-training environment.
- Pilot deployment of e-forms and workflow tools.

- Implement an online recruitment system for internal and external applicants.
- Investigate portal and personalisation technologies and further develop CSIRO Online and the corporate intranet.
- Plan standards and investigate content management tools for integrated divisional and corporate web sites.
- Deploy enhanced collaboration tools including use of alternative media, such as streaming video and instant messaging.
- Support development of a dataset directory and metadata standards.
- Implement improved records management and record-keeping practices throughout CSIRO, including electronic and scientific records.
- Enhance access to the records management system on the desktop and introduce improved electronic document management tools and techniques.
- Plan and develop a pre-print server and management strategy for CSIRO publications.

IT Infrastructure

- Plan and lead a project (e^{-max}) to provide an up-to-date, rational, CSIRO-wide IT infrastructure for delivery of basic IT services such as e-mail, backup, archive and large scale regional storage.
- Finalise deployment of the Microsoft Windows file server environment and Exchange based messaging services across CSIRO.
- Finalise the implementation of an architecture for a single IT systems log-on across CSIRO utilising the Microsoft Windows Active Directory domain model.
- Consolidate corporate Unix and NT servers and storage and integrate the storage area network.
- Complete the roll out of voice over IP to regional and small metropolitan sites giving them access to the CSIRO Voice Network.
- Finalise the implementation of security firewalls and develop a prototype intrusion detection system for installation at all major network points-of-presence.

Implementation

- Contribute to, support and assist the e-CSIRO initiative.
- Devise a new funding model for corporate IT initiatives.
- Achieve economies of scale, expertise and approach through cooperative activities with similar external organisations (eg CAUL, CAUDIT, science agencies cluster).
- Provide expert technical and systems advice and, where required, develop and implement cost-effective solutions, in consultation with relevant system users, corporate staff, divisional staff and the Executive.
- Implement software licensing and distribution and assistance to divisions with management & upgrade of workstations.
- Negotiate and manage corporate IT and Library materials purchasing agreements to achieve economies of scale.
- Negotiate further additions to the electronic journals collection and integrate other datasets into the system.
- Coordinate IT Security strategies, standards and practices across CSIRO to comply with government requirements for security.

Risk Assessment & Audit

The Risk Assessment and Audit Unit provides Management and the Board with independent assurance regarding the efficient and effective operation of the Organisation's internal control and risk assessment framework. The Unit's plans are approved by the Chief Executive and endorsed by the Board Audit Committee. Progress against approved plans is reported to the Board on a quarterly basis. These reports typically cover issues of risk, control and the efficiency and effectiveness of operations. Planned activities and achievements include:

- Facilitating project risk assessments which promote awareness and the benefits of an integrated risk assessment approach.
- Commercially focused reviews encompassing pricing and costing, revenue and contract management.
- The review of key research support functions including Human Resources and procurement.
- Information systems reviews covering security, data integrity and a series of divisional IT security risk assessments.
- Compliance with external laws and regulations such as the Goods and Services Tax.

Also, through the cyclical coverage of selected Divisions, the Unit will review Organisational compliance with baseline controls in financial management, commercial practices and information technology security.

Strategic Planning & Evaluation

Strategic Planning and Evaluation promotes and facilitates a strategic approach to planning and evaluation at all levels of CSIRO; provides or locates planning and evaluation services for CSIRO managers;

coordinates the sector planning and reporting process; and coordinates the preparation of corporate planning and evaluation documents. Planned activities and achievements include:

- Support the Chief Executive in the implementation of the new Strategic Action Plan and performance and accountability measures for the strategic management of CSIRO and for performance management across all Divisions and corporate groups.
- Facilitate the Executive's monitoring of progress against planned sector outcomes and commission return on investment (adoption/impact) studies on major CSIRO projects.
- Prepare planning and performance information for Federal Government budget documentation and the CSIRO Annual Report.
- Prepare and provide data on CSIRO's research effort and economic and trade statistics in response to internal and external needs.
- Commission bibliometric analysis of CSIRO's scientific publishing for 1996-2000.

Training and Development

The Leadership, Career and Team Development group designs and delivers leadership and personal development programs for staff at significant career transition points. The group also develops corporate policies and provides advice and consultancy services on education, training, personal and professional development. All major programs are accredited with Deakin University and the Association of Professional Engineers, Scientists and Managers, Australia. Links with other tertiary institutions in Australia and overseas are being developed. Planned activities and achievements include:

- Chief's Development Program to provide advanced leadership and management development for current Chiefs, including attendance at leading, international business schools.
- Leadership Development Program to develop senior staff for key leadership roles in the future and to support succession planning.
- The Leadership Consortium: a collaboration with a group of major Australian companies to develop and promote leadership capability using a team-based, action learning approach.
- Thriving on Complexity Program for integrating research activities that span a number of Divisions or research sectors.
- Leadership in Innovation: Achievement Through Teams courses (in collaboration with the Business/Higher Education Round Table) for leaders of multi organisational teams in universities, the private sector, public sector research agencies and CRCs.
- Research Business Program to build the commercial capability of research leaders, business managers and other senior staff.
- Project Leadership Program to build capability in leading teams, managing resources and delivering outcomes to clients for staff moving into research project leadership roles.
- Team Leadership Program to provide communication, performance management, interpersonal and coaching skills for leaders of teams in all functional groups.
- Consultancy services to divisions on leadership team development, change management and strategic planning.
- Consultancy services to other R&D organisations in Australia and overseas on research leadership and management development
- Research on the effectiveness of R&D teams and leaders.

Legal and Intellectual Property

Legal and intellectual property activities in CSIRO provide vital support to CSIRO's research, technology transfer, commercial and other activities carried out in pursuit of the Organisation's statutory functions.

Principal legal activities include:

- Provision of corporate governance advice and services to the Chief Executive, Executive Committee and the Board of CSIRO to ensure that CSIRO and its members and officers are aware of and comply with their legal obligations, including those under the Science and Industry Research Act 1949 and the Commonwealth Authorities and Companies Act 1997.
- Provision of legal advice and services to the Chief Executive, Deputy Chief Executive, Chiefs and others to ensure that commercial arrangements comply with CSIRO's legal obligations and represent the best available position for CSIRO; commercial arrangements include research contracts, intellectual property licenses, collaborations, joint ventures and start-up company formations.
- Provision of litigation, arbitration, mediation, negotiation and reporting advice and services to assist CSIRO in the management of disputes and compliance with CSIRO's statutory reporting and insurance obligations.

Principal intellectual property activities include:

- Maintenance through an external contractor of a database of all of CSIRO's registerable intellectual property and provision of professional patent

attorney advice to facilitate decision-making by Divisions.

- Providing access to world-wide intellectual property information, particularly through on-line databases.
- Planned activities and achievements include:
- Further development of CSIRO's legal intranet to provide a range of services throughout CSIRO, including access to relevant legislation, legal advice and standard form agreements.
- Review and retendering of CSIRO's externally contracted intellectual property management arrangements.

Continuing advice and services are provided in the following areas:

- Ensuring CSIRO's corporate governance policies, practices and compliance programs are appropriate from a legal perspective.
- Ensuring that CSIRO's commercial arrangements are structured optimally from a legal perspective.
- Implementing best practice in the management and utilisation of CSIRO's IP resources.
- Implementing corporate-level risk management strategies to minimize risks of legal conflicts.
- Ensuring that CSIRO adopts the best defence strategies and practices against legal conflicts initiated by outside parties.
- Training in legal and IP issues.

Commercial Committee and Network

The DCE Commercial is accountable to the Chief Executive for the strategic development of CSIRO's commercial activities to ensure CSIRO has the structure, systems and processes in place to deliver CSIRO's commercial objectives, and that staff, both Corporate and Divisional, have the business skills and expertise needed to identify opportunities and generate business deals that effectively capitalise upon CSIRO's technologies.

The Corporate Leadership Group (CLG) reports to the DCE Commercial for the development of the Organisation's commercial activities. This group is responsible for assisting Divisional commercial staff with the identification, facilitation, and development of commercial opportunities, ensuring that appropriate skill/expertise is brought to bear on commercial proposals, and to lead the development of significant commercial deals such as the formation of start-ups, complex technology sales or licences etc.

The Commercial Network was established by the former DCE Commercial and covers all staff with a professional role in the commercial activity of the Organisation. The Network is the principal conduit for staff in raising the professional standards in the commercial activity of the Organisation. Planned commercial activities include:

- The establishment of an Enterprise Creation Program for the identification, evaluation and development of new business enterprises.
- The establishment of standard commercial Divisional and Corporate reports to assists in understanding, managing and improving their business dealings in a simple and effective manner.
- Revision of the CSIRO Commercial Practice Manual to reflect changes in the Organisation and in the commercial environment in which the Organisation operates. This is an annual activity which this year will see the establishment of a more user-friendly intranet web version.
- Education of staff in the commercial area through induction and training programs, workshops and conferences.

CSIRO Publishing

CSIRO Publishing operates as a fully self-contained business unit publishing products or providing services for both Australian and overseas markets in four main product streams: primary research journals; academic books and CDs; education and general reference books, magazines and CDs; and multimedia products and services. Planned activities and achievements include:

- Launching of Landlinks.com, an agribusiness and sustainable development *e*Commerce content and information server.
- Launching of three new journals on behalf of Australian societies: *Australasian Plant Pathology, International Journal of Wildland Fire* and *Emu: Austral Ornithology.*
- Publication and distribution of 109 issues of 16 primary research journals to customers worldwide with increasing emphasis on electronic formats.
- Continued development of *e*Commerce facilities for the purchase of journal articles on a paper-by-paper basis.
- Publication of 25 new academic titles in print or CD formats with international appeal and sales potential.
- Broadening the readership of *Ecos*, CSIRO's science and environment magazine, to reach both print subscribers and online browsers.
- Publication of 20 general reference books or CDs including *State of the Environment 2001* on behalf of Environment Australia.
- Development of the Landlinks Press imprint by publishing 10 new titles and providing distribution for other products targeted at the rural sector.

- Continued development of *Science Image Online* as a source of science images for the media, students and commercial users.
- Continued development of the online product catalogue as our key 24-hour marketing and *e*Commerce facility with global reach.
- Production and distribution of two new *Australia Advances* video series.
- Continued development of publishing, marketing and distribution arrangements with key partners including Australian Biological Resources Study (ABRS), Australian Centre for International Agricultural Research (ACIAR) and Murray Darling Basin Commission (MDBC).

Resource Summary 2001-2002	
Total Revenue ($'000)	54,705
- Direct Appropriation ($'000)	43,503
- Research & Services ($'000)	6,998
- Other ($'000)	60
Earnings Performance Indicator (%)	12.8
Operating Result ($'000)	611
End of Year Cash Balance ($'000)	-1,804
Research Staff (EFT)	16
Total Staff (EFT)	307

This summary includes resourcing estimates for all the above Corporate Units, CSIRO Publishing and the CSIRO Executive.

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