

CSIRO Operational Plan

2005-06

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





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Foreword

The CSIRO Operational Plan for 2005-06 reflects our continuing strong commitment to the execution and delivery of our Strategic Plan for 2003-2007.

Our Strategic Plan goals reinforce delivery around our six key messages: (1) **focusing** our efforts, particularly in line with national research priorities, around the major opportunities and challenges which confront us - we cannot be all things to all people; (2) harnessing the massive power of an integrated and unified **one-CSIRO**; (3) effective **partnering**, both in the development and delivery of great science and innovative solutions, but also (with our clients and stakeholders) in the efficient uptake of our scientific outcomes; (4) ensuring that we deliver quality **service from our science**; (5) being mindful of our responsibilities to help create a healthy and stimulating future for Australians, and indeed the larger world, through **looking out** to the future through the science we do - and choose to do - today; and (6) by **growing our impact** and relevance, continually, as a force for positive difference in our nation.

We have made strong progress in delivering on the first phase of the Strategic Plan and we will continue to focus on its implementation. Throughout all of this, it is critical that we continue to deliver excellent science. Excellent science, focused on delivering to identified needs, is our core business. We are committed to doing this in collaboration with others to achieve the return on investment that is so clearly expected of us.

The next couple of years will continue to be an exciting and, as always, challenging time during which we can build on the best of the past and present to forge a vibrant and sustainable future for CSIRO in the service of our nation.

I commend the plan to all Staff and interested stakeholders.

Geoff Garrett

Chief Executive, June 2005.

CSIRO Operational Plan 2005-06

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Section 1.0: Introduction and Context

1.1 Looking Back, Looking Forward

Dr Geoff Garrett

Looking Back

Looking back over the past four years, while retaining a quality set of outputs and outcomes in the core of our business (science and innovative solutions), we have achieved much, *inter alia*:

- *Strategy, and key messages*: a clearly articulated and compelling strategic roadmap, with significant senior stakeholder acceptance, incorporating "six key messages" central to our transformation to a research enterprise;
- *Differentiation, National Research Priority alignment and Flagships*: excellent alignment with National Research Priorities, and a corresponding set of major programs (our Flagships), well funded, addressing major national needs and opportunities, and leading the charge in transforming the way we work, and leveraging our major differentiating advantage in the national innovation system (NIS);
- *Revitalised Leadership*: a strong management team with new, complementary business skills and a resourceful and talented set of operating unit leaders; and
- *Commercial and Process Skills*: an emerging track record in both process professionalism and financial benefits from both our commercial endeavours and the way we operate our business.

We continue to face some important challenges. We have yet to:

- adequately articulate and gain complete organisational acceptance of the case for change, and our vision for the future;
- get to grips with necessary organisational cultural transformation;
- fully overcome our more historical silo'd past, and the role conflicts and organisational power struggles resulting from this.

We have also not done well across a number of dimensions relating to external communications; we are still, as an organisation, migrating from a simplistic 'external earnings target' model to one of more fundamental value creation; and our business development initiatives and progress remain in early development, particularly in regard to SME engagement.

Where are we now, and looking forward?

We have been well served by our longer-range "Future C" work¹; however, we must continue to focus on the implementation of our 2003/07 Strategic Plan. Our efforts must deliver to our strategic commitments around building world class teams, focusing on high priority research areas, ensuring effective knowledge transfer and deepening our one CSIRO culture - embedding our Six Key Messages as "the way we do things around here".

Major thrusts here will include:

External impact:

- *Flagships*: continuing to increase investment in our Flagships, and their operational implementation as "well oiled machines" (currently a work-in-process);
- *Commercialisation and RIPPERS*: doing all that we can to ensure that our RIPPER initiative(s), and other commercialisation activities, are successful, with appropriate tangible and intangible benefits resulting from these, for CSIRO and the nation;

¹ "Future C" is a project that has been developing a framework for CSIRO's future enterprise strategy, building on the 2003-2007 Strategic Plan and the "Six Key Messages". Future C is focusing on the changing context in which CSIRO operates, the priority roles CSIRO plays in delivering value to Australia and our vision for CSIRO's future. Future C will help guide the creation of our 2007-2010 Strategic Plan.

- '*Return on Investment*' on roles: building on the Future C role(s) clarification, in "the Role House"², developing and articulating a clear value proposition for further national investment in each of our roles, in preparation for the next Triennium Funding Agreement;
- *Innovation framework*: seeking to appropriately influence the national innovation policy agenda to maximise the opportunities for CSIRO's efforts to contribute to industrial growth and national competitiveness;
- *Global Reach*: clarifying, as we move to the next Strategic Plan, our international engagement strategy: objectives, contribution and approach.
- *Policy*: as we redefine the role of the Chief, for example, a more proactive role in 'leading the policy charge' will become increasingly important.

Ongoing organisational transformation:

- *Leadership*: we have had considerable change at the top and have in place a relatively new set of leaders such that stability and continuity here now is essential;
- *New processes*: embedding our new science investment processes, a shared services approach to research support, the introduction of an organisation-wide information support system, and enhancing customer engagement, particularly through Customer Service Teams; and, most importantly
- *Communication*: we must substantially ratchet up our communication initiatives, both externally and internally, around what we have achieved, where we are going – and why, and how we are going to get there.

Next Steps

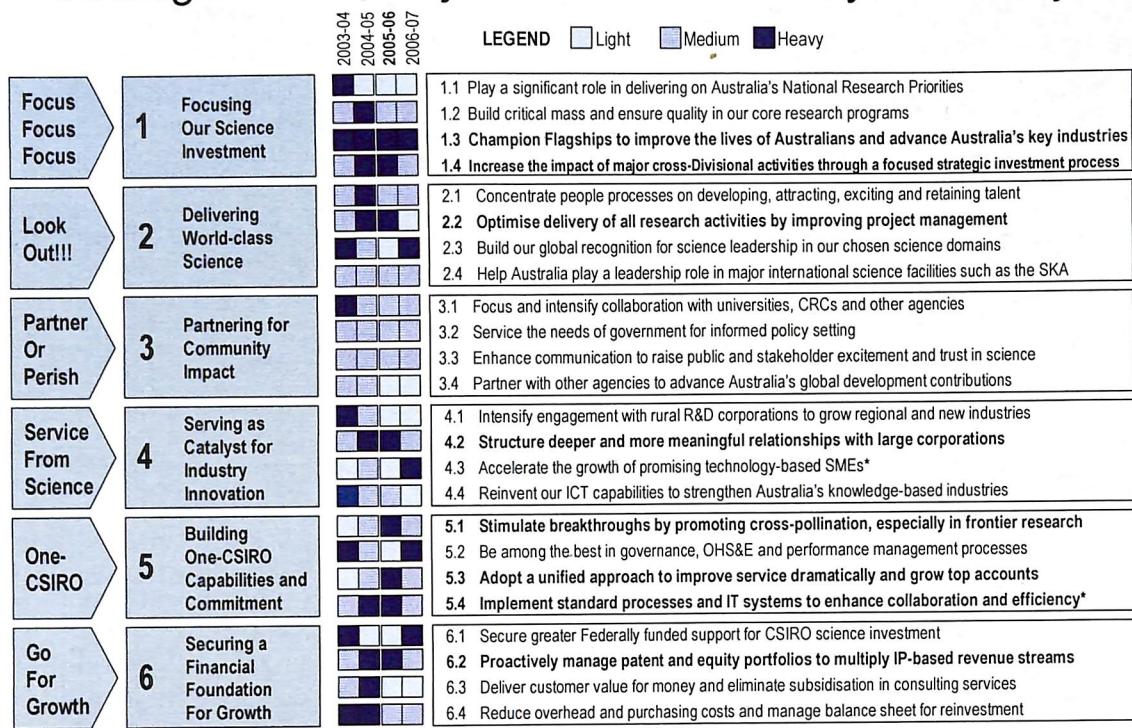
Over the next 12-18 months, we need to:

- stay focused on delivery on the work programs summarised in this Operational Plan in the context of the objectives set out in our 2003/07 Strategic Plan. These are summarised in Figure 1, which also shows the intensity of activity with which each of the strategic objectives will be pursued in 2005-06;
- address the key challenges articulated in this review document, specifically around Flagships implementation, external communications, and cementing the new leadership roles in our matrix organisation; and
- carefully plan, prioritise and appropriately resource our prevailing change initiatives, ie: the science investment process (SIP), business and enabling technologies review (BETR) implementation, and shared research support services.

Six major, interlinked strategic change projects, described in the following section, have been designed to deliver on these strategic commitments.

² A full description of the Role House follows in section 1.4.

Strategic Goals, Objectives and Intensity of Activity



* In light of current priorities the Intensity of Activity on these Objectives in 2005-06 has been adjusted from the level anticipated in the Strategic Plan 2003-2007

Figure 1: Strategic Goals, Objectives and intensity of Activity

1.2 Implementation of Major Strategic Change Projects

To deliver on the strategic commitments described in section 1.1 - building world class teams, focusing on high priority research areas, ensuring effective knowledge transfer and deepening our one CSIRO culture – we have developed six major, interlinked strategic change projects.

- *Flagships:* We are committed to full implementation of the National Flagships Program and we aim to remove any impediments to operational effectiveness and the successful delivery of their research outcomes. The high level goals and organising structure (Themes) for our Flagships are described in Section 4 of this Plan.
- *Science Investment:* We will move to the next stage of the Science Investment Process (SIP). This is in preparation for further focusing of our research investment in 2006-07. The SIP will improve accountability for our approximately \$600 M per annum of taxpayers' investment in CSIRO, and seek to ensure that we invest in the science that will provide greatest benefit to our nation into the future.
- *Enabling Systems:* We will move to the next stage of the Business Processes and Enabling Technologies Review (BETR) project, starting in November. In support of "one- CSIRO", BETR will deliver common, streamlined information systems across the domains of HR management, financial management, customer relationship management, project management, contract management, and resource planning.
- *Research Support:* In parallel with BETR, we will be migrating our current Divisional and corporate based delivery of research support services into enterprise-wide delivery of services (often referred to as shared services). This will support the delivery of research across our Divisional boundaries (particularly to support Flagships and cross-Divisional programs), enhance our service levels supporting our 'core business' of science, provide flexibility of support into the future and reduce our overhead costs so that we can redirect resources into science.
- *Project Leadership:* Research projects are the building blocks of our science excellence and its delivery and are at the core of our business; we will therefore concentrate on continuously improving Project Leadership within CSIRO.
- *Delivery for Client Impact:* CSIRO's core purpose remains constant and robust: '*By igniting the creative spirit of our people we deliver great science and innovative solutions for industry, society and the environment.*' Thus, as we continue to evolve as an organisation and increasingly operate as a single enterprise, it is vital that we pay keen and close attention to our primary purpose, i.e. providing science solutions to meet the needs of our external stakeholders. The summary work programs articulated in Sections 5–7 in this Plan, for our three Operating Groups, describe the key domains, and goals, upon which our 'engine room' will continue to deliver. As such, we will also continue to evaluate and improve on how we build relationships with, and deliver maximum benefit to, our many customers and diverse stakeholders.

Implementation of these projects will proceed as illustrated in Figure 2. Further detail of the processes supporting change are provided in Section 8.5 and Appendix 10.1.

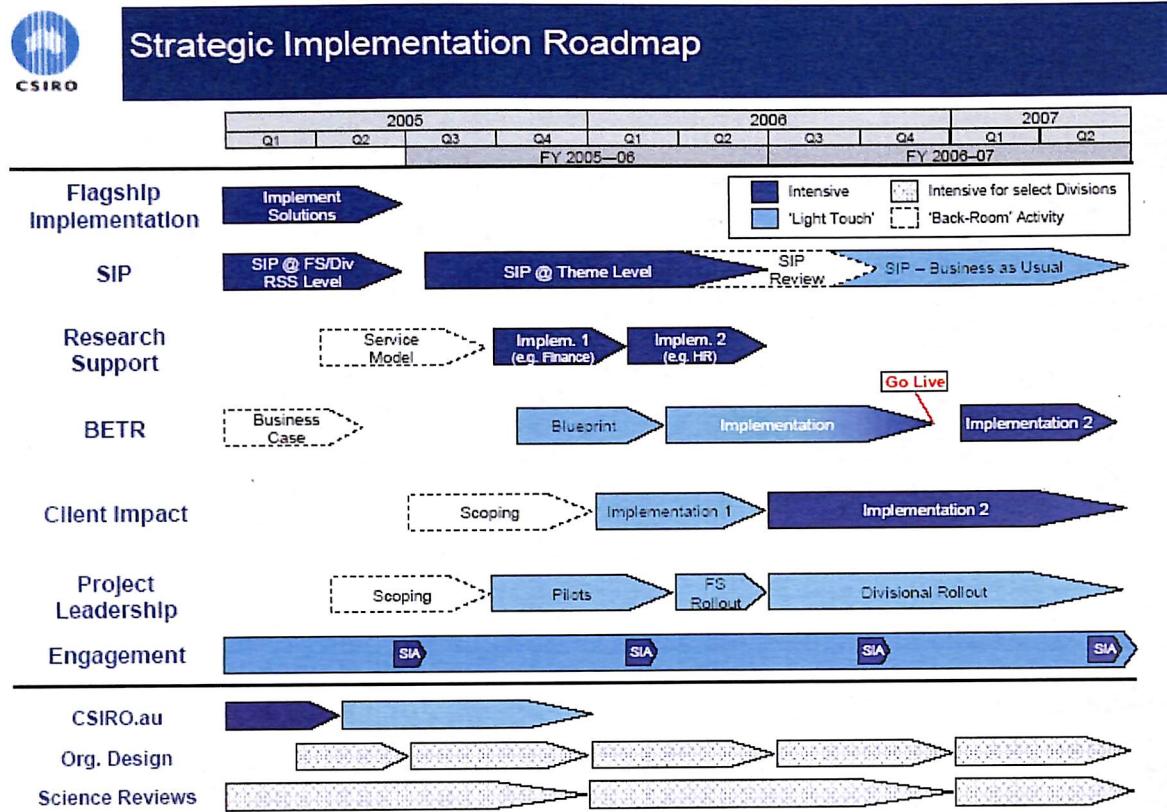


Figure 2: Strategic Implementation Roadmap

Organisation Risk Overview

In looking at the scale and scope of the change program outlined above it is important to consider its impact in the context of the external environment in which the CSIRO operates. Factors such as the ever increasing scale and pace of globalisation of industry, the emergence of explicit national innovation strategies by developing nations such as Brazil, Russia India and China and the ongoing examination of public and private investment priorities within Australia's own innovation system make the environment in which CSIRO seeks to operate a challenging one.

To stand still and ignore or resist these forces of change would be folly. However, the task of responding to them appropriately is not without risk. As Australia's leading research agency with over 75 years of success in creating impact for the nation, how CSIRO chooses to respond to these factors is closely monitored and analysed both internally and externally. It is therefore essential that the organisation's strategy and the operationalisation of it through the activities outlined in this plan are underpinned by a comprehensive risk framework.

In appendix 10.5 of this plan is an overview of the organisation's risk profile. It classifies risk according to strategic and operational characteristics with the former actively examined and monitored by the Executive and the Board as a whole with operational risk reviewed by the Risk Assessment & Audit Function and monitored by the line management and the Board Audit Committee. It is important to note that this is a dynamic process with risk rankings and categorisations reviewed and adjusted on a regular basis.

The key strategic challenge facing CSIRO over the course of 2005-06 will be its ability to remain focused on the execution of its strategic objectives while remaining agile enough to respond to internal feedback on the traction and impact of those activities and key developments in the external environment. The activities and processes described in this plan together with the commitment of the staff who work for CSIRO give the organisation the confidence this challenge can be addressed.

1.3 Strategic Context for this Plan

A strong national innovation system is more important than ever

CSIRO operates within a continually changing context - both globally and nationally. Remaining relevant and effective within Australia's national innovation system involves charting a clear strategic pathway, identifying and communicating the various roles CSIRO plays, as well as staying sufficiently nimble to effectively respond to external and internal changes. The external world, and developments therein, are more important than ever before. The global and national context sets the foundation for articulating the role that CSIRO plays in the Australian innovation system.

Science - by its very nature - has the ability to transform communities, industries, and even whole economies. The historical success of science lies with discovery and application that can achieve rapid and significant breakthroughs, affecting the lives of many. Science today is no different. What is different about this present era of science is the pace of development. Discoveries across a number of fields, including information technology, biotechnology and nanotechnology, combined with a significantly enhanced ability to crosspollinate across disciplines, are having a cumulative effect on the nature of science. The implications of this are substantial. Countries are both investing more than ever before in science and becoming more strategic about these innovation investments. To remain competitive, countries must actively be part of the global scientific community and maintain an outward focus to stay on top of, and leverage, new developments.

A critical role for CSIRO within Australia's national innovation system

Australia cannot develop an innovation strategy in isolation from these global trends. Recent initiatives, such as Backing Australia's Ability and the establishment of the National Research Priorities, recognise this. The innovation system must be flexible and responsive to be able to adapt to changes and developments globally. Understanding the spectrum of scientific development - from applied research through to frontier science developments - underpins the formulation of the innovation strategy. For Australia, a winning innovation strategy will strike a delicate balance between the adoption and integration of offshore technologies to drive productivity of key sectors with selective investment in strategic R&D and frontier science.

The role of CSIRO within Australia's innovation system cannot be underestimated. As the largest player, it has an important role to play, and an obligation to other players to be clear and consistent in defining this role and developing supportive strategies. In particular, CSIRO is differentiated and well positioned to form strong partnerships and lead large, complex, multi-disciplinary campaigns. To be effective in its role, CSIRO must continue apace its reform agenda and clarify the roles and areas of distinctiveness, all the while staying on top of global and local developments.

CSIRO's role and future strategy

Every public research organisation contributes to the national wellbeing in a different way. For CSIRO, the focus is on delivering science solutions direct to Australian industry and communities, while building Australia's science base. By specifying its roles and functions explicitly in the "Role House"¹, CSIRO is able to deliver in areas of greatest relevance and impact. Clear articulation of roles also helps the organisation to prioritise investments and to demonstrate the benefits science brings to Australia.

¹ A full description of the Role House follows in section 1.4.

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The "Role House" itself is neither the CSIRO strategy nor the sole determiner of CSIRO's future direction. It does however provide a language and framework to help develop and implement strategy and a powerful communication tool to describe the future direction.

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

Strong organisations define their strategy around a few key commitments. The ability to commit to important choices despite short-term costs, long lead-times and cultural barriers is the hallmark of a strong organisation with a firm sense of direction. CSIRO's core purpose, (mission), is all about people, science, impact and the underpinning organisation. CSIRO, in recent years, has made a number of commitments in those areas. These include; building capabilities around world class teams, focusing and boosting investment in high priority areas (like Flagships), ensuring effective knowledge transfer and deepening the One-CSIRO culture. These commitments underpin the vital change agenda described in Section 1.1 to deliver against CSIRO's 2003-2007 strategic plan.

1.4 CSIRO Roles

With the increasing pace and competitiveness of innovation across the globe, CSIRO's place in Australia's national innovation system (NIS) has become more important than ever. A healthy, unified and differentiated CSIRO can deliver significant benefits for Australia. Recently, consistent with the broad directions of its enterprise strategy, CSIRO has developed a new articulation of the roles it performs, and will continue to perform, for the Australian community. At the core, these roles revolve around fulfilling the science needs of industry and the community. This new perspective will improve stakeholder and collaborator understanding of the full spread of research activities being conducted by CSIRO.

CSIRO has multiple roles to play within the context of Australia's NIS. These can be classified into three types: Core, Satellite and Enabling. CSIRO's core roles revolve around fulfilling the science needs of industry and the community. Related satellite roles are important in the NIS and complement or support CSIRO's execution of the core roles. Enabling functions provide the strong foundation necessary for effective and efficient delivery towards CSIRO's goals.

Core Roles

CSIRO's core roles were first enumerated in the Science and Industry Research Act (1949) as CSIRO's "primary functions" (Appendix 10.2). The Act states that CSIRO's primary functions are "to carry out scientific research for any of the following purposes: assisting Australian industry; furthering the interests of the Australian community; contributing to the achievement of Australian national objectives or the performance of the national and international responsibilities of the Commonwealth; any other purpose determined by the Minister; [and] to encourage or facilitate the application or utilisation of the results of such research." (Sec 9[1][a,b]).

A role is considered to be "core" if and only if abandoning the role is inconceivable, even over a long time horizon. Each core role also involves a focus on capability building for both Australia and CSIRO as well as technology transfer to ensure that CSIRO's science creates impact.

For CSIRO, the five core roles are:

- Science-based Solutions for the Community
- Delivering Incremental Innovation for Existing Industries
- Solving Major National Challenges (Improve quality of life and/or reduce national costs)
- Creating New or Significantly Transforming Industries
- Advancing the Frontiers of Science

Core roles are immutable – they define the essence of an organisation. To change the core roles is to change the organisation. As Australia's largest national research and development organisation, CSIRO is first and foremost an enterprise that delivers impact for Australia through its science.

CSIRO's core roles, therefore, are all around science – whether through applying and integrating existing technologies to solve problems, coming up with clever new innovative science-based approaches or through creating new paradigms in the understanding of leading edge science areas.

Satellite Roles

CSIRO performs a number of other roles that deliver value to Australia, but they are not the defining roles for CSIRO. These "satellite" roles are strongly related to the core science activities that CSIRO performs and CSIRO has developed distinctive ability to deliver on these roles – providing strong justification for CSIRO to carry out these satellite roles. However, it could be envisaged over the long term that the nature of these satellite roles could change without changing the fundamental nature of CSIRO. CSIRO will periodically review its satellite roles, and over time possibly add or remove or modify satellite roles from its stable of articulated roles. Currently, CSIRO's satellite roles are: 'Supporting Post-Grad/Post-Doc Development'; 'Outreach and Education'; 'Scientific Publishing Services'; 'Providing Technical Services'; 'Managing National Collections'; and Managing National Facilities' (note that only the actual activities of managing the National Facilities and Collections is regarded as a satellite role, the research conducted in and using such collections and facilities is very much part of the core roles for CSIRO).

Enabling Functions

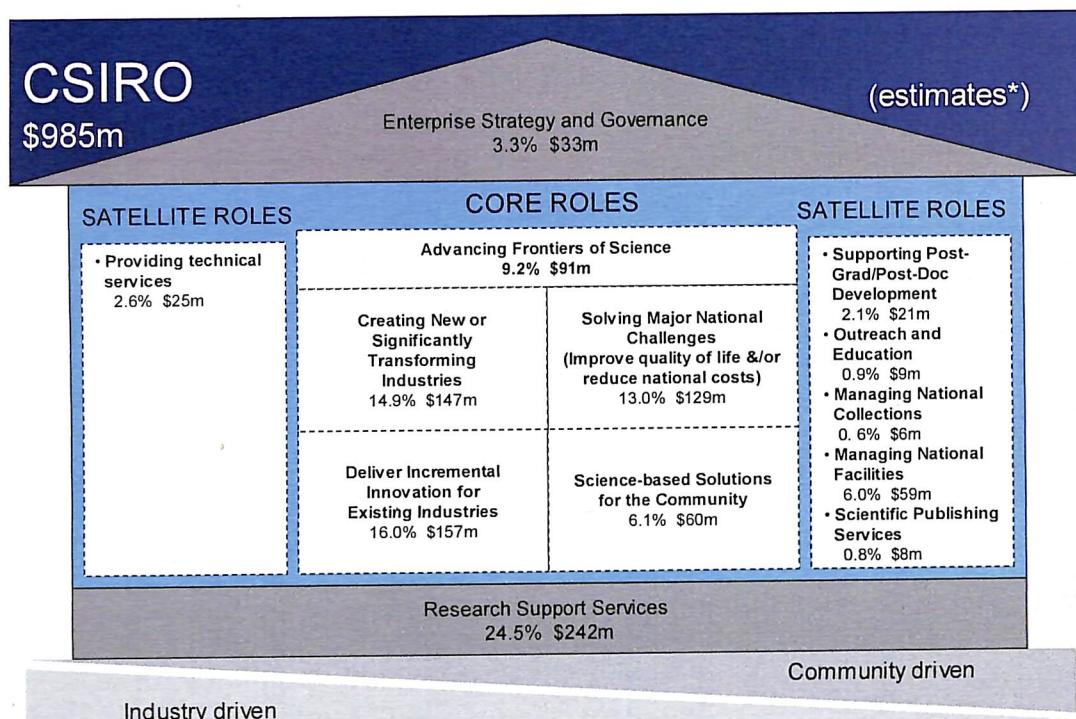
Certain enabling functions are necessary to enable the organisation to deliver on its core and satellite roles. These functions do not occur for their own sake, and are not roles in and of themselves. Rather, they are supporting activities that make it possible to perform the roles appropriately, effectively and efficiently. In CSIRO the two most important enabling functions are: 'Providing Research Support Services' and 'Enterprise Strategy and Governance'.

Role Summary

The role-based perspective is now being incorporated as a key principle in many of CSIRO's management processes. This is significant. It will become the common language, providing the framework in which decisions related to strategy, investment and operations can be taken. It will help CSIRO researchers to even better understand the broader national context when any new investment decision is taken and when they are conceiving of the next big challenge to address. The clarity of CSIRO's role descriptions will facilitate collaboration with other players in the Australia's innovation system. Above all, though, by allowing for transparent prioritisation across CSIRO's entire research portfolio, it will enhance CSIRO's ability to perform relevant science that delivers maximum impact for Australia.

The Role House

CSIRO's roles can be simply represented via a model of a house (*Figure 2*).



* The resourcing estimates shown in this diagram are of a preliminary nature for indicative purposes only. They are subject to change as more refined estimation methods are developed – particularly in relation to the separation of costs between core and satellite roles. Significant over attribution of core research costs to satellite roles has occurred during initial estimates. These estimates are based on an aggregate of Divisional estimates (as shown in sections 5-7) and the distribution of Corporate expenses by role. The aggregate figure differs from CSIRO Total Expenses as shown in the financial statements due to the accounting treatment of FSA and ensis.

Figure 2: The Role House

The "Role house" illustrates CSIRO's core roles at the centre of the diagram, surrounded by satellite roles. The enabling functions are represented as the "roof" and "floor" of the house, highlighting the support and guidance they provide to the other roles. The house also illustrates the continuum between industry driven activities (left side of the house) and community driven activities (right side of

the house) for the various roles CSIRO is operating within. The industry driven / community driven continuum illustrates that, while all of CSIRO's activities ultimately deliver public good benefits for Australia, some activities are more driven by industry needs and others are more driven by community needs. The dashed lines within the house signify the integration and interdependence between the roles. None of the roles can exist in isolation – there are linkages between each of them. No sharp boundaries exist between roles, and no core role is separable. Within the core roles, time horizons correlate with vertical position within the house. In other words, "Advancing Frontiers of Science" has a long term time horizon while "Delivering Incremental Innovation for Existing Industries" has a much nearer time horizon.

Limitations of the Role House

Clearly any such representation has its limitations. People are at CSIRO's core; yet the house model does not adequately emphasise the importance of the roles that our scientists and staff play in delivering impact to Australia, nor does it highlight the importance of collaboration with external parties. CSIRO's collaboration with other players within the National Innovation System is critical to leverage the benefits of a "Team Australia" approach. The diagram may also give a false impression of a static and unchanging CSIRO. In addition, it does not seek to represent the relative size of each of the roles within CSIRO. Nonetheless, the house diagram is a useful and simple tool that reflects the roles of CSIRO, and one which has gained internal acceptance.

The House as a Whole

Ultimately, the role of CSIRO, expressed through the "Role house" as a whole, is to deliver outcomes that enhance the lives of all Australians over the long-term. The strength and effectiveness of each role represented in the "Role house" contributes to CSIRO's ability to deliver impact for Australia through its science .

Clarity of roles is fundamental and will:

- Allow the organisation to strategically prioritise its activities to ensure maximum benefit to Australia,
- Help the 6,500 scientists and staff within CSIRO better focus and align their activities and understand how their activities and achievements impact the objectives of the organisation,
- Give clarity to CSIRO stakeholders regarding the value of CSIRO to Australia, and help set expectations appropriately, and
- Facilitate partnerships, collaborations and specialisation with other members in the national innovation system (including state clusters, universities, CRCs, etc) for maximum impact.

Section 2 Governance

2.1 Governance Framework

Executive Responsibility: Mr Mike Whelan

Overview

As part of our commitment to best practice governance, CSIRO has developed a Governance Framework which encapsulates all of the governance elements across the Organisation.

In summary, CSIRO's Governance Framework is made up of overarching elements and enabling elements, as shown in the *Figure 3* below. These elements can be further broken down as follows:

1. Overarching elements

- i. External and legislative – including CSIRO's governing legislation (the *Science and Industry Research Act 1949* and the *Commonwealth Authorities and Companies Act 1997*) and its responsibility to the Minister, government and Parliament. A summary of CSIRO's functions is included at Appendix 10.2.
- ii. Internal – CSIRO's own overarching governance structure. A high level organisation chart is included at Appendix 10.3.

2. Enabling elements

- i. Directing – including organisational policy and strategic direction
- ii. Controlling and managing – key processes and procedures
- iii. Assuring – performance assessment, and internal and external audit

Overarching elements		Enabling elements		
External and legislative	Internal	Directing	Controlling and managing	Assuring
SIR Act 1949	CSIRO Board	Policy Framework	Primary Processes	Performance Measurement Framework
CAC Act 1997	Board Committees	Code of Conduct	Enabling Processes	Science Assessment Reviews
Other legislation	Board direction to Chief Executive	Service Charter		
• Commonwealth	Executive Team (ET)	Strategic Plan		
• State/Territory	Management Committees	Science Investment Process		Risk Assessment and Audit
Minister	Executive Management Council (EMC)	Operational Plans/Budgets		ANAO external audit
Department of Education, Science and Training	Advisory Committees			Other Government audits/reviews
Other Commonwealth Government agencies	Authorities and Delegations Framework			
Parliament	Awards and Enterprise Agreements			
Triennium Funding Agreement	Associated Entities			
National Research Priorities	Governance Principles			

Figure 3: The CSIRO Governance Framework

The Governance and Performance Frameworks are designed to:

- promote transparency, both internally and externally
- ensure accountability for the resources we invest
- better understand and manage risk
- ensure performance meets investment expectations, and clearly link research and path to market to generate impact.

Governance initiatives

The development and continuous improvement of the Governance Framework is an important function. A key for 2005 is the further development and implementation of CSIRO's Policy Framework for the Organisation, which will see policy updated and standardised, and made more accessible to staff.

Also in 2005, the Organisation's governance structure will be assessed against the recommendations of the Australian government's Review of the Corporate Governance of Statutory Authorities and Office Holders (the Uhrig review). The organisation will make use of the CSIRO Governance Framework in coordinating involvement in this exercise.

2.2 Performance Planning and Measurement

Executive Responsibility: Mr Mike Whelan

Operational Planning

The *Science and Industry Research Act 1949* requires the Organisation to formulate an annual Operational Plan before the commencement of the financial year, setting out:

- the strategies the Organisation proposes to pursue
- the activities the Organisation proposes to carry out
- the resources the Organisation proposes to allocate to each such activity during the year in giving effect to the relevant Strategic Plan.

An annual Operational Plan has no effect until it has been approved by the CSIRO Board.

The primary direction for the development of this 2005-06 Operational Plan is provided by the CSIRO Strategic Plan for 2003-2007. As illustrated in Figure 4, the CSIRO Operational Plan provides a one-year whole-of-CSIRO view of how CSIRO is organised to deliver on its strategic goals and objectives. It describes specific initiatives and activities for the coming year, and provides details of the allocation of resources across these activities and functional groups. This broad whole-of CSIRO view is supported by more detailed planning that takes place across the Organisation.

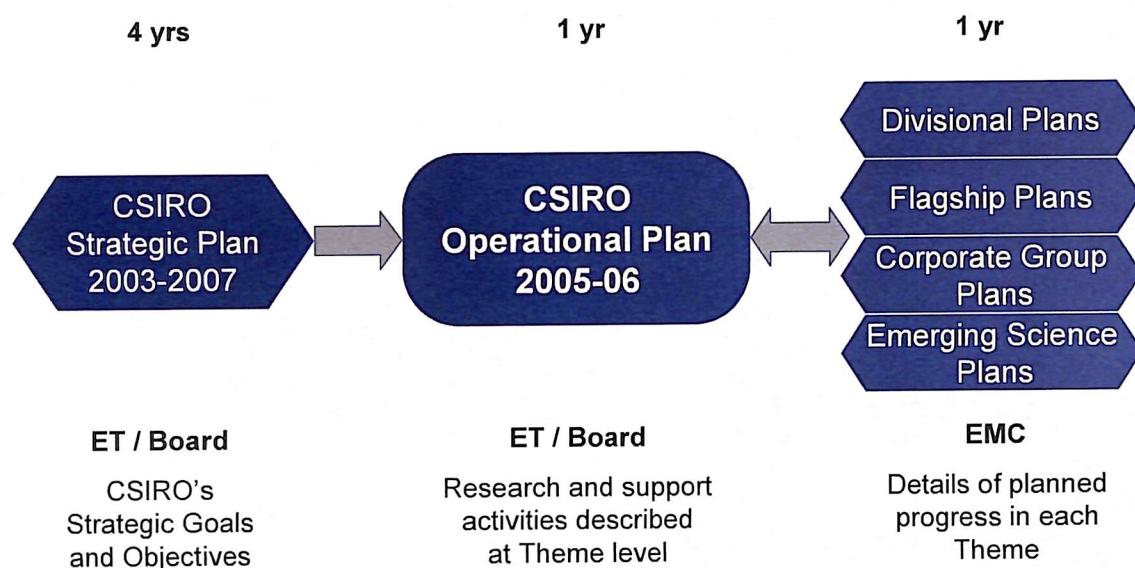


Figure 4: Relationship between CSIRO Plans

Sections 1-3 of this plan describe the broad strategies of the organisation while Sections 4 -8 describe specific goals and activities to be pursued throughout the year by Divisions, Flagships and Corporate Groups. Throughout these sections activities are clearly linked to the strategic objectives set out in Strategic Plan, and details of resource allocation are provided for each Theme¹. Divisional entries also show estimates of resource distribution across the various roles described in the 'Role House' (see Section 1.3). Further detail of organisation wide resource allocation and planned financial performance are provided in Section 9.

Outcomes and Outputs

As a significant commonwealth agency, CSIRO operates within the Government's formal "outcome-outputs" resourcing framework. CSIRO's outcome and outputs, as currently defined, are shown in

¹ The 'Theme' concept is introduced and explained in Section 3.2

Figure 5 below. In the light of changes to CSIRO's internal research group structure which take effect from 1 July 2005 (moving from four groups to three), and the ongoing development of CSIRO's own strategic investment process, this outcome-output structure will be reviewed during 2005-06.

CSIRO's outputs are generated through three main lines of business.

- **Strategic Research:** Directed toward national priorities and other issues of national significance, strategic research sustains and builds national research capabilities. Strategic research may be funded wholly from CSIRO's government appropriation or co-invested with public or private sector partners.
- **Consulting and Specialised Testing Services:** Offered on a commercial basis, these services make the most of CSIRO's knowledge and facilities to help solve problems and realise new opportunities for industry and other clients.
- **Licensing and Exploitation of Intellectual Property:** Focused commercialisation activities help create new enterprises based on CSIRO know how and generate revenue by way of licenses and royalties.

Outcome			
Outputs			
Research Products and Services for Information Technology, Manufacturing and Services	Research Products and Services for Sustainable Minerals and Energy	Research Products and Services for the Environment and Natural Resources	Research Products and Services for Agribusiness and Health
<p>The application or utilisation of the results of scientific research delivers</p> <ul style="list-style-type: none"> – Innovative and competitive industries – Healthy environment and lifestyles – A technologically advanced society 			

Figure 5: CSIRO's Outcome-Outputs Framework (to be reviewed in 2005-06)

Operational Performance

To help maintain our focus on delivery and execution, and to underpin accountability for performance, the Executive Team (ET) and CSIRO Board will regularly consider an Organisational Performance Report that consists of the components illustrated in Figure 6.

Strategy Implementation Goals: The Strategy Implementation Goals for 2005-06 are assigned to members of the Executive Team and can be found in the relevant team entries throughout the Plan.

Organisational Health Measures: These capture quantitative information on the CSIRO's performance across a range of important processes – monitoring trends over time and performance against specific targets (where relevant). The organisational health measures selected for 2005-06 include measures of financial performance, scientific output and quality, stakeholder relationships, people management and operational performance. A detailed list of measures and targets is provided at Appendix 10.4.

Program Performance: CSIRO's Program Performance Framework serves two complementary purposes. Its strategic planning elements (themes, streams, research and engagement goals, roadmaps) provide a common language for describing and organizing research activities, reinforce goal-oriented planning and assist prioritization decisions at a range of levels. Its performance assessment elements (scoring of annual performance goals, assessment of theme/stream progress, management response) promote focus on progress toward clearly articulated goals and objectives. A more detailed explanation of themes and streams follows in Section 3 of this plan.

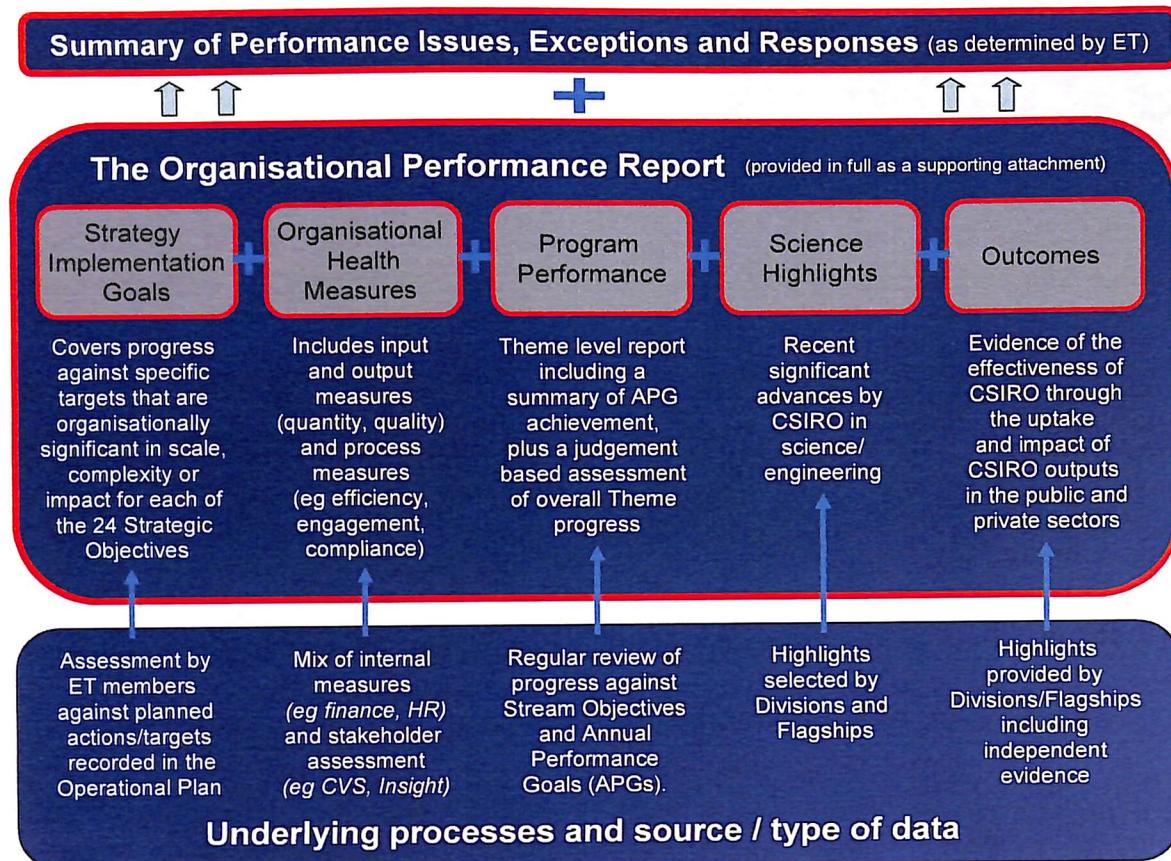


Figure 6: CSIRO's Performance Measurement Framework

Science Highlights: These reflect CSIRO's commitment to the conduct of excellent science and celebrate the excitement that comes with providing novel Sciences and Technology solutions to industry, community or environmental problems and through expanding the frontiers of knowledge.

Outcomes: As our 'Purpose' and 'Outcome' statements indicate, CSIRO is successful when research results are applied by our stakeholders in ways that deliver impacts across the 'triple bottom line'. The effectiveness indicators shown in Figure 7 below represent the specific types of economic, social and environmental impacts achieved through the adoption of CSIRO outputs. CSIRO's Annual Report provides many examples of outputs and their associated outcomes described in these terms.

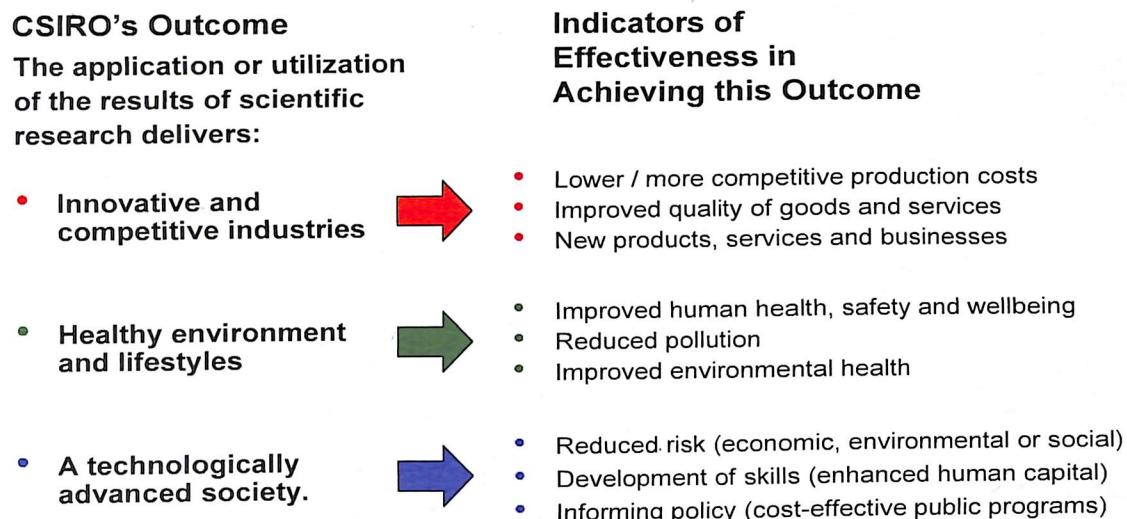


Figure 7: CSIRO Outcomes – the economic, social and environmental impacts

2.3 Organisational Risk Management

Executive Responsibility: Mr Mike Whelan

Risk Management Framework

CSIRO's Risk Management Framework is built upon the Australian and New Zealand Risk Management Standard (AS/NZS 4360:1999). The framework is used to identify and analyse risk at the Enterprise level, at the Divisional level and at the project and functional level of the organisation.

The processes in place to facilitate this are to evaluate and prioritise risks, to identify risk treatment options and implement cost effective mitigation strategies where appropriate.

The Enterprise Risk Advisory Committee (ERAC) has been established to;

- Review and refine CSIRO's risk management policy and process and recommend any changes to the Executive Team (ET).
- Evaluate and review the Organisational Risk Profile on an ongoing basis and report the revised profile and provide advice on risk management strategies prepared by Executive Team owners
- Identify and evaluate any risk trends and ensure corporate strategy is responsive to issues raised
- ERAC is a central point within the organisation that advises ET on enterprise risk management activities and takes an enterprise view of process improvements and risk assessments.

The Board monitors strategic risks and the Audit Committee reviews operational risks.

In 2005-06 the outcomes of the Risk Harmonisation Project will be implemented. The purpose of this Project is to review and consolidate the risk methodologies, framework and tools that currently exist across the organisation.

An outcome of the Risk Harmonisation Project will be to provide a platform to support the key message that completion of risk assessments is a line management responsibility, including implementation of risk mitigation strategies. Risk assessments together with mitigation strategies are to be reported to ET.

Risk Assessment and Audit (RA&A) will support line management in meeting this obligation through the provision of advice regarding process and methodology and will quality assure the work being performed. Further, RA&A will regularly report to ET on outstanding high and significant risk issues including risk mitigation strategies, nominated owner and timeline for completion.

The Organisational Risk Profile as at June 2005 is included at Appendix 10.5.

2.4 Occupational Health, Safety and Environment

Executive Responsibility: Mr Peter May

CSIRO recognises that Occupational Health, Safety and Environment (OHS&E) is a critical and integral component of science, business and management activities. We accept our responsibilities under Commonwealth and State legislation, regulations, and codes of practice. Through our OHS&E Management Systems, we have established systems of work and defined the OHS&E responsibilities of managers and staff.

The CSIRO workforce faces a diverse range of workplace hazards by nature of our various research and development activities and our involvement in evolving science. The potential for environmental impacts to arise from our activities also requires effective management and control. To manage these risks, a network of OHS&E staff work together with management, scientists and support staff in order to integrate OHS&E management strategies into all business activities of the organisation.

CSIRO recognises that accurate measurement and monitoring of OHS&E performance is an important part of effective and efficient business practice. Measuring OHS&E performance reinforces line management accountability for meeting our OHS&E objectives. OHS&E performance indicators (see Appendix 10.4) were introduced to identify ways of measuring, improving, and comparing OHS&E performance between Divisions and between CSIRO and similar external organisations.

Emerging trends and/or high risks are identified through a process of incident review by the OHS&E Manager, resulting in a range of management controls being identified to better manage these risks. A range of internal surveys, focusing on specific hazards, are also conducted on a risk basis in order to assist with early identification and prevention of injury or environmental damage.

The Board, Executive Team and the Executive Management Council receive OHS&E performance reports detailing the Divisions quarterly and year to date OH&S performance and annual environmental performance. These include lead and lag indicators and also compensable and non-compensable incidents, costs and lost time of all occupational incidents, injuries and environmental resource indicators. The Audit Committee also receive summary reports of audits conducted within CSIRO.

Risk Assessment & Audit branch conducted audits of CSIRO's OHS&E Management Systems as a means of internal, yet independent verification of compliance performance. These audits were completed in August 2004. Risk Assessment & Audit branch also conducted a review of the organisational OH&S and Environmental risk exposures in order to establish organisational OHS&E risk profiles.

External auditing is conducted by various Commonwealth OHS&E regulators in response to incidents and in accordance with their own audit programs. These include audits by Comcare (the regulatory authority for OH&S compliance) and the Australian Radiation Protection and Nuclear Safety Authority (ARPANSA), the regulatory authority for radiation safety compliance.

As part of the on-going review of the organisation's OHS&E performance regular performance reports are also provided to the CSIRO Health and Safety Committee and Environmental Management Systems Committee.

Section 3 Science Investment and Research Portfolio Management

3.1 Science Investment Process

Executive Responsibility: Dr Ron Sandland

Overview

As part of the implementation of the strategic plan, work is underway to refine the way CSIRO invests in science (and support projects) across the whole organisation. A combination of enhanced strategic and analytical processes will enable CSIRO to implement a more systematic and deliberate approach to managing its research portfolio. CSIRO will continue to ensure that its collection / portfolio of science investments is managed in such a way as to:

- focus CSIRO skills and energies on the most important issues for Australia;
- continue to increase the impact and relevance of CSIRO science;
- maintain an appropriate balance between all the roles and responsibilities of CSIRO; and
- ensure the wise investment of taxpayers' dollars (our appropriation funding)

There are two stages to the project. The first will tackle how broad organisation-wide decisions are made; the second will ensure that consistent investment principles are used across the organisation as we make resourcing decisions. The plan is to design and progressively implement the improved process over the next two to three years. The "Role House" will be an important tool to facilitate prioritisation.

Building upon the trial approach taken during 2004-05, the focus for 2005-06 will be managing the enterprise investment, with consideration of the science investment context to commence in August. The approach is comprised of two major components:

1. High level direction setting. The senior executives of the organisation, taking into consideration a large array of internal and external factors, translate CSIRO's Strategy into medium term investment priorities.
2. Iteration. Divisions, Groups and Flagships iterate to give effect to required directional shifts and deliver specific outcomes throughs Themes, Streams, Projects and Capability development.

This year will also concentrate on the convergence of Flagship and Emerging Science investment processes into one unified CSIRO approach, building on the experience to-date in investment focussed through the current Flagship program.

3.2 How Research is Organised in CSIRO

Themes and Streams

CSIRO's research programs are organised into **Themes, Streams and Projects**. This classification method has been adopted across the organisation to enable a greater ability to ensure the alignment of individual projects with high level strategic goals and to monitor progress toward these goals through the **Program Performance Framework**:

Program: A Program focuses significant CSIRO effort and resources on a clearly defined mission (eg The Preventative Health Flagship Program's mission is to improve the health and wellbeing of Australians and save \$2billion in annual direct health costs by 2020 through the prevention and early detection of chronic diseases).

Theme / Theme Goal: A Theme refers to a major area of research that is directed towards a clear and measurable strategic goal which is a key part of the Program's mission (eg the Goal for the Colorectal Cancer Theme in Preventative Health is to reduce colorectal cancer incidence by 10% and increase 5-year survival from around 63% to 70% by 2020 through prevention and early diagnosis).

Stream: A Stream represents a collection of related projects that address a particular aspect of the Theme Goal. (eg The Colorectal Cancer Theme Goal is pursued through three streams of activity, Developing protective foods, Developing novel diagnostics, and Developing policies and guidelines). Each Stream has an explicit medium-term Stream Objective supported by specific annual performance goals.

Project: A project is the core unit of research activity and budgetary control within a Division. (eg Developing novel diagnostics Stream in the Colorectal Cancer Theme consists of numerous projects such as *Novel protein scaffolds* that is delivering protein structures and scaffolds for measurement of key markers of the disease and *Abnormal methylation for prognosis and early diagnosis of Colorectal Cancer* that is mapping methylation of DNA as an additional potential marker).

The CSIRO Operational Plan describes research groups to the Theme level, while Strategic Alignment Diagrams for each Flagship / Division illustrate how each Stream and Theme is aligned to the mission of the Flagship or Division. Details of Stream Objectives and associated annual performance goals are described in supporting Divisional, Flagship and Emerging Science plans. Individual projects are required to have a project plan in accordance with CSIRO's project management policy.

A list of 2005-06 and 2004-05 Research Themes is available in Appendix 10.6.

Research Groups and Divisions

On 1 July 2005 the number of Research Divisions in CSIRO will be reduced from 21 to 19 and the four Research Groups will be reconfigured into three. The Research Groups are headed by a Group Executive with line management responsibility for Divisional Chiefs and Flagship Directors. The Groups fulfil an important role in intra-organisational coordination, collaboration and leadership development. They also provide a focus for developing relationships with CSIRO's Sector Advisory Councils.

Each Division has a number of core capabilities built on particular disciplinary skills, facilities and relationships. Application of these capabilities is often focussed around the research needs of a particular group of clients. While Divisions provide a home for the development and nurture of these capabilities, one of CSIRO's great strengths is in drawing together the diverse range of capabilities across Divisional boundaries. The Flagship Programs (and Major Cross Divisional Programs) described in this Plan are prime examples of this "One-CSIRO" approach. They represent the concentrated application of resources to major programs of research which are designed to address problems and opportunities of national significance with a high degree of alignment to the government's National Research Priorities. However, in addition to these formal programs, there are innumerable smaller and less formal inter-Divisional collaborations. As indicated by the "Partner or Perish" key message in our Strategic Plan, partnerships with other research providers are also increasingly important in the way that CSIRO formulates research programs to ensure the most effective use of Australia's research capacity.

3.3 Science Capabilities, Assessment, and Alignment to National Research Priorities

Executive Responsibility: Dr Michael Barber

Defining and Building our Scientific Capabilities

For organisations like CSIRO excellence is required in both science and its applications. Consequently, CSIRO needs to pay explicit attention to both its science base and how this base is being used in outcome oriented applications if the Organisation is to maximise its impact. Sustaining this impact and the relevance of CSIRO to Australia also requires careful attention be given to the maintenance of the science base and, in particular, to the development of new scientific capabilities that will be critical in future applications.

This explicit concept of capabilities and the capabilities/theme dichotomy was introduced for the first time in the 2003-04 Operational Plan. The intent was that ultimately the capabilities—including technical skills, infrastructure, know-how and networks—should depict CSIRO's scientific and technical strengths while the themes depict how these capabilities are deployed to achieve the resulting value proposition. It would be fair to say that Divisional definitions of capabilities and themes continue to show considerable variability and are not, as yet, articulated as clearly as would be desirable. This is particularly so of capabilities for which Divisional definitions should allow an easy identification of a number of distinctive "CSIRO capabilities" that help strengthen the differentiation of the organisation within the National Innovation System.

Building the scientific capabilities of CSIRO is also an important objective of the Emerging Science Initiative. One of the objectives of the ESI is to establish new capabilities in CSIRO by building research capacity through tackling significant, challenging problems. Planning is in progress that will lead to substantial new investment in 2005-06 to develop or augment CSIRO capabilities in a number of key areas including materials science, nanotechnology, genomics and social sciences.

The clarification of themes, including an increasing emphasis on outcome orientation, has continued in this Operational Plan. It will be furthered by the implementation of the new Science Investment Process (SIP). Effective implementation of the SIP requires clearly articulated themes with outcomes that align as closely as possible with the roles of the organisation as summarised in the "Role House" (Figure 7). At the same time it has been recognised in the design of the SIP that a one-dimensional focus on theme outcomes is neither feasible nor desirable. The delivery of theme outcomes requires deployment of the scientific capabilities of the organisation and an investment model that aims to invest through themes must take account of how that resulting investment maintains and sustains the underlying capabilities. Completion of the design of SIP and its first implementation over 2005-06 will considerably further the definition of CSIRO's capabilities and the identification of the organisation's key strengths.

The Capability Tables at the beginning of each Research Group entries (Section 5, 6, 7) provide a good foundation for the continuation of this important work.

The Science Assessment Process

This identification of key strengths is also being furthered by the roll out of the science assessment process. These reviews explicitly ask external reviewers to assess and comment on:

- The quality of the Division's capabilities and their underpinning scientific skills and disciplines.
- The relevance of the capabilities to the themes and to achieving the proposed outcomes, ie are the theme outcomes feasible given the science base?
- The Divisional identification of future and emerging capabilities that are believed to be necessary to achieve the Division's aspirations

From the reviews that have been completed to date, it has become clear that the effectiveness of the review is increased if Divisions clearly articulate their scientific capabilities and construct their assessment portfolio on the basis of these capabilities. This learning from the first round of reviews is being incorporated into future reviews.

In line with the June 2004 Board endorsed policy, the Science Planning Office will continue to oversee and implement the science assessment reviews. The Divisions to be reviewed during 2005-06 include: Sustainable Ecosystems, Livestock Industries, Land and Water, Mathematical and Information Sciences, Energy Technology, and Exploration and Mining. Reports will be provided to the Board and Minister at the conclusion of each review. The findings of each review will be analysed and organisational and other high level issues will be assessed as part of the annual Science Health Report.

Alignment to National Research Priorities

CSIRO is committed to the Government's National Research Priorities (NRPs) and has incorporated an explicit objective in its Strategic Plan which states that CSIRO will play a significant role in delivering on Australia's National Research Priorities. CSIRO's commitment is about focusing its contribution to the NRPs across its science portfolio not only for level of investment but evidence of impact. The Science Planning Office will monitor and ensure accurate reporting to the Government in line with the strategic objective. This will include analysis of investment and impact data to produce a NRP Progress Report for the 2005-06 financial year detailing CSIRO NRP investment and impact alignment across the Divisions, Flagship Program, the Emerging Science Initiative, Major Cross Divisional Programs and other key activities.

CSIRO planned Divisional alignment against National Research Priorities is illustrated in Figure 8, as is the Flagship alignment in Figure 9 following. The most notable shifts in focus (when comparing to planned outcomes for 2004-05 and noting new Divisional amalgamations and joint ventures) include:

- A slightly reduced Divisional focus on the priorities 'Promoting and Maintaining Good Health and Safeguarding Australia'.
- A moderate increased Flagship focus around the same priorities 'Promoting and Maintaining Good Health and Safeguarding Australia'.
- A moderate Divisional re-focussing around particular goals under the 'Environmentally Sustainable Australia' and 'Frontier Technologies for Building and Transforming Australian Industries' priority areas, most notably increased investment for goals A2, A5, A6 and C1 and reduced investment for C2 and C4.

A full list and descriptions of the National Research Priorities is included at Appendix 10.7.

Summary of Planned Divisional investments in the National Research Priorities (2005-06)

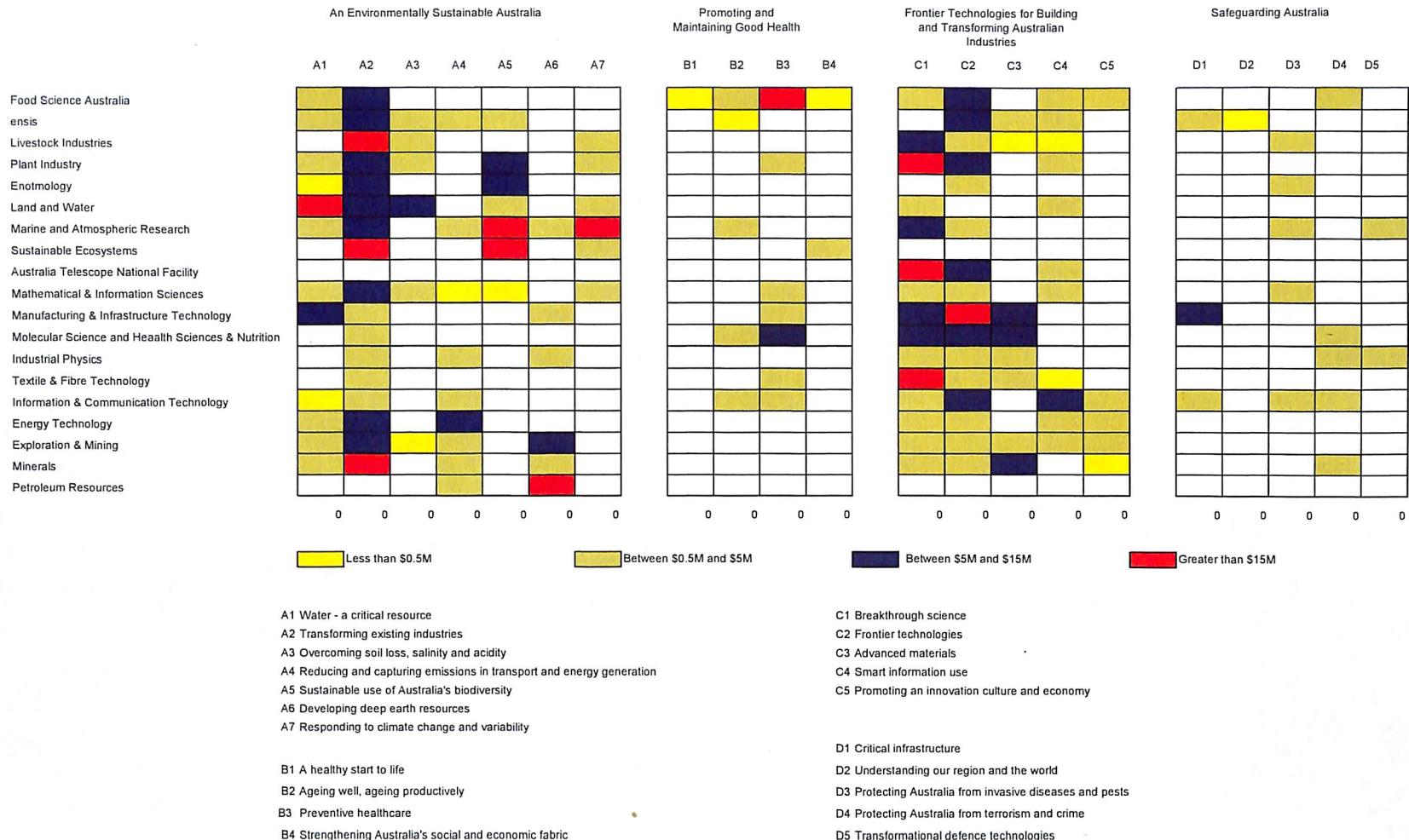
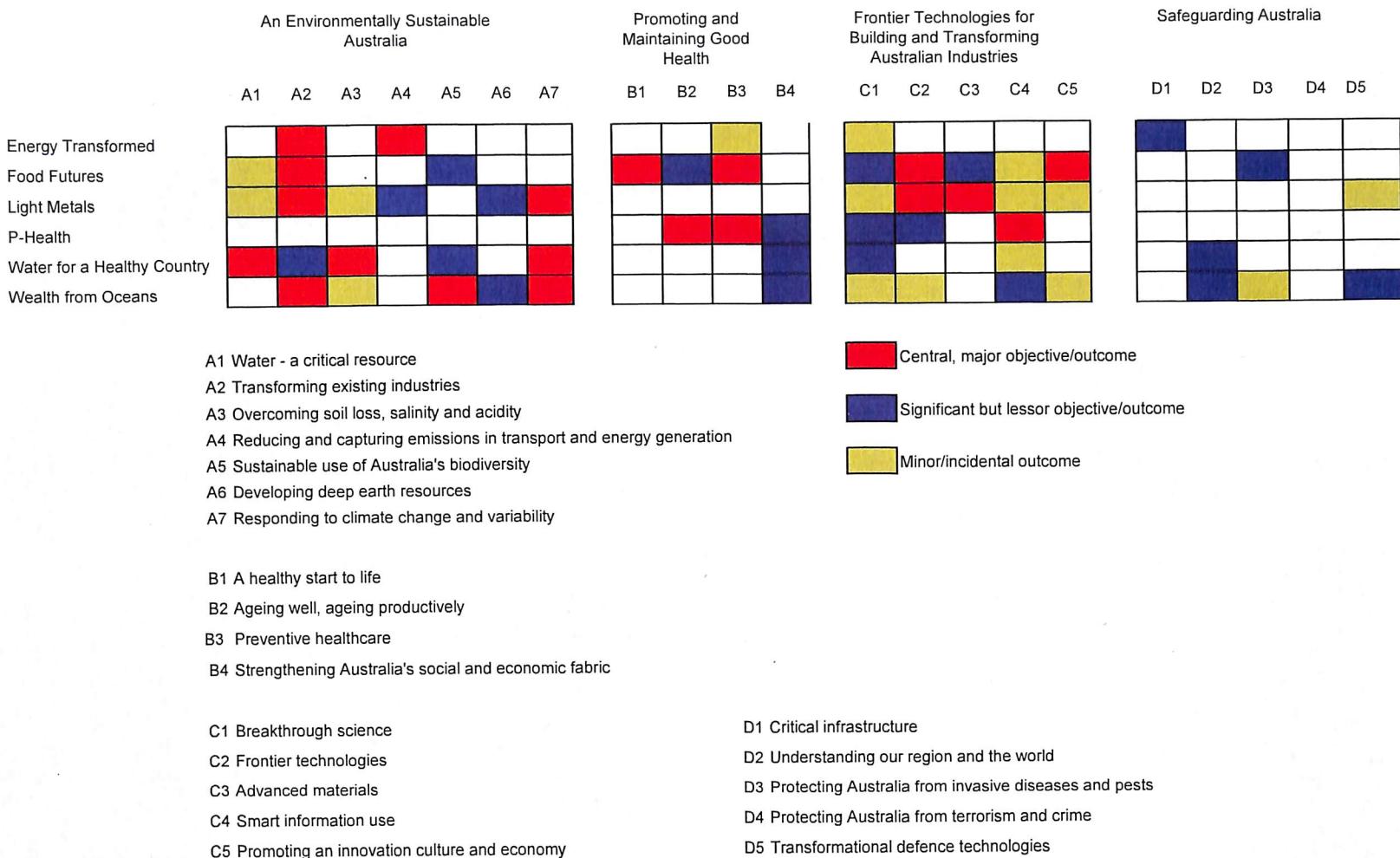


Figure 8: CSIRO Divisional Alignment to the National Research Priorities (2005-06)

Figure 9: CSIRO Flagship Alignment to the National Research Priorities (2005-06)



Section 4 The Flagship Programs

Executive Responsibility: Dr Ron Sandland

Overview

The National Research Flagships are partnerships of CSIRO, other leading scientists, research institutions, Government agencies, commercial companies and selected international partners that aim to make a sustained contribution to Australia's economic and social growth and sustainability. They focus CSIRO's and its partners' research efforts and resources on issues of longer-term national importance, closely aligned with the National Research Priorities.

Governance of the Flagship initiative is in the hands of the Flagship Oversight Committee (FOC). Chaired by the Deputy Chief Executive, the FOC includes all three Group Executives, the Executive Director Science Planning, the Chief Finance Officer, the Chief of Staff BD&C and the General Manager, Flagship Implementation. It meets at least four times a year to:

- decide on resource allocations to the Flagships
- ensure that Flagship research is appropriately aligned with long-term Flagship goals
- ensure that the Flagships' research portfolio is appropriately balanced and aligned with the Organisation's strategic research initiatives
- ensure that research in the Flagships remains of the highest quality
- review the performance of the Flagships against annual performance plans.

The committees provide advice to the Flagship Directors about maximising the effectiveness of their R&D portfolios and about technology transfer opportunities and options.

Significant initiatives being undertaken in 2005-06 – The Flagship Programs

The Flagship Collaboration Fund will begin full operation during 2005-06. It provides a contestable pool of funds for Flagship Visiting Fellows, PhD scholarships and collaborative research with universities and other publicly-funded research agencies. The primary criteria for the award of funding are alignment with the research and the goals of the Flagships, and science quality. The Fund will provide \$8.75m in 2005-06.

The February 2005 Science Investment Process delivered additional funding over and above that originally planned for 2005-06 to Wealth from Oceans and Energy Transformed. Additional funding of just under \$1.5m will enable Wealth from Oceans to boost its work in oil and gas and multi-use management of particular marine areas. Energy Transformed will invest an additional \$900k in capturing carbon dioxide emissions from existing power stations and energy storage technologies that will cater for energy from renewable sources.

CSIRO is committed to growing the Flagships to at least 30% of the Organisation's total appropriation by 2007-08. This is consistent with the complex nature of the national problems and opportunities that the Flagships are addressing. Consequently, we expect that additional investment in Flagships for 2006-07 will be announced during 2005-06. The existing Flagships will therefore be required to plan for increased activity in the lead-up to 2006-07. Part of any additional funding from the Science Investment Process for 2007-08 could also be applied to proposed new Flagships.

During 2004-05 the FOC provisionally endorsed a proposal for a proto Flagship initiative called *Minerals Down Under*. Seed funding will be made available during 2005-06 to enable the interim Director to present a detailed business plan to the Flagship Oversight Committee and to initiate some early research activities. At that stage FOC will consider whether additional investment in *Minerals Down Under* is warranted and whether the initiative meets the criteria for establishment as a Flagship.

During 2005-06, FOC will continue to work on Flagship risk mitigation in the individual Flagships and at the level of the overall Flagship initiative.

Flagship Initiative Resources

Flagship Resources (\$m)				
Year	New Appropriation (BAA2)*	Redirected Appropriation	External**	Total
2005-06	35.00	93.01	37.40	165.41
2004-05	30.00	87.75	27.09	144.84
2003-04	20.00	54.34	6.36	80.70

*Funding provided to CSIRO for the Flagship Initiative under the second "Backing Australia's Ability" program.

** To reflect the full impact of the Flagship Program external revenue includes revenue earned by the Food Science Australia and ensis Joint Ventures. For accounting reasons these revenues are accounted for in the Joint Ventures and are not recorded as revenue by CSIRO.

Note: Flagship figures include Flagship Directors and Implementation Office, but do not include allocation of other Corporate Support Costs.

4.1 Energy Transformed

Flagship Director: Dr John Wright

Overview

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

Research Themes – 2005-06

During 2005-06, the growth in the existing Flagship activities will mainly be in the further development of new power cycles to increase generation efficiency, carbon dioxide capture systems and energy storage to build on areas of high potential and initial success.

The Flagship received additional funding through the Science Investment Process to invest in processes for capturing carbon dioxide from existing power stations and for integrating energy storage technologies to deliver a smooth energy supply from renewable sources around the clock.

Flagship growth is also anticipated through the development of a project and cluster with universities and other eligible organisations under the Flagship Collaboration Fund. This includes a major R&D cluster on the development of new materials for the generation and storage of hydrogen.

Theme 1 – Energy Futures (\$2.31 m)

Goal: Through a process of government, industry and community engagement, supply the tools, data and modelling capability to develop a range of techno-economic scenarios for the stationary energy and transport sectors to 2050.

Theme 2 – Low Emission Electricity (\$18.21 m)

Goal: Cost effective, progressive reductions in greenhouse emissions from large scale (greater than 30 MW) stationary energy generation (fossil fuel and renewable systems) by 5% to 2020, 15% by 2030 and 25% by 2050.

Theme 3 – Low Emission Transport (\$7.35 m)

Goal: Innovations in vehicle technologies and traffic management systems that will reduce greenhouse gas emissions from the transport sector by 37% to 2020, 60% by 2030 and 80% by 2040.

Theme 4 – Low Emission Distributed Energy (\$3.99 m)

Goal: Development of small scale stationary technology (less than 30 MW) and system solutions to enable cost effective large scale deployment of distributed energy to reduce greenhouse gas emissions by 5% to 2020, 14% by 2030 and 22% by 2050.

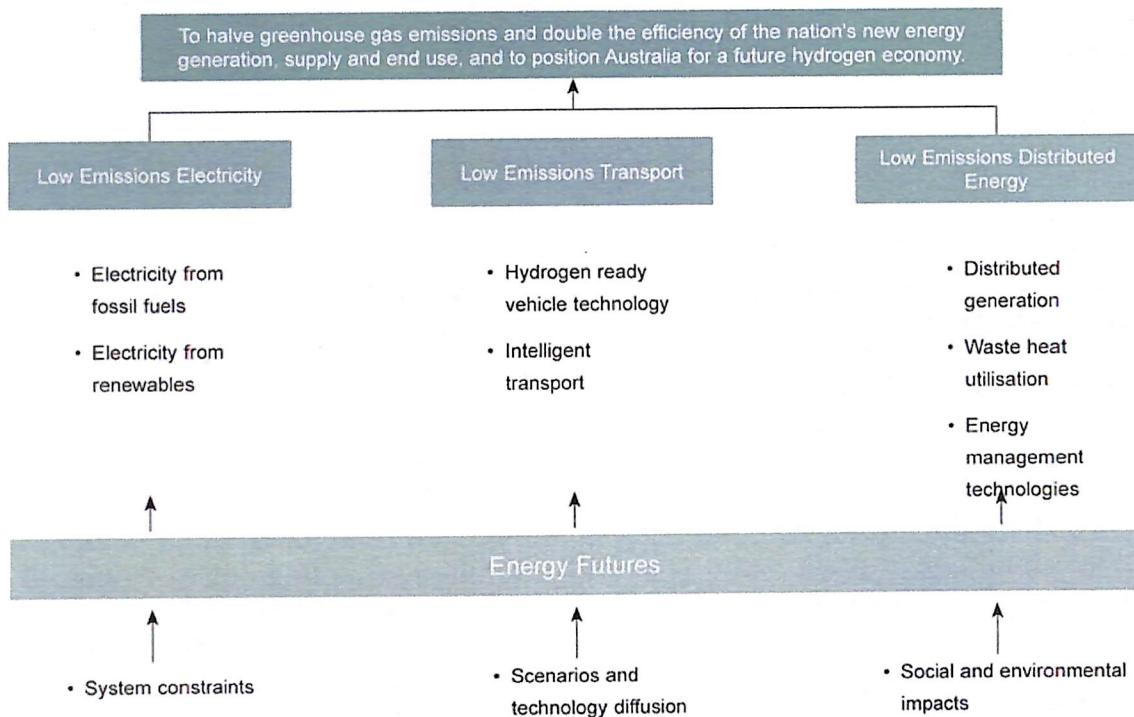
Energy Transformed 2005-06

Flagship Resources (\$k)				
Theme	New Appropriation (BAA2)*	Redirected Appropriation	External	Flagship Total
Energy Futures	333.6	1,066.3	910.0	2,309.9
Low Emission Electricity	2,877.2	9,190.2	6,140.2	18,207.6
Low Emission Transport	1,479.2	4,721.4	1,150.0	7,350.6
Low Emission Distributed Energy	855.9	2,730.8	400.0	3,986.7
Total	5,545.9	17,708.8	8,600.2	31,854.9

*Funding provided to CSIRO for the Flagship Initiative under the second "Backing Australia's Ability" program.

Flagship Alignment Diagram

Energy Transformed Research Program



4.2 Food Futures

Flagship Director: Dr Bruce Lee

Overview

Flagship goal: *To transform the international competitiveness and add \$3B annually of value to the Australian agrifood sector by the application of frontier technologies to high-potential industries*

Research Themes – 2005-06

Major changes in the Flagship's focus for 2005/6 will be around shifting the balance of the portfolio away from primary industry and more into the food processing area, resulting in a higher level of value adding to the Agrifood industry. The Flagship will also review its current level of focus on the biosensor theme particularly in the wine research area.

The Flagship is also aiming to grow via collaboration with universities and other eligible organisations through the Flagship Collaboration Fund. The Flagship will pursue major clusters in frontier separative technologies (as part of theme 3) and in developing a biosensor-based system to measure and monitor volatile odour and flavour compounds (under theme 4).

The structure of the Flagship's research program has changed with the amalgamation of the previous Separation Technologies and High Pressure Processing themes into the Innovative Processing Theme. This amalgamation will lead to fundamental advances in the understanding of some unexplored areas of food processing leading to a greater focus in innovative processing technologies to enhance the benefit from the portfolio shift in the Flagship.

Theme 1 – Advanced Genetics (\$10.11 m)

Goal: To apply advanced genetics to create differentiated grain products that increase the value of Australia's grain production by \$400M for wheat and by \$150M for canola by 2013

Theme 2 – Breed Engineering (\$6.36 m)

Goal: To apply breed engineering to boost the product value of Australia's animal based food industries by \$250M for beef and by \$550M for seafood by 2013

Theme 3 – Innovative Processing (\$8.41 m)

Goals: (1) To apply novel separation technologies to create a new Australian bioactive industry generating \$250 M in sales of bioactives to the global functional food market by 2013

(2) To apply science based rationale to processing to create a new Australian industry generating A\$100M in sales of protein based encapsulates/foods to the global food market by 2013

(3) To apply non-thermal processing to create a new Australian industry generating \$350M sales of 'Preserved-Fresh' foods for global convenience markets by 2013

Theme 4 – Quality Biosensors (\$4.25 m)

Goal: To apply advanced sensory technology to match and monitor products for consumer appeal and improve the competitiveness of the wine industry generating \$750M in sales of wines developed using this technology by 2013

Consumer Engagement (\$0.73 m)

Goal: To maximise outcomes resulting from Food Futures outputs by focusing on products with high potential for consumer adoption

Food Futures 2005-06

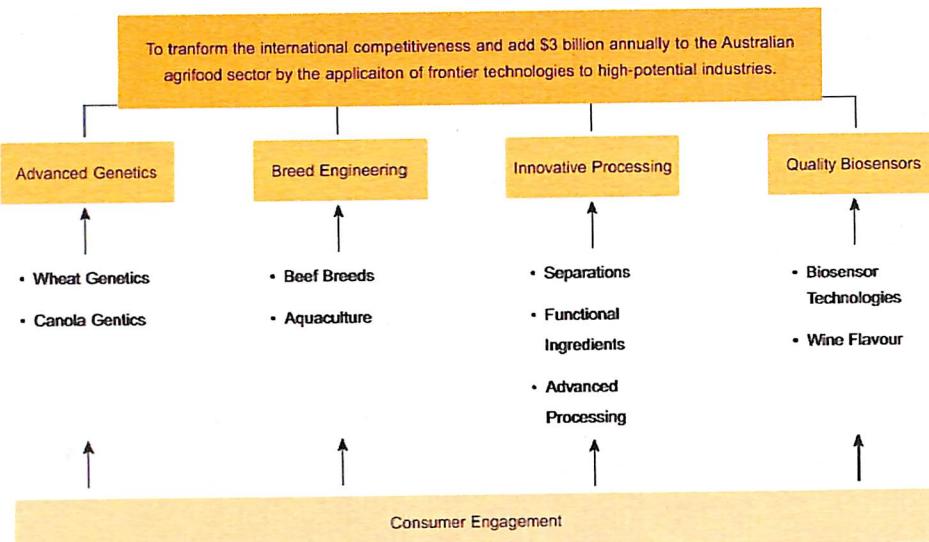
Flagship Resources (\$k)				
Theme	New Appropriation (BAA2)*	Redirected Appropriation	External**	Flagship Total
Advanced Genetics	2,019.9	5,612.7	2,480.0	10,112.6
Breed Engineering	1,579.2	4,384.9	398.0	6,362.1
Innovative Processing	1,769.0	4,911.4	1,732.0	8,412.4
Quality Biosensors	887.7	2,464.5	900.0	4,252.2
Consumer Engagement	194.1	538.4	-	732.4
Total	6,449.9	17,911.8	5,510.0	29,871.8

*Funding provided to CSIRO for the Flagship Initiative under the second "Backing Australia's Ability" program.

** To reflect the full impact of the Flagship Program external revenue includes revenue earned by the Food Science Australia Joint Venture. For accounting reasons these revenues are accounted for in the Joint Venture and are not recorded as revenue by CSIRO.

Flagship Alignment Diagram

Food Futures Research Program



4.3 Light Metals

Flagship Director: Dr Raj Rajakumar

Overview

Flagship goal: *To lead a global revolution in light metals, doubling export income and generating significant new industries for Australia by the 2020s while reducing environmental impact*

Research Themes – 2005-06

During 2005-06 the Flagship will grow steadily in four of the five themes to continue the focus and effective interactions with Divisions and clients. The budget for the Magnesium theme will contract pending higher levels of partner engagement. The Aluminium and Magnesium Manufacturing theme has been refocused on engaging with global first-wave technology adopters, especially in the automotive industry. This is to strengthen local industries via their traditional technology access paths.

The Flagship is to grow via collaboration with universities and other eligible organisations through the Flagship Collaboration Fund. This activity will be focused on a major cluster that will aim to develop and commercialise key science and technologies in its Aluminium and Magnesium Manufacturing and Titanium themes.

Theme 1 – Alumina (\$5.58 m)

Goal: Building on Australia's bauxite resources to grow the share of global alumina production to 50% by 2012

Theme 2 – Aluminium Metal Production (\$6.53 m)

Goal: Reduce the energy requirement and hence the global greenhouse impact (CO₂ equivalent/t) by 30% whilst improving cost effectiveness by 2012

Theme 3 – Magnesium Metal Production (\$2.45 m)

Goal: Growth of first cost quartile Australian magnesium industry to 200kt pa by 2012

Theme 4 – Aluminium and Magnesium Manufacturing (\$2.15 m)

Goal: Develop technologies which are adopted in platforms for critical global products, eg engine blocks and which promote new industries in Australia by 2012

Theme 5 – Titanium (\$7.07 m)

Goal: Creation of a world scale (20 kt pa) titanium industry, based on continuous processing and integrated with downstream manufacturing in Australia by 2012

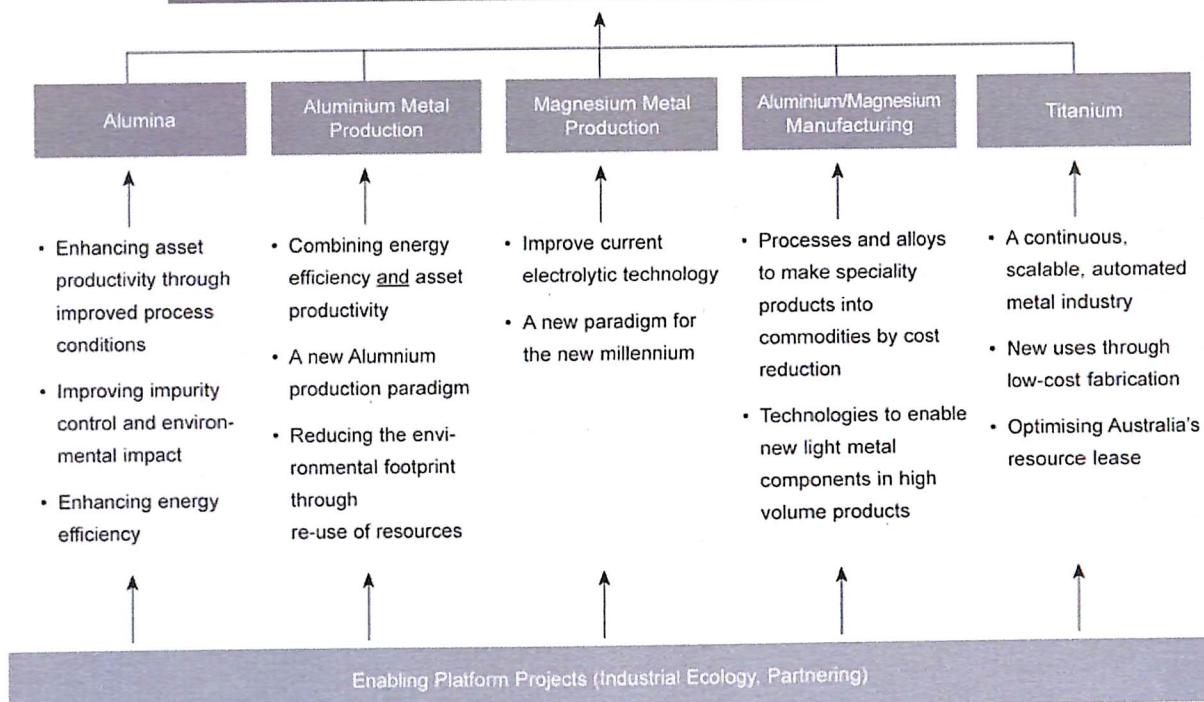
Light Metals 2005-06

Flagship Resources (\$k)				
Theme	New Appropriation (BAA2)*	Redirected Appropriation	External	Flagship Total
Alumina	1,136.8	3,054.2	1,385.0	5,576.0
Aluminium	1,338.7	3,602.5	1,586.0	6,527.2
Magnesium	571.1	1,534.9	340.0	2,446.0
Manufacturing	482.6	1,298.6	365.0	2,146.2
Titanium	1,503.9	4,049.2	1,520.0	7,073.1
Total	5,033.1	13,539.4	5,196.0	23,768.5

*Funding provided to CSIRO for the Flagship Initiative under the second "Backing Australia's Ability" program.

Flagship Alignment Diagram**Light Metals Research Program**

To lead a global revolution in light metals, doubling export income and generating significant new industries for Australia by the 2020s while reducing environmental impact.



4.4 Preventative Health

Flagship Director: Dr Richard Head

Overview

Flagship goal: To improve the health and well being of Australians and save \$2 billion in annual direct health costs by 2020 through the prevention and early detection of chronic diseases

Research Themes – 2005-06

During 2005/6 the Flagship will be aiming for growth in the Colorectal Cancer Theme. This growth will be achieved by reducing the scale of activities in the Cardiovascular and Inflammatory Themes. The Flagship will also grow the Neurodegenerative Diseases Theme through focusing on providing new approaches, based on human population studies, to prevention of Alzheimer's disease by early detection and novel preventative strategies including diet and lifestyle. The growth in this area is anticipated through collaboration with universities and other eligible organisations under the Flagship Collaboration Fund. A range of collaboration projects is also under consideration.

Theme 1 – Colorectal Cancer (\$12.55 m)

Goal: To reduce colorectal cancer incidence by 10% and increase 5-year survival from 63% to 70% by 2020 through prevention and early diagnosis

Theme 2 – Neurodegenerative Diseases (\$1.53 m)

Goal: To delay the onset of Alzheimer's disease in Australia by 5 years by 2020 through early detection and lifestyle changes

Theme 3 – Cardiovascular Disease/Inflammatory Diseases (\$2.78 m)

Goal: To reduce the prevalence of individuals with elevated cardiovascular risk factors by 10% by 2020 and reduce the prevalence of inflammatory diseases in the Australian population

Theme 4 – Environment and human health (\$0.46 m)

Goal: To prevent or reduce negative environmental impact on national health issues

Theme 5 – Health Data Integration (\$3.20 m)

Goal: To integrate existing isolated health and social datasets into a national database in a secure environment from which to generate information to guide policies and/or preventative health research

Preventative Health 2005-06

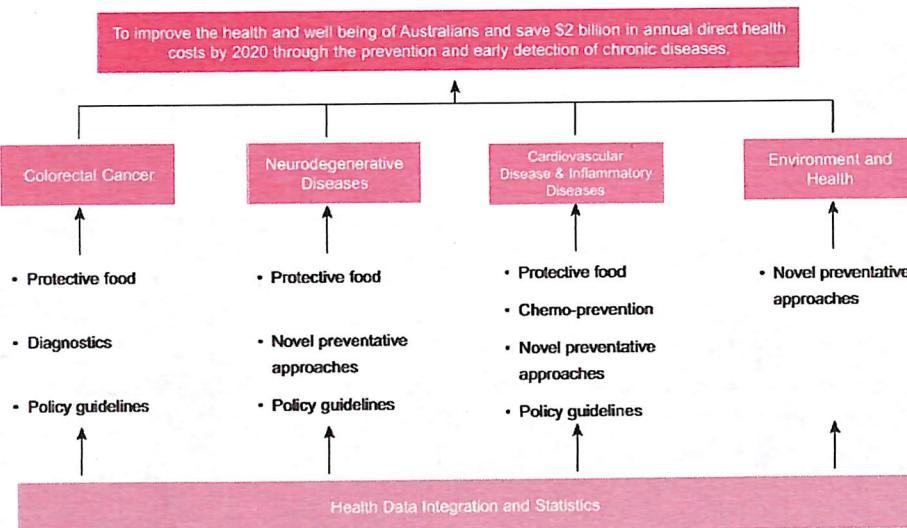
Flagship Resources (\$k)				
Theme	New Appropriation (BAA2)*	Redirect Appropriation	External**	Flagship Total
Colorectal Cancer	3,182.7	8,069.5	1,300.0	12,552.2
Neurodegenerative Diseases	447.5	1,136.0	-	1,583.5
CVD & Inflammatory Diseases	561.3	1,423.7	800.0	2,785.0
Health Data Integration	719.9	1,826.8	650.0	3,196.7
Environment & Health	120.3	307.1	30.0	457.5
Total	5,031.7	12,763.2	2,780.0	20,574.9

*Funding provided to CSIRO for the Flagship Initiative under the second "Backing Australia's Ability" program.

** To reflect the full impact of the Flagship Program external revenue includes revenue earned by the Food Science Australia Joint Venture. For accounting reasons these revenues are accounted for in the Joint Venture and are not recorded as revenue by CSIRO.

Flagship Alignment Diagram

Preventative Health Research Program



4.5 Water for a Healthy Country

Flagship Director: Colin Creighton

Overview

Flagship goal: To achieve a tenfold increase in the social, economic and environmental benefits from water by 2025.

Research Themes – 2005-06

For 2005-06 and as part of a sharpened focus on water and the water benefits likely to be derived from systems-scale research, the Flagship will increase or accelerate research effort on:

- **urban water** – meeting water needs of cities by revitalising Australia's urban water infrastructure through new generation technologies and minimal impact systems that 'free up' 50% more water through water use reduction, reuse or recycling.
- **irrigation** – improving cost effectiveness and efficiency of sourcing and saving water which can derive benefits from trading to high return areas, further irrigation productivity or development, and/or improved ecological water regimes.
- **catchment management** – improving surface water and groundwater quality, quantity and yield through land use change and management for increased benefits from water use in-situ or downstream in the context of climate change and variability
- **estuaries, rivers, wetlands and floodplains** – improving water use productivity in modified environments for healthier and functioning ecosystems

Engagement and new research initiatives will be guided by the Advisory Council and includes supporting the National Water Commission's implementation of the *National Water Initiative*.

The Flagship is also aiming to grow via further collaboration with universities and other research providers. Additional activities to the collaborative arrangements already underway will be focused on a major cluster that will increase understanding of the Murray estuary (the Coorong), a partnership with the new created water economic research unit within the School of Earth and Environmental Sciences, Adelaide University and a series of project-level investments with James Cook, WA and Australian National Universities.

Theme 1 – Great Barrier Reef Catchments (\$5.49 m)

Goal: To increase water quality and wetland integrity from economically rejuvenated production systems in the Great Barrier Reef (GBR) region

Theme 2 – River Murray Region (\$8.09 m)

Goal: To more effectively gain benefits from the use of the water that supports commodity production and the terrestrial and aquatic ecosystems by designing, protecting and profiting from sustainable landscapes

Theme 3 – Urban Waterscapes (\$4.43 m)

Goal: To provide water security for growth and enhanced quality of life in urban areas while reducing water management impacts on surrounding natural system

Theme 4 – Southwestern WA (\$6.31 m)

Goal: To support the development of Perth's water supply, improve the surrounding natural systems and participate in defining realisable futures for the wheat belt towns and landscapes

Theme 5 – Water Knowledge (\$2.85 m)

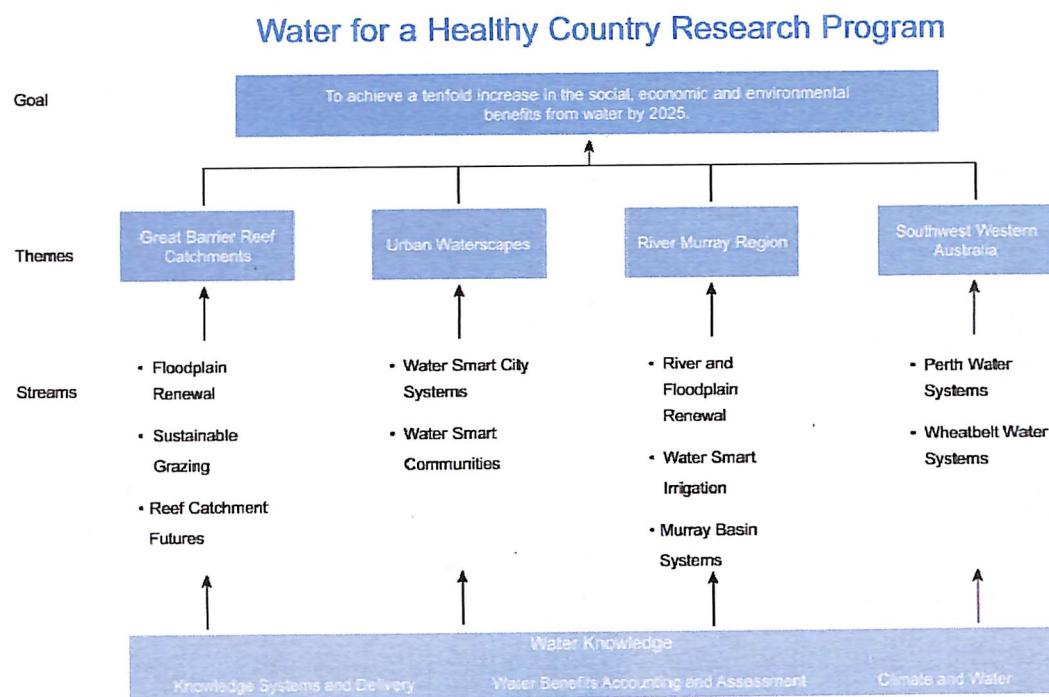
Goal: CSIRO and collaborators as an **authoritative** source of water resources information & decision support.

Water for Healthy Country 2005-06

Flagship Resources (\$k)				
Theme	New Appropriation (BAA2)*	Redirected Appropriation	External	Flagship Total
Great Barrier Reef Catchments	661.0	1,715.9	3,111.0	5,487.9
River Murray Region	1,870.2	4,865.4	1,353.0	8,088.6
Urban Waterscapes	941.5	2,445.5	1,040.0	4,427.0
Southwest Western Australia	940.5	2,441.3	2,925.0	6,306.8
Water Knowledge	674.98	1,750.85	420.00	2,845.83
Total	5,088.1	13,219.0	8,849.0	27,156.2

*Funding provided to CSIRO for the Flagship Initiative under the second "Backing Australia's Ability" program.

Flagship Alignment Diagram



4.6 Wealth from Oceans

Flagship Director: Craig Roy

Overview

Flagship goal: *To position Australia by 2020 as an international benchmark in the delivery of economic, social and environmental wealth based on leadership in understanding ocean systems and processes.*

Research Themes – 2005-06

While investment has predominately focussed on developing critical mass across Themes 1 and 2 to date, the Flagship is now ready to build scaled capacity across the entire portfolio.

Investments in Themes 1 (Springboard) and 2 (Oceans to Rain) will be maintained into 2005/06, and the Flagship looks forward to substantial delivery across these two themes over the 12 month period, particularly for Theme 1.

Theme 3 (Blue GDP) is on the critical pathway to the Flagship's audacious goal, and the theme is now ready to commence a steep growth trajectory – this theme will grow by more than 200% in size from 2004-05 to 2005-06. Additional capability will be applied to the most substantial industry opportunities, including a major oil and gas initiative. Substantial industry engagement is an important aspect of this theme.

Theme 4 (Marine Nation) is also critical to the success of the Flagship, and investments in 2005-06 will build on some excellent foundation work. This theme will grow by more than 150% year on year into 2005-06 with extra effort invested into a number of important activities including a 56 day expedition to explore the waters off south-western Western Australia and preliminary work into developing multiple use management strategies for the Ningaloo Reef region.

The Flagship is also aiming to grow via collaboration with universities and other eligible organisations through the Flagship Collaboration Fund. This activity will be focused on a major cluster that will aim to increase understanding of the Ningaloo Reef and the possible effects of multiple uses of the area. This work will be closely integrated with the increased activity funded by the Science Investment Process.

Theme 1 – Ocean System Prediction and Responses – “the Springboard” (\$11.86 m)

Goal: To springboard sustainable access to Australia's vast ocean resources through characterisation and prediction of our oceans physical, biogeochemical and seabed systems by 2008.

Theme 2 – Ocean Based Forecasts of Australian Climate – “Oceans to Rain” (\$3.97 m)

Goal: To exploit the climate information residing in the oceans to deliver a \$200M pa increase in the value of Australia's climate sensitive industries, while safeguarding the marine environment, by 2013

Theme 3 – Ocean Based Industry Development and Growth – “Blue GDP” (\$4.86 m)

Goal: To deliver transformational benefits to Australia's most promising (present and prospective) ocean based industries by 2013, through a combination of science driven efficiency dividends and the unlocking of new industrial development opportunities

Theme 4 – Ocean based regional development and growth – the “Marine Nation” (\$3.68 m)

Goal: To unlock responsibly the value of Australia's most sensitive and valuable marine regions by 2013, through development and application of sophisticated tools and techniques for multiple – use management of marine resources based on world class scientific research

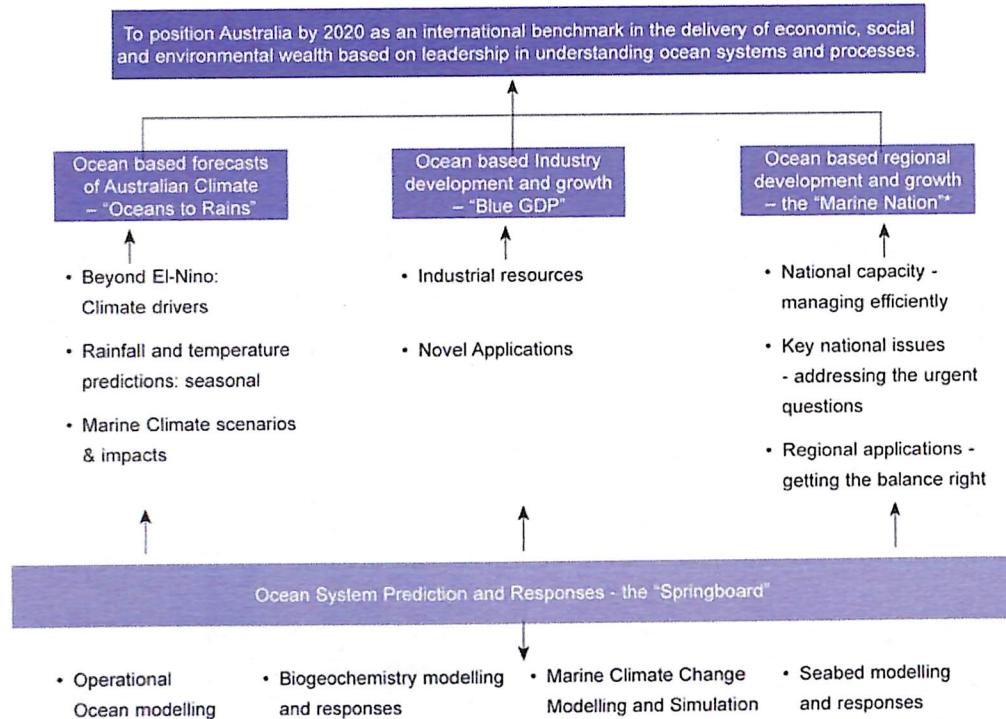
Wealth from Oceans 2005-06

Flagship Resources (\$k)				
Theme	New Appropriation (BAA2)*	Redirected Appropriation	External	Flagship Total
'The Springboard'	1,722.3	5,934.2	4,207.0	11,863.5
'Oceans to Rain'	711.3	2,447.9	816.0	3,975.2
'Blue GDP'	936.9	3,225.4	700.0	4,862.3
'Marine Nation'	661.8	2,276.7	745.0	3,683.6
Total	4,032.2	13,884.2	6,468.0	24,384.4

*Funding provided to CSIRO for the Flagship Initiative under the second “Backing Australia’s Ability” program.

Flagship Alignment Diagram

Wealth from Oceans Research Program



Section 5 Agribusiness Group

Group Executive(s): Dr Michael Eyles and Dr Alastair Robertson¹

Introduction

The Agribusiness Group serves large and vital sectors of Australian industry, as well as pursuing a range of community objectives:

- The Group's capabilities add value to the spectrum of industries that are based on materials derived from plants and animals. The ability to integrate across the industry value chain is a key differentiator of the Group. We can design and optimise raw materials, develop production processes for industries that are based on materials of biological origin as well as new materials, and understand the determinants of consumer behaviour. These industries are substantial employers, major wealth-generators and exporters, and mainstays of regional Australia. The Group's impact extends to the knowledge-intensive service providers that work with these industries internationally.
- The life sciences platforms of the Group have an impact well beyond the industries described above. These platforms are aligned with the life sciences revolution that is driving knowledge creation, innovation and growth of new enterprises internationally.
- The Group contributes to human health, particularly through the Preventative Health Flagship. The emphasis is on early detection of disease and predisposition to disease, allied with the maintenance of health through protective strategies, rather than treatment.
- We play a major role in biosecurity; protecting Australia from exotic invasive species that threaten industries, the environment and human health.
- The Group provides scientific foundations for policy development by Governments in a wide range of areas, for example food safety, nutrition, biosecurity, pest and disease control, land use and the application of biotechnology.
- Agribusiness research is a major source of strength for CSIRO's brand in Australia and overseas.

Key components of the Group

The Agribusiness Group includes the following Divisions, Joint Ventures and Flagships:

Divisions	<ul style="list-style-type: none"> • Entomology • Plant Industry 	<ul style="list-style-type: none"> • Livestock Industries • Textile and Fibre Technology
Joint Ventures	<ul style="list-style-type: none"> • Food Science Australia – A joint venture with the Victorian Government 	<ul style="list-style-type: none"> • Ensis – CSIRO's forestry and forest products research is conducted within Ensis, a joint venture with New Zealand's Forest Research
Flagships	<ul style="list-style-type: none"> • Food Futures 	<ul style="list-style-type: none"> • Preventative Health

¹ Dr Robertson will replace Dr Eyles as Group Executive when a new appointment is made to Dr Robertson's current position as Chief Executive of Food Science Australia.

Group Focus 2005-06 – Agribusiness Group

High level objectives for the Group are as follows.

- Apply scientific platforms to develop new tools and technologies that will enable industry to undergo quantum changes in productivity or major changes to products:
 - Create differentiated value-added primary products (e.g. specialized crops with health benefits, crop biofactories based on novel biosynthetic pathways).
 - New products and processes for high-value manufactured products that respond to market drivers.
 - Growth of knowledge-intensive service industries based on science.
- Leverage our substantial life sciences and nanotechnology platforms for impact in areas outside agribusiness, e.g. control of emerging infectious diseases such as avian influenza, genetic technologies such as RNAi, and new classes of industrial products.
- Maintain the competitive advantage of Australian agribusiness through continuous incremental improvements in productivity. Extend planted forests into new regions.
- Ensure preferential access to international markets for Australian products by addressing consumer and political drivers related to product integrity, safety and performance and sustainability. Provide the scientific basis for maintenance of biosecurity in Australia.
- Develop integrated production systems that address the needs for environment responsibility and sustainable business sectors. Address competing demands for land use (agribusiness vs. residential vs. recreational) through the provision of scientific information to allow informed decisions.
- Promote health and prevent disease through development of early diagnostics, protective food products, and strategies leading to healthier lifestyles and diet.

Reflections on 2004-05 – Agribusiness Group

We have made substantial progress in the implementation of CSIRO strategy, particularly in Flagships, focus and partnerships.

Both the Preventative Health and Food Futures Flagships are now well established, with external Advisory Committees operating and engaged. Important partnerships and some exciting science related to the Flagships were announced during the year, for example the investment of \$3.5 million by the Victorian Government in an Advanced Processing and Innovative Foods Program aligned with Food Futures. Significant cultural issues related to the implementation of matrix management in Flagships are being addressed.

Implementation of several organisational changes was commenced or completed, with the aim of building critical mass in our core research programs, improving our engagement with key industries, or partnering for greater scale and impact.

The Ensis joint venture with New Zealand's Forest Research began operating in July 2004. Detailed planning has taken place with Forest Research to expand the joint venture from July 2005. Ensis will then fully replace the Division of Forestry and Forest Products as CSIRO's vehicle for delivery of research for forest-based industries and become the sole entity focussed on these industries for Forest Research. Ensis won an inaugural Telstra Trans-Tasman Business award in March 2005.

A new Food Science Australia joint venture agreement was implemented from July 2004, capturing lessons from the first seven years of this venture. Detailed planning has taken place for further changes involving Food Science Australia. From July 2005, the Division of Health Sciences and Nutrition will cease to exist and the Division's nutrition-related research will be integrated with Food Science Australia. This change will allow CSIRO to respond more effectively to the strong consumer and industry trends towards food with health benefits. The change was strongly endorsed by the external science review of the Division and Food Science Australia.

The remainder of the Division of Health Sciences and Nutrition will be merged with the Division of Molecular Science, strengthening CSIRO's health and biotechnology capability. An excellent strategic dialogue is under way with the Health Sector Advisory Council aimed at improving the focus and impact of CSIRO's human health research.

We have made significant progress elsewhere in our efforts to reduce fragmentation of Australasian research. Discussions with the Queensland and Victorian Governments have been particularly promising during this year and a range of new collaborations are being established.

The year ahead 2005-06 – Agribusiness Group

The change in CSIRO structure is a catalyst for re-evaluation of the collective direction of the business units in the Group in two ways. First, the Group has unique capability and competitive strength across the industry value chain of a range of industries. We can address major technological issues from raw materials through manufacturing and distribution to the determinants of consumer behaviour. We will examine better ways to leverage this unique capability in the marketplace.

Secondly, the Group and its collaborators have outstanding capabilities that are at the heart of the international life sciences revolution. We have a great opportunity to increase the impact of these platforms in a range of industry and community good contexts, often outside the traditional boundaries of our activities. We will assess the mechanisms for generating greater impact from this depth of capability in the life sciences.

The Group will place a greater emphasis on the development of cross-Divisional research initiatives. For example a scoping study will be conducted for a new major science initiative on Agricultural Sustainability, with a view to commencing the initiative in 2006/07. The study will be led by Plant Industry and involve several other Divisions. The Group has also commenced a holistic examination of CSIRO's considerable research effort related to starch, across a range of Divisions. The Group hopes to identify priority research areas, enhance external collaboration, speed the delivery of outcomes and increase investment opportunities across the value chain. The continued development of the portfolio of the two Flagships will be a priority.

The major organisational changes that are planned have been noted above, i.e. the expansion of Ensis and the integration of nutrition research with Food Science Australia. Ensis will be expanded from four to seven Strategic Business Units. The development of these joint ventures continues to require considerable attention. The implementation of the Science Investment Process provides the opportunity and need to re-invigorate and refocus the Agribusiness Sector Advisory Council.

Over the past year the group has been engaging with Commonwealth and State Departments, including through the Primary Industries Ministerial Council. The objectives include building a national rural R&D framework and reducing fragmentation and duplication of effort. This work will continue this year, with a particular focus on biosecurity and food research.

The continuing moratoria on commercial genetically modified food crops in most Australian States highlights the need for informed public debate in biotechnology. CSIRO has substantial expertise and investment in agricultural biotechnology. The Biotechnology Strategy Group will work with relevant Divisions and the corporate Communications Group to develop and implement a strategy for an appropriate public profile for CSIRO on biotechnology.

Strategy Implementation Goals for 2005-06 – Agribusiness Group

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
1.2 Build critical mass and ensure quality in our core research programs	Integrate nutrition capability formerly in CSIRO Health Sciences and Nutrition into Food Science Australia. Review and implement the recommendations from Divisional Science Reviews for: Entomology; Food Science Australia; Textile & Fibre Technology.
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	Conduct a scoping study for a major new multi-Divisional science initiative in Agricultural Sustainability for commencement in 2006-07.
3.2 Service the needs of government for informed policy setting	Contribute to the development of a national framework for rural R&D through interactions with the Primary Industries Ministerial Council (PIMC).
3.3 Enhance communication to raise public and stakeholder excitement and trust in science	Work with the Communications Group to engage CSIRO's scientific expertise more effectively with the public debate on genetically modified organisms.

Capability Table 2005-06 – Agribusiness Group

The current core capabilities in the Agribusiness Group, and the ones designated for growth, are summarised as follows:

Agribusiness Group Capabilities			
Division	Core Capabilities	Grow Capabilities	Reduce Resources
Ensis (Forestry & Forest Products)	<ul style="list-style-type: none"> ▪ Development of new forest germplasm with enhanced commercial and environmental traits ▪ Forest management systems: Development of tools for measurement, monitoring and prediction of commercial and environmental attributes of forests ▪ Characterisation of forest health biology and application to biosecurity and risk minimisation. ▪ Fire behaviour modelling and suppression technology ▪ Wood and fibre quality science: linking resource quality (from fibre-level to forest-level) to value ▪ Optimising the fiber value chain for pulp, paper and packaging processes and products ▪ Product innovation for wood and fibre-based materials 	<ul style="list-style-type: none"> ▪ Development and application of geospatial and modelling technologies for assessment and prediction of forest growth, condition, risk (fire & health) and environmental impacts (especially water). ▪ Frameworks for quantifying & managing biotic risk (drought, pests, fire, diseases) ▪ Propagation technologies for forest germplasm ▪ New materials for wood adhesion, protection and functionality. ▪ Sensing and measurement technologies for industrial wood and fibre segregation from forest to mill ▪ Surface enhancement technologies for improved wood, paper and paperboard performance 	<ul style="list-style-type: none"> ▪ Silvicultural systems and nutritional diagnostics. ▪ Development of synthetic biocides ▪ Bioenergy ▪ Marker-aided selection (eg QTL) as a molecular breeding tool for forest germplasm
Entomology	<ul style="list-style-type: none"> ▪ Plant biosecurity solutions ▪ Species interactions ▪ Biodiversity and evolution ▪ Invertebrate molecular pathways 	<ul style="list-style-type: none"> ▪ Insect metabolomics ▪ Proteomics and gene insertion risks ▪ Ecosystem invisibility and management ▪ Environmental biotechnology ▪ Systems-based biosecurity science ▪ Soil biology 	<ul style="list-style-type: none"> ▪ Stored grain protection
Food Science Australia	<ul style="list-style-type: none"> ▪ Ingredients Functionality ▪ Processing innovation ▪ Supply Chain Performance ▪ Integrated Food Safety ▪ Nutrition 	<ul style="list-style-type: none"> ▪ Build material science platform to understand the behaviour of biological macromolecules in food systems in relation to ingredient functionality, food architecture and sensory properties. ▪ Application of functional genomics in nutrition and microbial epidemiology 	<ul style="list-style-type: none"> ▪ Packaging research ▪ Co-investments in cheese technology and dairy process engineering support

Capability Table 2005-06 – Agribusiness Group (continued)

Division	Core Capabilities	Grow Capabilities	Reduce Resources
Livestock Industries	<ul style="list-style-type: none"> ▪ Exotic disease preparedness ▪ Diagnosis and prevention of endemic disease ▪ Livestock management ▪ Genetic development ▪ Market-driven consumer demand ▪ Advanced reproduction ▪ Mammalian biology 	<ul style="list-style-type: none"> ▪ Epidemiology ▪ FMD capabilities through development of international linkages and platforms ▪ Genomic analysis of host and pathogen ▪ Quantitative measurement of livestock welfare eg heat and transport stress ▪ Data-mining of the whole genome ▪ Integration of quantitative and molecular genetics for on-farm adoption ▪ Application of microbiology capability to on-farm food safety ▪ Epigenetics (with UQ and NZ partners) 	<ul style="list-style-type: none"> ▪ Traditional parasitology approaches which rely on chemical control ▪ Identification and quantification of plant-derived toxins ▪ Realign traditional skills in livestock biology (eg nutrition, biology) towards support of new areas eg epigenetics, food safety
Plant Industry	<ul style="list-style-type: none"> ▪ Gene discovery & utilisation ▪ Plant-pathogen genetics ▪ Nutritional modification of crops ▪ Integrated crop & pasture management systems ▪ Plant-soil interactions ▪ Biodiversity assessment ▪ Molecular & accelerated plant breeding 	<ul style="list-style-type: none"> ▪ Integrated production sustainability & biodiversity conservation ▪ Cereal grain development ▪ Biometrics and bioinformatics ▪ Organoleptics ▪ Molecular engineering 	<ul style="list-style-type: none"> ▪ Narrowly focused work that is not integrated and has little or no industry support
Textile and Fibre Technology	<ul style="list-style-type: none"> ▪ Advanced Sensors, Instrumentation and Software ▪ Machine Prototype Design and Development ▪ Textile Product Development ▪ Textile and Fibre Process Engineering ▪ Fibre and Textile Analysis and Testing 	<ul style="list-style-type: none"> ▪ Advanced Fibre Materials and Composites (especially carbon nanotubes and medical textiles) 	<ul style="list-style-type: none"> ▪ Resource levels in all areas determined by levels of demand (taking into account timeframe appropriate to the activity, H1, H2 or H3) ▪ Eg. Fibre and Textile Analysis and Testing in the leather industry will be scaled down (H1). ▪ Some reduction is predicted for Textile and Fibre Process Engineering (H2) with redirection into Textile Product Development.

Role Table 2005-06 – Agribusiness Group

Agribusiness Group Roles					
Division	Creating new or significantly transforming industries	Incremental innovation for existing industries	Solving Major National Challenges	Science-based solutions for the Community	Frontier Science
Ensis (Forestry & Forest Products)	<ul style="list-style-type: none"> ▪ Germplasm for commercial environmental forestry ▪ Commercial environmental forestry – Scenario Planning & Investment Framework (50%) 	<ul style="list-style-type: none"> ▪ Wood quality tools for trees, logs and timber ▪ Decision support systems for wood quality management ▪ Improved monitoring and management of plantation inventory & condition ▪ Advanced DSS for site-specific management of forests ▪ Germplasm for plantation forestry ▪ Decision support tools for fast and efficient genetic improvement ▪ New materials for wood and fibre product innovation 	<ul style="list-style-type: none"> ▪ Commercial environmental forestry – Scenario Planning & Investment Framework (50%) 	<ul style="list-style-type: none"> ▪ Environmental services from forests ▪ Fire danger rating ▪ Fire suppression technologies 	<ul style="list-style-type: none"> ▪ Hierarchical and multi-scale modelling for fuel & bushfire dynamics and for forest inventory ▪ Development of intelligent materials and coatings for paper and paperboard applications ▪ New sensing technologies for wood quality (next-generation SilviScan) ▪ Genomic and metabolomic modelling (forestry applications)
Entomology	<ul style="list-style-type: none"> ▪ Biocatalysis ▪ Grain Protection Genes ▪ Chemosensory systems ▪ Genetics and evolution of resistance to Bt 	<ul style="list-style-type: none"> ▪ Stored grain protection ▪ Pasture weed biocontrol ▪ Horticultural pest management 	<ul style="list-style-type: none"> ▪ Weeds of National Significance ▪ National pest and disease database ▪ Biological water use benefits 	<ul style="list-style-type: none"> ▪ Bridal creeper biocontrol network ▪ Online insect resources ▪ Termite management 	<ul style="list-style-type: none"> ▪ Synthetic biology ▪ Biocomplexity
Food Science Australia	<ul style="list-style-type: none"> ▪ New approaches to food processing and functional ingredient production creating new generation products and materials. 	<ul style="list-style-type: none"> ▪ Improved efficiency through new processes, better raw material usage, lower wastage, improved operational efficiency across the supply chain, through automation and control. 	<ul style="list-style-type: none"> ▪ Food in health prevention ▪ Food and health through life ▪ Frontier technologies for building and transforming Australian 	<ul style="list-style-type: none"> ▪ Food Safety Risk Assessment and Management ▪ Whole diet studies for health and wellbeing 	<ul style="list-style-type: none"> ▪ Molecular understanding of ingredient understanding and food architecture ▪ Functional genomic approaches to nutrition and microbiological control ▪ Molecular recognition in separations science

Role Table 2005-06 – Agribusiness Group (continued)

Division	Creating new or significantly transforming industries	Incremental innovation for existing industries	Solving Major National Challenges	Science-based solutions for the Community	Frontier Science
Livestock Industries	<ul style="list-style-type: none"> ▪ Advanced reproduction techniques to transform Australia's animal industries ▪ Closing the prawn cycle in aquaculture enterprises ▪ Genes to meet consumer demand for new products ▪ Identification of new bioactives with industrial application 	<ul style="list-style-type: none"> ▪ Integrated on-farm systems ▪ Application of quantitative genetics ▪ Reduced reliance on chemicals for control of endemic diseases 	<ul style="list-style-type: none"> ▪ Improvement of saline lands 	<ul style="list-style-type: none"> ▪ On-farm food safety ▪ Improvement of livestock welfare ▪ Control of cane toads 	<ul style="list-style-type: none"> ▪ Epigenetics ▪ New nanotechnology-based products ▪ Application of advanced bioinformatics ▪ RNAi gene silencing
Plant Industry	<ul style="list-style-type: none"> ▪ Cotton breeding ▪ Cropping systems for the high rainfall zones ▪ Innovations for mixed farming ▪ Genetic improvement of horticultural crops ▪ Metabolic engineering of plant products 	<ul style="list-style-type: none"> ▪ Tropical and subtropical horticulture ▪ Vineyard productivity and grape quality ▪ High yielding crops with biotic tolerances ▪ DSS for grazing industries ▪ Nutrient & water use management 	<ul style="list-style-type: none"> ▪ Vegetation in relation to global atmospheric change ▪ Conservation biology and utilisation of the Australian flora ▪ Plant based solutions for dryland salinity ▪ Improved grain and oilseed functionality for health ▪ Revegetation & remnant vegetation management 	<ul style="list-style-type: none"> ▪ Water and nutrient use to achieve sustainable agricultural production ▪ Better plants for managing environmental constraints ▪ Farming to land capability ▪ Biodiversity of the Australian flora 	<ul style="list-style-type: none"> ▪ Cereal grain development ▪ Genes controlling reproductive development ▪ Hormonal control of gene expression ▪ Gene discovery by functional genomics ▪ Plant resistance genes ▪ Organoleptics ▪ Root and soil biology

Division	Creating new or significantly transforming industries	Incremental innovation for existing industries	Solving Major National Challenges	Science-based solutions for the Community	Frontier Science
Textile and Fibre Technology	<ul style="list-style-type: none"> ▪ Impacting worldwide marketing of cotton via maturity measurement ▪ 30% overall cost reduction for spinning wool with no loss in product attributes ▪ Develop a new suite of products based on the new luxury fibre, Optim ▪ Develop world first wool-blend spun-lace products for use in outdoor performance apparel ▪ Develop 2nd and 3rd generation wound healing bandages based on smart technology 	<ul style="list-style-type: none"> ▪ Develop new markets for wool based on electrostatic barrier products ▪ Develop new improved dyeing and bleaching methods for wool and wool blends ▪ Transfer wool-blend easy care technology to Chinese and Indian mills ▪ New finishing treatments for wool-polyester blend fabrics 	<ul style="list-style-type: none"> ▪ Develop new wool based products for injury prevention in the aged care environment 		<ul style="list-style-type: none"> ▪ Production of high quality carbon nanotubes (CNTs) in tens of grams per day ▪ Dry spinning of CNTs ▪ Prepare fibres based on polymer-blend nano-composites ▪ Develop flexible textile battery that can deliver 1.5V for 48hr continuously ▪ Use of azo dyes in photovoltaic cells ▪ Identify chromophores responsible for yellowing optically brightened wool

5.1 ensis / Forestry and Forest Products

Chief: Dr Rick Ede

Overview

From 1 July 2005, CSIRO's forest industries-facing research will be delivered through **ensis**, its 50:50 joint venture with the New Zealand Crown Research Institute, Scion¹.

ensis was created in July 2004 as a joint venture between CSIRO Forestry and Forest Products and Scion, and both organisations' forestry-facing research will be delivered through **ensis** as of 1 July 2005. **ensis** was established to create a viable, sustainable and high impact research delivery business unit that acts as CSIRO's market entry point for the Australasian and international (especially Pacific Rim) forest-based industries, and the forestry-related activities of relevant government agencies and NGOs.

At 1 July 2005 three new Strategic Business Units (SBU) will join the four existing **ensis** SBUs to complete the **ensis** expansion process. The new SBUs will focus primarily on the 'growing' end of the forest industries value chain, supporting profitable and sustainable forest management, industry risk and sustainability management, and natural resource management objectives. In terms of impact for Australia, the new SBUs will focus on providing the science and technology outcomes that (a) will assist the industry and Commonwealth government to achieve the objectives of the joint Plantations 2020 Vision, (b) support the creation of the forest resource base to allow the reversal of the current trade deficit in forest products, and (c) contribute significantly to the sustainability and rehabilitation of degrade Australian landscapes.

Joint ventures are different: Owing to accounting requirements, CSIRO's interest in **ensis** is recognised through a 50% share of the **ensis** operating gross margin – the majority of revenue and expenditure is accounted for in the **ensis** accounts. The parent share of the operating gross margin is used to fund the support services provided to **ensis**, and a net margin.

Some key indicators in the **ensis** budget for 2005-06 are as follows:²

Total revenue:	\$55.4 M
External revenue:	\$26.1 M
CSIRO Appropriation:	\$15.9 M
NZ Government Research for Industry Funding:	\$12.3 M
Operating gross margin (shared 50:50):	\$13.1 million
Science delivery staff:	325 full time equivalents

CSIRO's appropriation investment to **ensis** will be via Themes. Owing to the nature and structure of **ensis**, external investment (co-investment, research services etc) linked with themes is no longer able to be recognised as CSIRO revenue. In order to provide a comparable sense of scale of expenditure to other CSIRO Divisions, theme budgets from 2004-05 have been recast to reflect CSIRO's appropriation investment along with a pro rata distribution of a proxy sum of 50% of the **ensis** external earnings across the Themes. The total expenditure levels are thus indicative only. During 2005-06, the CSIRO and Forest Research investment portfolios will be evaluated, and a joint 'view' of government science investment taking into account the planning constructs of both parents, will be developed.

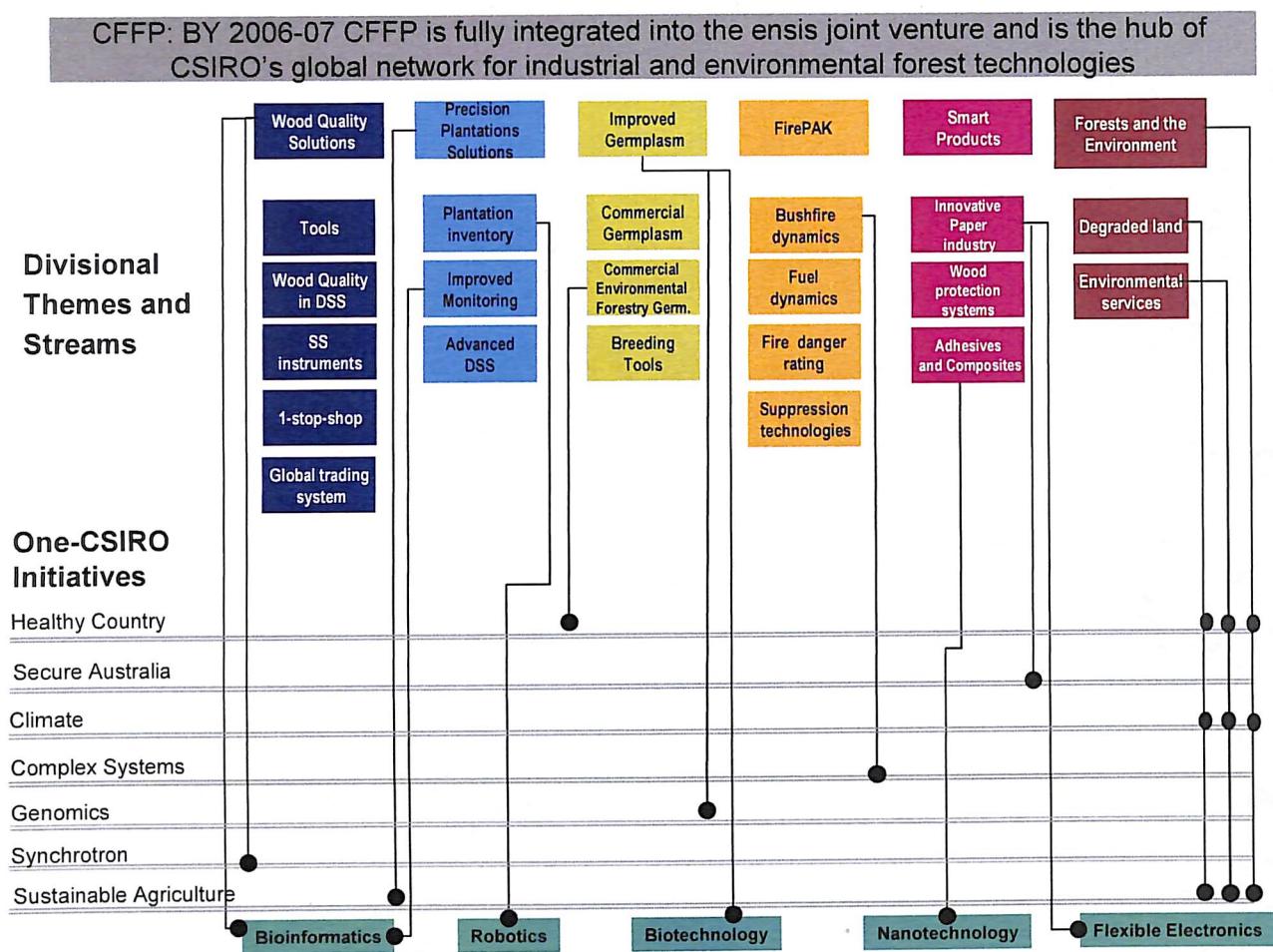
During the planning for the expansion of **ensis** the following changes in the 2004-05 non-**ensis** CFFP themes have been identified:

¹ Formerly known as Forest Research.

² At an exchange rate of \$NZ1.00 = \$AUD0.90

1. Non-theme projects will cease to receive appropriation funds as co-investment contracts are completed. Appropriation investment from these projects will be directed to a modified and enhanced Theme portfolio.
2. The Commercial Environmental Forestry (CEF) and Precision Plantation Solutions (PPS) themes will be restructured to reflect the clear synergies between them, and will incorporate appropriation funding identified in item1 above. Existing theme outcomes will be refined and enhanced with additional outcomes driven off the increased allocation of appropriation funds.
3. Indicatively, CEF will broaden its scope and its working title will become 'Forests and the Environment'. This will drive a consolidation at streams/project level such that CEF becomes a stream within the expanded theme, and a new stream environmental services stream will be added.
4. The 'Business Units' Theme used in 2004-05 will cease to be recognised as a Theme, as these units do not receive appropriation investment and are in any case aligned to support existing Theme outcomes.

Alignment Diagram 2005-06 – CSIRO Component of ensis



Research Themes 2005-06 – CSIRO Component ensis

Theme 1 – Wood Quality Solutions (\$4.3 m)

Goal: Develop a suite of technologies, tools and systems that enable matching of wood properties with wood product values, and develop solutions for continuously maximising wood value by 2008. Promote adoption of at least 50% of these innovations by 2010.

Theme 2 – Precision Plantation Solutions (\$ 4.9 m)

Goal: By June 30 2007 deploy a comprehensive plantation management and inventory optimisation toolbox that will deliver significantly improved commercial and environmental outcomes from Australian plantations.

Theme 3 – Development of Improved Germplasm and Breeding Decision Support Tools (\$ 7.8 m)

Goal: Lead the development of plantation forestry through the deployment of germplasm adapted to environment and suited to product with at least 75% of plantations in Australasia comprising material developed by ensis-Genetics and its partners by 2008.

Theme 4 – FirePAK - National Bushfire Behaviour Prediction System (\$ 2.7 m)

Goal: By June 2010 provide fire and land management agencies with the fire prediction tools to manage bushfires for the sustainable management of Australian landscapes and to minimize loss of life and property.

Theme 5 – Smart Wood Products (\$7.0 m)

Goal: By 2008, develop a minimum of 20 new products and technologies for the Australian wood products industry, which have the potential to add value and diversify product ranges by: reducing product manufacturing costs; improving product performance; reducing product and processing environmental impact. A minimum of 5 of these will be taken up by industry by 2008, and 10 by 2010.

Theme 6 – Forests and the Environment (\$ 5.9 m)

Goal: By June 2008, a toolbox that leads to a 3-fold increase in the value of forests in the integrated management of natural resources.

Capabilities by Theme 2005-06 – ensis (CSIRO Staff vs CSIRO Themes)

NB This table reflects CSIRO staff EFTs contributed to ensis and the allocation of these capabilities across CSIRO's Themes that are delivered through ensis.

Theme	Capability							Total
	A	B	C	D	E	F	G	
Approx No of EFTs*	31.84	16.00	27.40	9.51	20.70	19.70	13.70	138.85
% of total	22.92%	11.53%	19.73%	6.85%	14.91%	14.19%	9.87%	100%
Wood Quality Solutions	Blue				Orange	Yellow	Blue	Yellow
Precision Plantation	Blue	Yellow	Yellow	Yellow	Blue			Yellow
Improved Germplasm	Orange	Blue	Blue	Blue	Yellow			Blue
FirePAK			Yellow	Orange				Blue
Smart Products				Blue	Yellow	Yellow	Orange	Yellow
Forests and the Environment	Blue	Orange	Yellow	Yellow	Blue	Blue	Blue	Yellow

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High'	≥ 50 %	'Medium'	20 – 50 %	'Low'	0 – 20 %
--------	---------------	----------	------------------	-------	-----------------

- | | |
|--------------------------------------|---|
| A. Genetics | E. Wood & Fibre Quality |
| B. Integrated Environmental Forestry | F. Wood Processing & Products |
| C. Sustainable Productive Forestry | G. PAPRO (Pulp & Paper Research Organisation) |
| D. Forest Biosecurity & Protection | |

Investment Profile 2005-06 – CSIRO Component of ensis

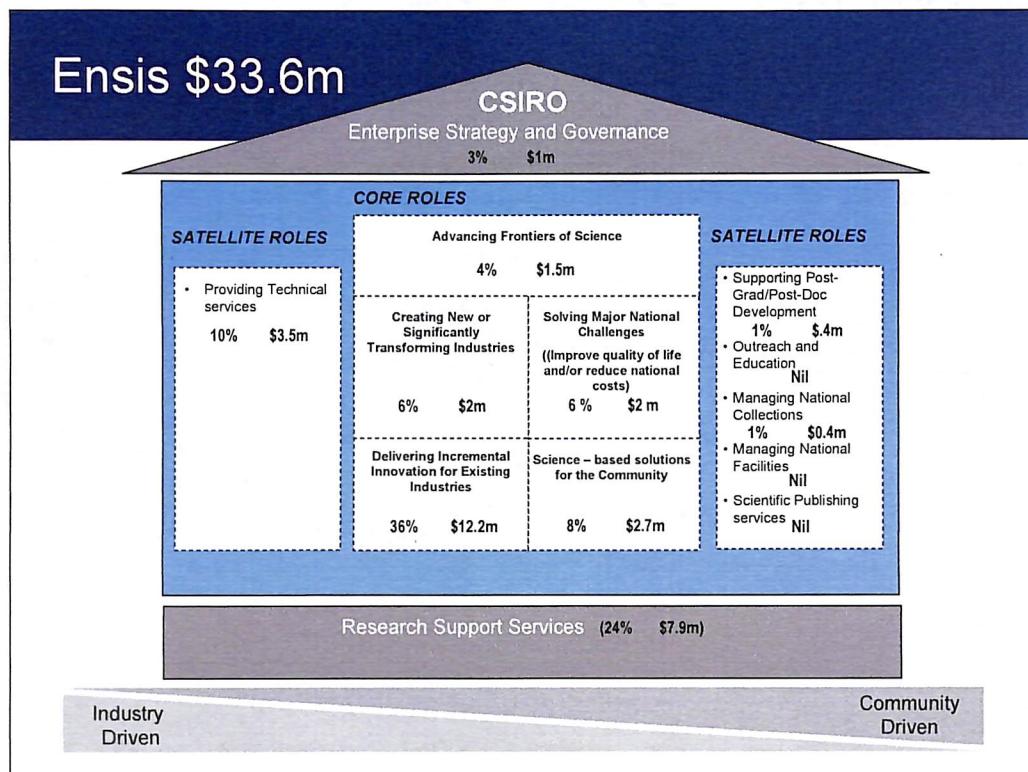
The 05-06 Ensis budget has allocated \$5.5M to strategic R&D investment projects funded via CSIRO Appropriation. The remaining \$10.4M of CSIRO's appropriation investment is in strategic coinvestment projects.

Owing to the ensis financial and operational structure, it is not possible to fully populate the CSIRO Investment Model Profile.

CSIRO's share of licensing and exploitation of both CSIRO background intellectual property and ensis project intellectual property is forecast to be \$0.2M in 2005-06.

Investment by Roles for 2005-06 – CSIRO Component of ensis

Owing to the financial structure of ensis, it is not possible to identify CSIRO total expenditure by role. The data below are indicative, assuming that CSIRO's 50% of the ensis external revenue (\$13 M) is allocated to expenditure across the CSIRO roles as appropriate.



Staffing Profile 2005-06 – CSIRO Component of ensis

Planned Staffing Profile 2005 – 06 (EFTs)		Total for Division
Functional Area		
Research Scientist/Engineer		55
Research Consulting		1
Research Management		7
Research Projects		72
Technical Services		12
General Management		1
Communication and Information		5
Administrative Services		19
General Services		1
Specialist		0
Total Staff		173

5.2 Entomology

Chief: Dr Joanne Daly

Overview

During 2005-06 the Division will be reorganised around a new Theme and Stream structure which will accommodate the recent changes in divisional boundaries, the Entomology Science Review, our growth in Flagships and our increased CRC engagement and emerging science initiatives. Activities of some Research Scientists from CSIRO Land and Water and CSIRO Sustainable Ecosystems are to transferred to Entomology and will increase our critical mass in soil biology and invasive species.

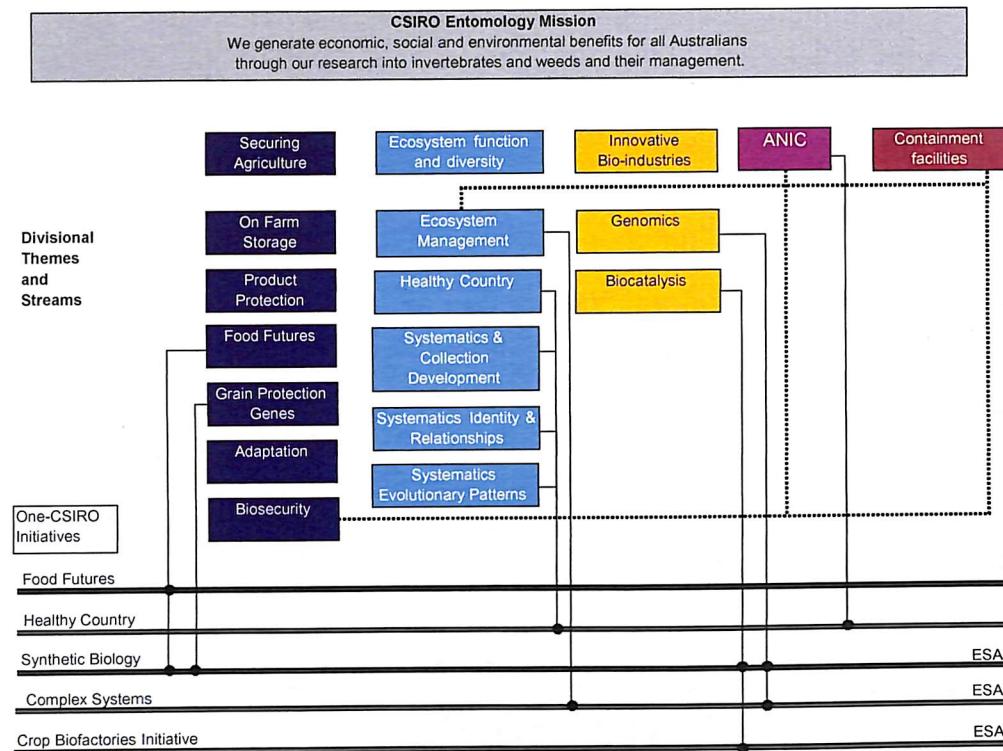
These changes enable us to build activities around our strengths in ecology and molecular sciences. The Division will increase its molecular capabilities in the area of biotechnology to solve or assist with environmental problems and our ability to manage soil biodiversity and function.

Flowing on from these changes and from the recent Entomology Science Review (February 2005), the number of Themes will increase from three to four and the overall number of Streams will be reduced to improve our focus while further increasing collaboration. The new structure will be in place by June 2006. Provisionally, the new mission and the four new Themes will be:

Managing key species to support ecosystem function and communities in the face of environmental change and enable the utilisation of invertebrates for bioindustries.

- Key Biological Threats,
- Ecosystem Function and Global Change,
- Australia's Invertebrate Biodiversity,
- Invertebrate Synthetic Biology.

Alignment Diagram 2005-06 – Entomology



Research Themes 2005-06 – Entomology

As noted above the Division will be reorganised around a new Theme and Stream structure, which will be in place by June 2006. The following are the themes current at the commencement of 2005-06.

Theme 1 – Securing agriculture against biological threats (\$14.58 m)

Goals:

1. Improve Australia's standard of biosecurity through participation in national programs and initiatives on preparedness, diagnostics, surveillance and response supported by rigorous science in the areas of risk analysis, ecological complexity and climate modelling.
2. Increase profitability and sustainability of agriculture and timber through enhanced crop protection and storage technologies.
3. Improve Australia's food safety and quality through development of biosensors to monitor quality in the supply chain.

Theme 2 – Protecting ecosystem function, biodiversity and water quality (\$14.77 m)

Goals:

1. Quantify the functional role of invertebrate, weed and microbial biodiversity in key ecosystems, and develop landscape scale options for ecosystem protection and reconstruction.
2. Build the knowledge base to enable the management of biodiversity services in regional sustainability.
3. Develop knowledge of invertebrate systematics and evolutionary processes to help explain patterns of biodiversity and provide the information systems to support the management of nationally important species and ecological communities.
4. Develop strategies to protect the environment from damage caused by invasive pests.

Theme 3 – Developing innovative bio-industries (\$4.86 m)

Goals:

1. Develop platform capabilities in enzyme and protein engineering and invertebrate functional genomics.
2. Apply these capabilities to elucidate the unique metabolic and sensory biochemistries underlying the adaptation of terrestrial invertebrates to their environment
3. Exploit these capabilities and insights to develop novel biocatalysts and biopolymers as the basis for new industrial and environmental biotechnologies, including environmental bioremediation.

Capabilities by Theme 2005-06 – Entomology

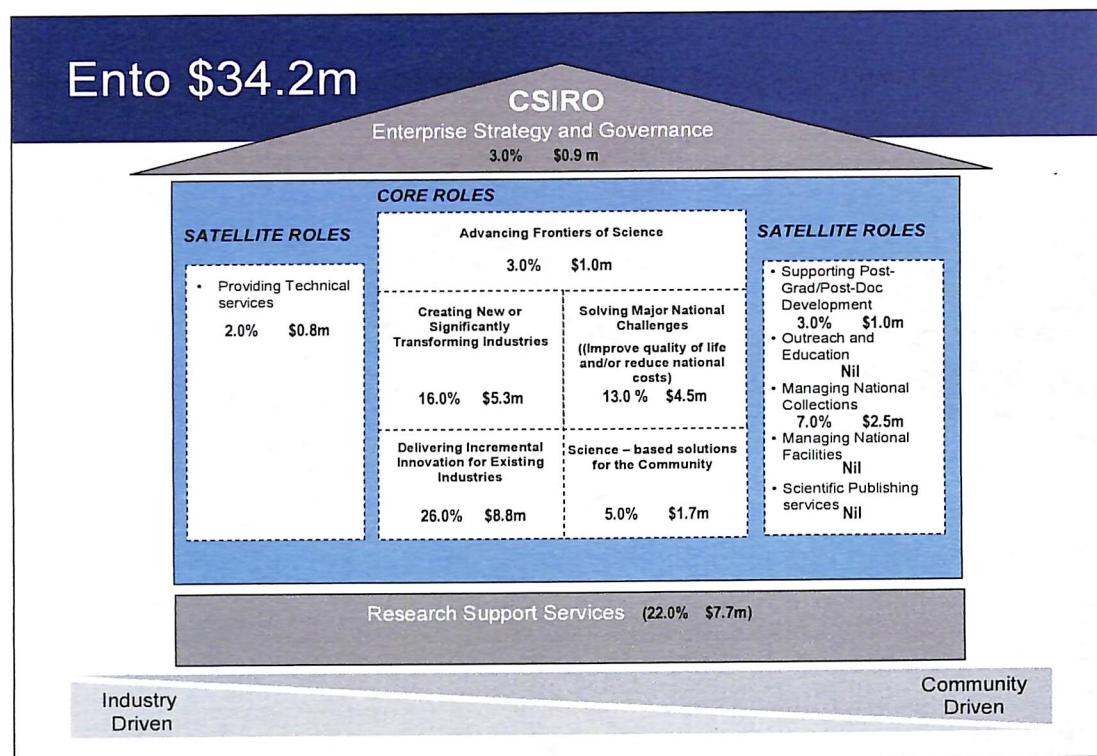
Theme	Capability				Total
	Plant biosecurity solutions	Species interactions	Biodiversity and evolution	Invertebrate molecular pathways	
Approx No of EFTs*	89	35	25	45	194
% of total	46%	18%	13%	23%	100%
Securing Agriculture					
Protecting Ecosystems					
Developing Innovative Bioindustries					

* includes staff in 3 functional areas: Research Scientist/Engineer, Research Projects and Research Management

Key: Proportion of Capability allocated to each Theme.

'High' ≥ 50 % 'Medium' 20 – 50 % 'Low' 0 – 20 %

Investment by Roles for 2005-06 – Entomology



Staffing Profile 2005-06 – Entomology

Planned Staffing Profile 2005 – 06 (EFTs)	
Functional Area	Total for Division
Research Scientist/Engineer	77
Research Consulting	1
Commercial Manager	1
Research Management	7
Research Projects	110
Technical Services	17
General Management	0
Communication and Information	6
Administrative Services	25
General Services	3
Specialist	0
Total Staff	247

Note: EFT numbers include CSE and CLW staff transferring on 1 July 2005.

Investment Profile 2005-06 – Entomology

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	8,806	10,949	0	0	19,755
Research & Services	N/A *	12,700	800	425	13,924
Expenditure	8,760	24,654	800	0	34,214
Net Revenue	45	-960	0	425	-490
Other Revenue and Interest	0	535	0	0	535
Operating Result	45	-470	0	425	0

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

5.3 Food Science Australia¹

Chief: Dr Alastair Robertson

Overview

Effective from July 2004, research management at Food Science Australia (FSA) is now organised with science strategy developed from mission driven Themes, and research delivery through on-site Centre management. Theme Directors network internally and externally to determine science strategy, in order to focus capability platforms towards problems relevant to FSA's stakeholder needs. Both Themes and capability platforms are highly interdependent but are managed in a matrix structure to ensure that skills are aligned to science strategy and an appropriate balance is maintained between the two. Centre Directors are responsible for facilitating resource / skills allocation and development across the organisation, and Centre budgetary financial management to deliver on Theme Director agreed projects.

The matrix management model of Theme directed science strategy and Centre management of staff and physical resources offers the following additional advantages:

- ensuring direction and focus against strategy
- problem/objective driven research focus
- enhanced multidisciplinary, fewer silos
- reduction of discipline/technique driven science (unless required)
- rational presentational framework for external communication
- embedding team work across the organization, from Executive Committee down

FSA's three research and commercialisation themes are *Process Innovation and Food Quality, Healthy Foods, and Integrated Food Safety*. Each Theme has a number of 'Streams' as a way of focussing common areas of science on delivering against the overall Theme missions. Within Streams projects aggregate to "Clusters" of similar scientific activities. This strategic management approach reflects the need to have strategic science direction reflecting the key consumer drivers.

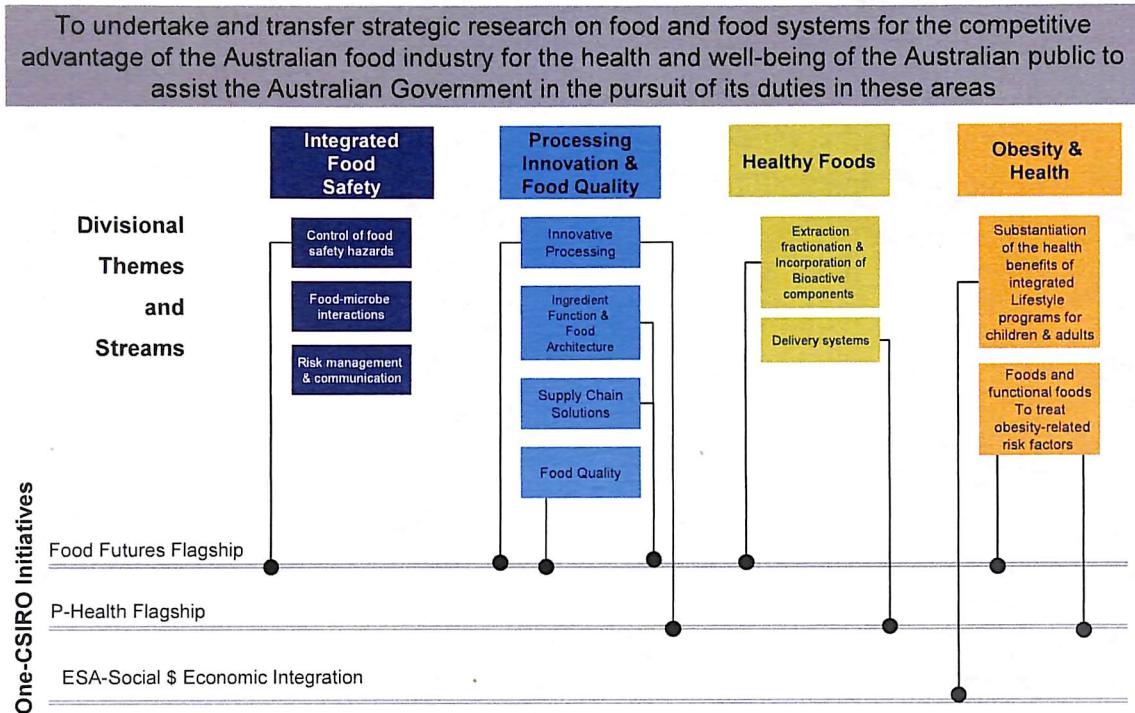
FSA is also involved with a number research centres, some covering important industry specific research topics (e.g. Australian Cheese Technology Programme) whilst others more generic such as the NFIS Centres of Excellence. The Themes not only provide appropriate structures in which to locate such activities but in addition provide a mechanism against which to test whether potential industry ventures are aligned with the FSA mission and research strategy.

From July 2005 the Science thought, leadership and research delivery of the Health Science and Nutrition Division based in Adelaide will be merged with the science capability of Food Science Australia.

The plan is to integrate the existing Theme in Nutrition into the Healthy Foods Theme in Food Science Australia. However, initially the *Obesity* Theme in Nutrition will be managed as a separate Theme is regarded as a separate Theme in the Divisional Operational Plan for 2005-06.

¹ Food Science Australia is a Joint Venture between CSIRO and the Victorian Government

Alignment Diagram 2005-06 – Food Science Australia



Research Themes 2005-06 – Food Science Australia

Theme 1 – Processing Innovation and Food Quality (\$20.34 m)

Goal: Improve food quality, eating satisfaction and manufacturing efficiency through innovation

Theme 2 – Healthy Foods (\$11.22 m)

Goal: To enhance the nutritional and physiological function of foods

Theme 3 – Integrated Food Safety (\$11. 59 m)

Goal: Control food safety through science-based integrated food chain intervention.

Theme 4 – Obesity and Health (\$11.40 m)

Goal: Develop three well validated alternative total dietary and exercise packages to prevent and treat obesity by 2008 and substantiate the dietary benefits of four novel functional foods in 2005/06

Note: Revenue & expenses shown here and on the following pages refer to the Joint venture as a whole. Under the Joint venture agreement only 85% of the net operating result of FSA is included in CSIRO's accounts.

Capabilities by Theme 2005-06 – Food Science Australia

Theme	Capability					Total
	Ingredients Functionality	Processing Innovation	Supply Chain Performance	Integrated Food Safety	Nutrition	
Approx No of EFTs*	64	62	25	36	60	247
% of total	26%	25%	10%	15%	22%	100%
Integrated Food Safety						
Processing Innovation and Food Quality						
Healthy Foods						
Obesity and Health						

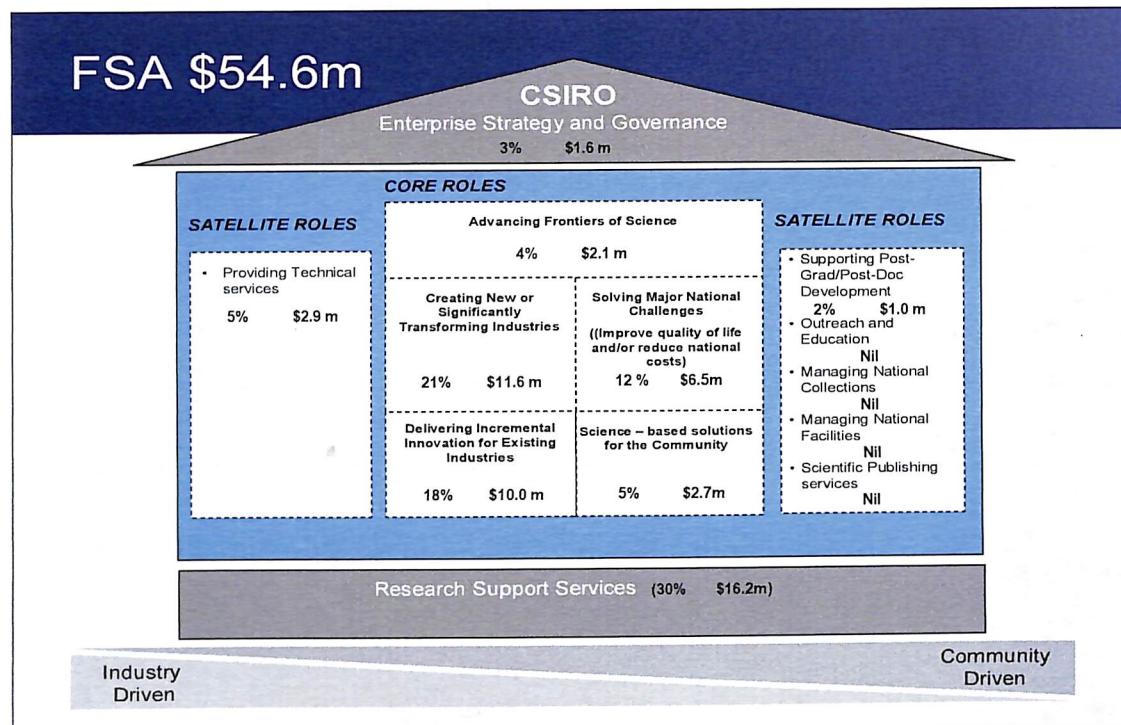
* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.



Investment by Roles for 2005-06 – Food Science Australia



Staffing Profile 2005-06 – Food Science Australia

Planned Staffing Profile 2005 – 06 (EFTs)		Total for Division
Functional Area		
Research Scientist/Engineer		73
Research Consulting		0
Research Management		9
Research Projects		152
Technical Services		14
General Management		3
Communication and Information		14
Administrative Services		40
General Services		3
Specialist		4
Total Staff		312

Investment Profile 2005-06 – Food Science Australia

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	19,426	11,438	0	0	30,864
Research & Services	N/A *	15,367	7,612	377	23,356
Expenditure	19,796	26,616	7,706	447	54,565
Net Revenue	-370	189	-94	-70	-345
Other Revenue and Interest	0	0	794	0	794
Operating Result	-370	189	700	-70	449

*Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

5.4 Livestock Industries

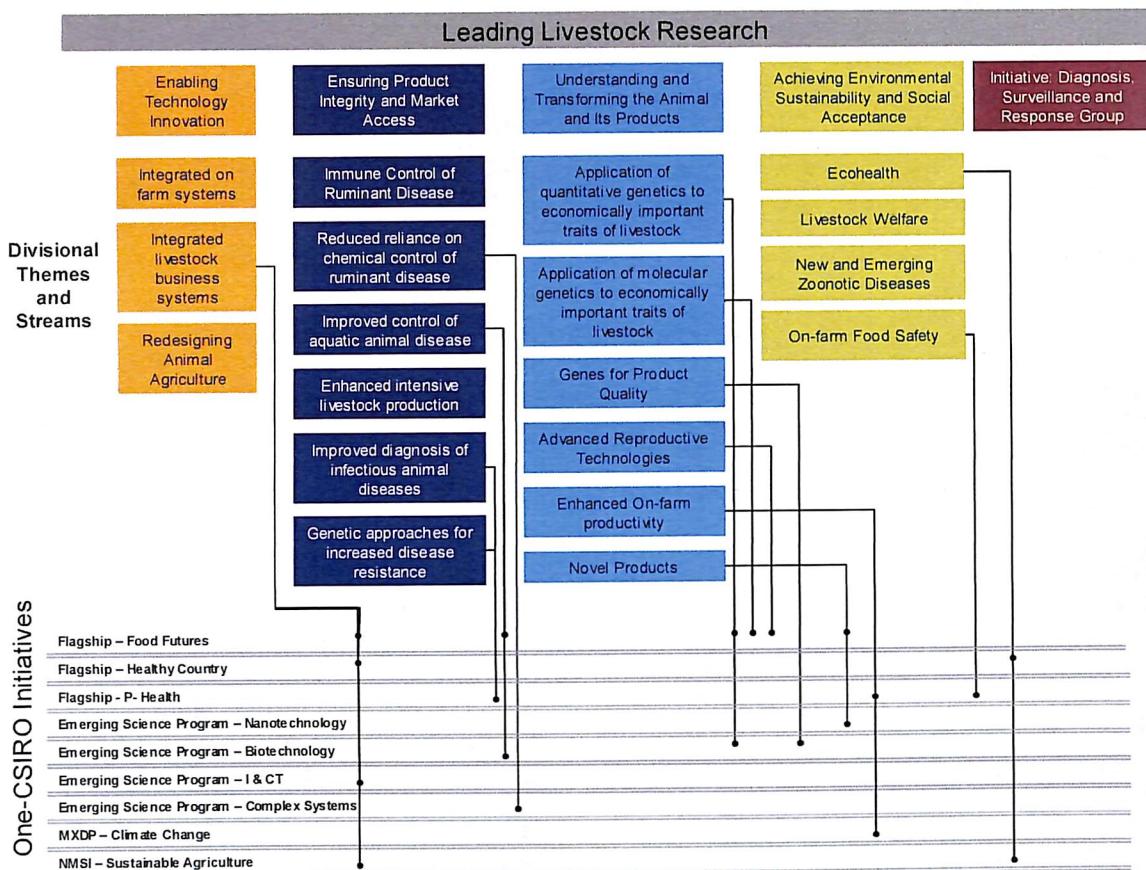
Chief: Mr Shaun Coffey

Overview

CSIRO Livestock Industries conducts research for and in partnership with Australia's livestock and allied industries to facilitate their sustainable competitive advantage. We assist industries to be economically viable, ecologically sustainable and capable of contributing to Australia's social and natural resources debate. We create, develop and transfer knowledge and technologies for novel products, new production options, improved production efficiency, disease control, improved welfare options and product safety and quality throughout the livestock industry value chain.

The current CSIRO Livestock Industries portfolio aligns strongly with science directions identified in the Agribusiness Strategic Plan in the broad areas of integration of agribusiness sustainability with environmental sustainability; movement toward post-genomic sciences and a better understanding of systems biology; delivery of customised animals, animal products and technologies with production and health benefits; understanding and meeting consumer demands for safe food and socially-responsible farming practices; and delivery of products and approaches which manage or reduce disease risks to trade.

Alignment Diagram 2005-06 – Livestock Industries



Research Themes 2005-06 – Livestock Industries

Theme 1 – Enabling Technology Innovation (\$8.37 m)

Goal: Adapting, integrating and information into farm and business systems. By 2008 we intend this theme will have grown in relative terms to reflect approximately 15-20% of our research portfolio. It will deliver best management practices for livestock enterprises, demonstrating the latest technology and full integration into the business economy. Delivery will be regionally-specific (Mediterranean, temperate and tropical) and will focus on whole-of-business productivity and profitability

Theme 2 – Ensuring Product Integrity and Market Access (\$31.50 m)

Goal: Improve the management of the risks posed by animal disease to both trade and protection. By 2008 improve Australia's disease risk management systems to progressively remove disease-related market barriers to trade, and deliver enhanced on-farm productivity. Produce five (5) significant new developments in key areas such as molecular diagnosis, epidemiology and vaccines.

Theme 3 – Understanding and transforming the Animal and its Products (\$19.50 m)

Goal: Increase the value of livestock by improving the inherent capacity of animals to deliver current and new products. Utilise new and emerging capabilities in molecular biology, computational mathematics and bioinformatics to develop at least ten enhancements and product quality and differentiation by 2008.

Theme 4 – Achieving Environmental Sustainability and Social Acceptance (\$11.76 m)

Goal: Develop approaches to increase the beneficial environmental impacts of livestock production and anticipate and address community concerns about livestock and livestock products. By 2008 develop a better understanding of key stressors and stress management in animals and provide the component knowledge needed to redesign production systems to meet community expectations. Develop four technologies to contribute to resource sustainability in fragile marginal grazing lands or degenerated environments, or to enhance environmental quality in production environments in general.

Other - Diagnostic, Surveillance & Response Group (\$7.5 m)

Goal: Provide diagnostic services, enhanced surveillance and the capability to respond to risks and needs posed by emerging and exotic diseases

Capabilities by Theme 2005-06 – Livestock Industries

Theme	Capability								Total
	A	B	C	D	E	F	G	H	
Approx No of EFTs*	56	73	64	30	32	51	10	16	332
% of total	17%	22%	20%	9%	10%	16%	2%	4%	100%
Theme 1									
Theme 2									
Theme 3									
Theme 4									
Other									

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High'

≥ 50 %

'Medium'

20 – 50 %

'Low'

0 – 20 %

Capability A: Exotic disease preparedness

Capability B: Diagnosis and prevention of endemic disease

Capability C: Livestock management

Capability D: Genetic development

Capability E: Post-genomic science

Capability F: Market-driven consumer demand

Capability G: Advanced reproduction

Capability H: Mammalian biology

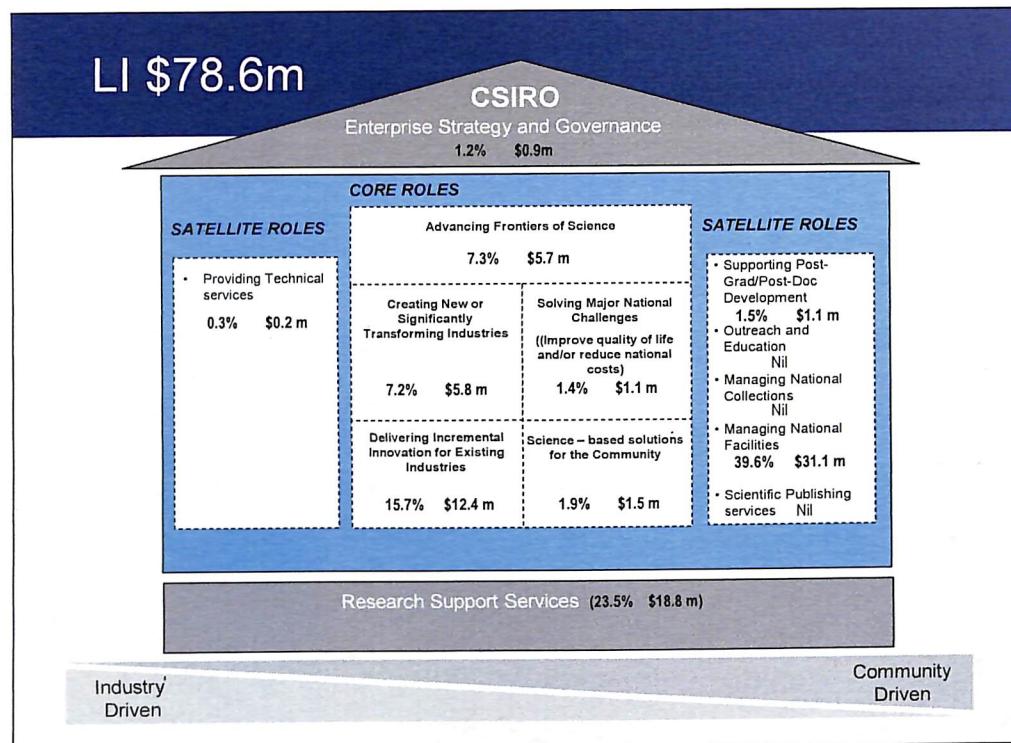
Theme 1 - Enabling Technology Innovation

Theme 2 - Ensuring Product Integrity and Market Access

Theme 3 - Understanding and transforming the Animal...

Theme 4 - Environmental Sustainability and Social...

Other - Diagnostic, Surveillance & Response Group

Investment by Roles for 2005-06 – Livestock Industries

Staffing Profile 2005-06 – Livestock Industries**Planned Staffing Profile 2005 – 06 (EFTs)**

Functional Area	Total for Division
Research Scientist/Engineer	121
Research Consulting	0
Research Management	11
Research Projects	231
Technical Services	74
General Management	6
Communication and Information	21
Administrative Services	51
General Services	25
Specialist	8
Total Staff	548

Investment Profile 2005-06 – Livestock Industries**Planned Investment Model Position 2005 – 06**

\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	12,773	40,206	600	121	53,700
Res & Services	N/A *	23,918	921	615	25,454
Expenditure	12,261	64,124	1521	736	78,642
Net Revenue	512	0	0	0	512
Other Revenue and Interest	-190	0	0	0	-190
Operating Result	322	0	0	0	322

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

5.5 Plant Industry

Chief: Dr Jeremy Burdon

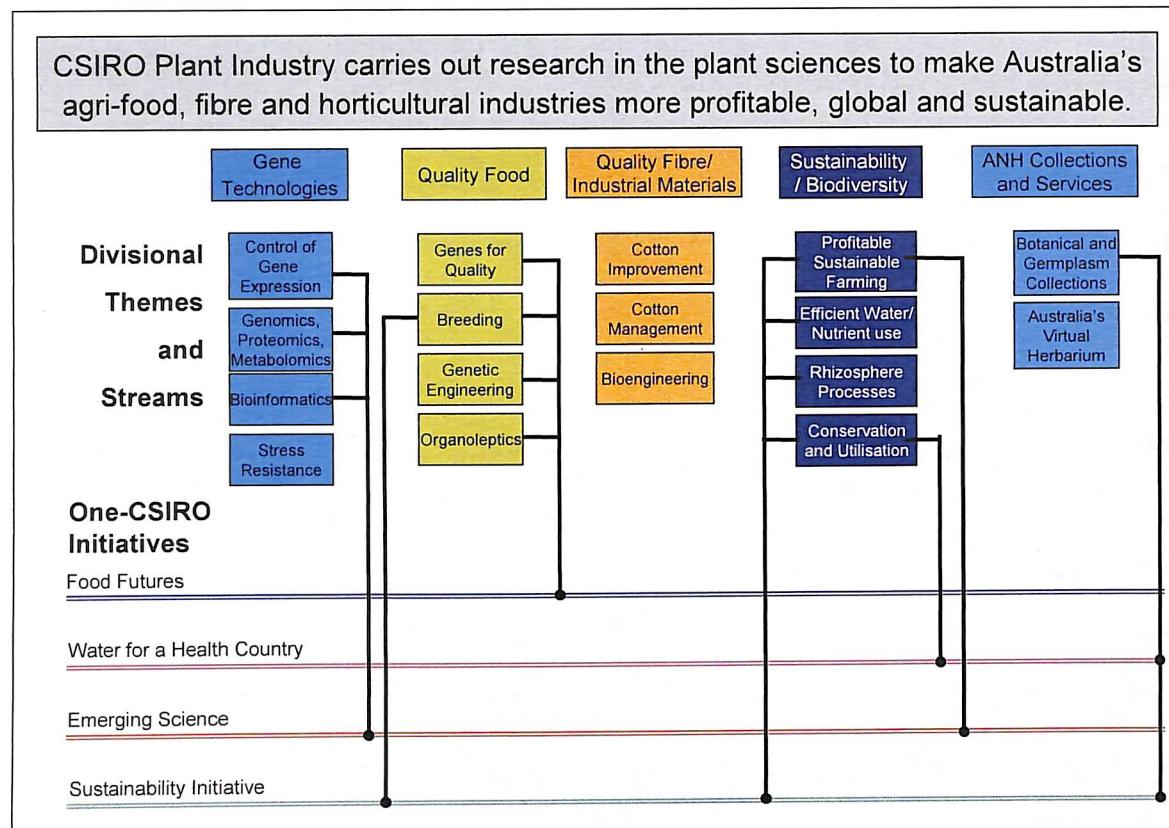
Overview

Plant Industry's Research Themes are closely inter-connected and activities in these Themes are distributed across the Division's geographical sites and between the Division's core capabilities. This inter-connectivity provides a structure which enables new initiatives and new capabilities to be developed. By ensuring that both the scientific and personal development of staff are linked closely with the Division's core scientific platforms, new opportunities can be rapidly evaluated and those which are valuable expanded and developed. Resources can be rapidly and seamlessly realigned in this way while maintaining the enthusiasm and involvement of staff concerned.

Changing priorities in the Flagships coupled with increasing real costs have required continuing reassessment of the rationale for all areas of activity. We are continuing a wide-ranging assessment within the Division reducing resources allocated to narrowly focused work that is not integrated and has little or no industry support. We are focusing activities in our core technology areas on cutting edge activities in which we have significant intellectual power such as RNAi and microRNA and using the resources freed to support a development of underlying platform skills and to make strategic successional appointments. These will support our ability to deliver to Flagship goals. We are strengthening delivery approaches and maximising the chances of significant innovative changes by pushing greater linkage and scientific collaboration between Programs at different points in the Research, Development and Application chain.

We will continue through the year with implementation of our strategy of developing collaborative partnerships with industry assisted by strategic Divisional appointments including new initiatives in production sustainability and fundamental research in cereal grain development. In addition we are making strategic appointments in underlying support areas of biometrics and bioinformatics.

Alignment Diagram 2005-06 – Plant Industry



Research Themes 2005-06 – Plant Industry

We continue to develop major collaborative partnerships with industry, however the climate for investment of national and multinational corporations in strategic research has changed, at least in part due to consumer resistance to GMOs. For example AWB Ltd has withdrawn from the Graingene Alliance and Syngenta may as well. Our efforts to develop strategic alliances with the Rural Research and Development Corporations will be redoubled with focus on longer-term basic strategic research balancing GM and alternative strategies.

A major new initiative in developing a multi-Divisional program on production sustainability has been assisted by provision of resources to scope opportunities in this area most critical to the future of Australia's agribusinesses. In Plant Industry we will be focusing our sustainability effort through combining our research in agricultural systems and biodiversity conservation into one Program.

Theme 1 – Advanced Gene Technologies for Plant Science and New Agricultural Products (\$18.67 m)

Goal: Utilise the new platform technologies of functional genomics and bioinformatics to develop scientific capability and 5 significant new IP positions by 2008 in key areas of genetic and epigenetic control of gene expression and critical areas of food quality characteristics for future market access and development.

Theme 2 – Quality, Differentiated Food for Health and Market Access (\$34.88 m)

Goal: By 2008 improve Australia's competitive advantage through provision of differentiated new materials for the development and delivery of at least eight enhanced crop products having a uniquely Australian brand image, and with yield, nutrition, flavour and or health attributes tailored for specific domestic and export markets.

Theme 3 – Plant Fibre and Biofactories for New Agricultural & Industrial Products (\$9.54 m)

Goal: By 2008 release 20 new cotton varieties adapted to Australian conditions with improved fibre quality ensuring international market access and further develop international markets for CSIRO bred varieties, release enhanced cotton management decision support packages to Australian growers, and develop a program focused on use of plants for bioengineering of industrial raw materials.

Theme 4 – Restructured Agriculture and Biodiversity Sustainability (\$19.47 m)

Goal: By 2008 develop and apply best practice management programs for sustainable agriculture production in a regional context to three major agricultural systems preserving environmental and biodiversity values and ensuring reliability and continuity of supply.

Theme 5 – Australian National Herbarium Collection and Services (\$3.98 m)

Goal: To maintain the Australian National Herbarium as the national focus Australia-wide set of botanical collections, and maintain our international responsibilities for germplasm collections of Australian indigenous relatives of important crop plants, making information about the ANH collections and Australian plant diversity, occurrence and distribution freely accessible through collaborative database projects and the Internet for community benefit and government policy development and decision-making for management, conservation and sustainable use of biodiversity.

Capabilities by Theme 2005-06 – Plant Industry

Theme	Capability								Total
	Gene discovery & utilisation	Host-pathogen genetics	Nutritional modification of crops	Integrated crop management systems	Plant-soil interactions	Biodiversity assessment	Organoleptics		
Approx No of EFTs	274	53	57	121	24	45	10	584	
% of Total	47%	9%	10%	21%	4%	8%	2%	100%	
Advanced Gene Technologies									
Quality Differentiated Food									
Plant Fiber and Biofactories									
Restructuring Agriculture									
Australian National Herbarium									

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High'

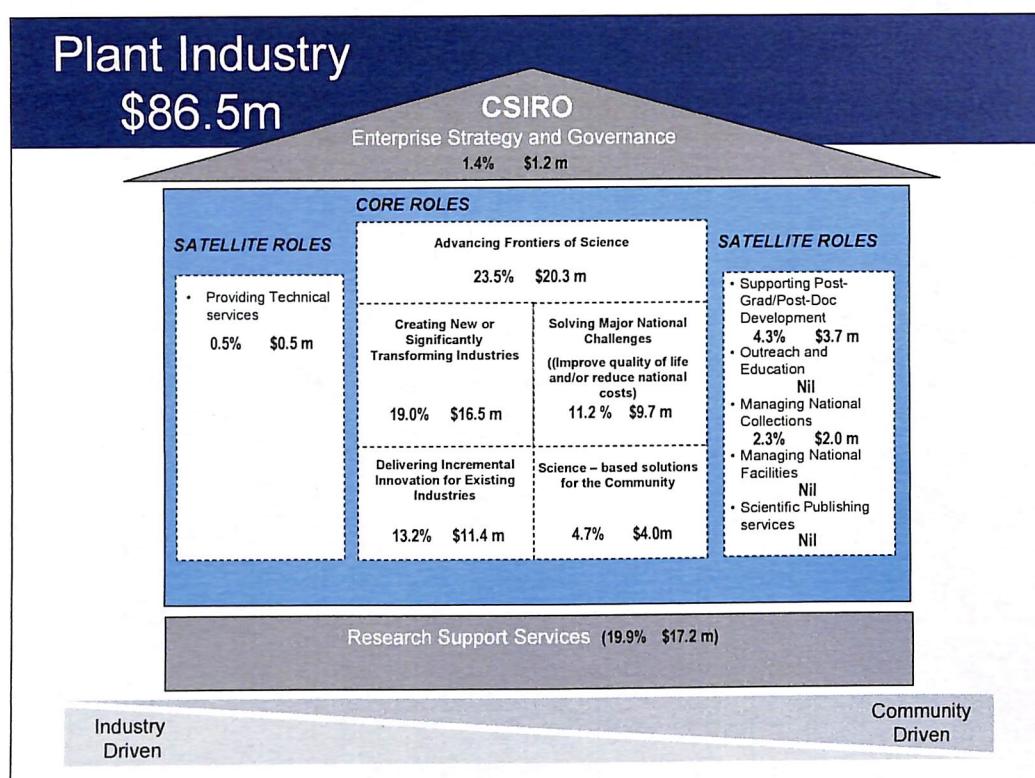
≥ 50 %

'Medium'

20 – 50 %

'Low'

0 – 20 %

Investment by Roles for 2005-06 – Plant Industry

Staffing Profile 2005-06 – Plant Industry

Planned Staffing Profile 2005 – 06 (EFTs)*		Total for Division
Functional Area		
Research Scientist/Engineer		210
Research Consulting		0
Research Management		15
Research Projects		359
Technical Services		36
General Management		9
Communication and Information		29
Administrative Services		57
General Services		6
Specialist		0
Total Staff		721*

*N.B. Includes effort of Visiting Scientists, Students, Research Fellows, staff of Australian National Botanic Gardens, Discovery, Black Mountain Library, and Black Mountain Site Services, under Cost Centre 05.

Investment Profile 2005-06 – Plant Industry

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	23,060	25,410	0	261	48,731
Research & Services	N/A *	27,832	0	8,330	36,162
Expenditure	31,043	53,242	0	2,261	86,546
Net Revenue	23,060	53,242	0	8,591	84,893
Other Revenue and Interest	950	0	0	0	950
Operating Result	-7,033	0	0	6,330	-703

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

5.6 Textile and Fibre Technology

Chief: Dr Brett Bateup

Overview

Our principal customer is the Australian wool industry (Australian Wool Innovation Ltd (AWI)) followed by the Australian cotton and technical textiles industries at a much lower level. We also provide product development and consulting services to Australia's small to medium sized textile enterprises.

Our two key Research Themes, which are heavily leveraged by external funding, are aligned closely to our customers' research needs. Our two Other Initiatives are much smaller and reflect CTFT's strategic investment in Emerging Science and industry's commercial investment in purchasing our fee-for-service activities respectively.

Outputs from our Emerging Science initiatives will feed into the Secure Australia MXDP and Energy Transformed Flagship.

Fundamental natural fibre studies, which is conducted in Theme 1, together with our Emerging Science activities in Other Initiative 1 comprise one of our core roles "Advancing the Frontiers of Science".

Key markets for our developments include global textile machine manufacturers, chemical manufacturers, garment manufacturers and fibre and textile processors. Important market segments include consumer apparel, medical, filtration, transport, sport, construction and geofabrics.

A key strategic initiative is to target niche, high value biomedical textile applications in addition to other technical textile segments as part of our diversification strategy. Critical mass in this new area will be achieved primarily through partnering with universities via PhD, Post doctoral students as well as direct collaboration supported by State and Commonwealth Government investment.

CTFT contributes primarily to CSIRO's Strategic Objectives 1.1: "to deliver on Australia's National Research Priorities" and 4.1: "Intensify engagement with RDCs to grow regional and new industries".

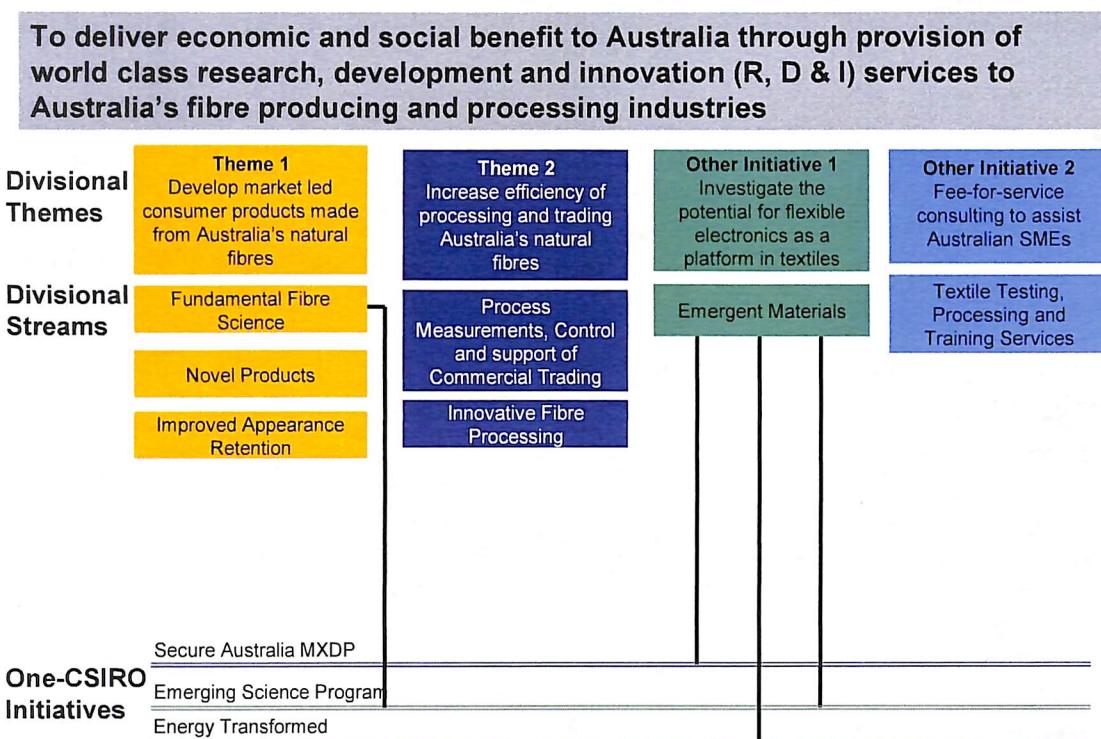
CTFT has a well established international reputation with an increasing number of large projects with major international corporations (strategic objective 4.2). With China's dominance in purchasing 50% of Australia's wool clip, CTFT is considering its future China strategy in terms of potential threats and opportunities.

In Geelong, CTFT operates the most comprehensive multi-fibre processing R&D facility in the world. We have complete wool processing and cotton processing capabilities plus needle-punch non-woven, hydroentanglement and bi-component fibre extrusion equipment. In our Clayton facility, CTFT researches carbon nanotube production, conducting polymers and medical textiles.

Our unique facilities provide a distinct competitive advantage for collaboration in product development ranging from conventional textile processing to carbon nanotube manufacture.

We offer a complete range of Research, Development & Innovation services which include: fibre characterisation, fibre processing, surface modification through chemical applications, fibre extrusion, product development, environmental monitoring and training.

Alignment Diagram 2005-06 – Textile & Fibre Technology



Research Themes 2005-06 – Textile & Fibre Technology

TFT's Themes and Other Initiatives have not changed significantly since 04/05. Some fine tuning of the goals to make them more specific and measurable ("SMART") has occurred. In order to better map with our customers' strategic needs, the number of Streams has been reduced from 16 to 7.

Theme 1 – Develop market led consumer products made from Australia's natural fibres (\$12.08 m)

Goal: To provide long term benefit to the Australian wool and cotton industry through implementation of seven new science based products which will add 35 Mkg of demand by 2010.

Theme 2 – Increase efficiency of processing and trading Australia's natural fibres (\$10.87 m)

Goal: To improve the sustainability and quality image of Australia's natural fibres in the international marketplace through introduction of six new technologies for improved fibre specification and innovative textile processing which will add \$200M value to the industry by 2010.

Other Initiative 1 - Investigate the potential for flexible electronics as a platform in textiles (\$1.75 m)

Goal: To create new business activity in Australia through the development of three high value added technological products for the local and global textile industry by 2010.

Other Initiative 2 - Assisting Australian Small to Medium Sized Enterprises (\$1.7 m)

Goal: To enhance the export capabilities of Australian small to medium sized enterprises through the provision of unique fee-for-service activities.

Capabilities by Theme 2005-06 – Textile & Fibre Technology

Theme	Capability							Total
	Advance Sensors, Instrumentation & Software	Machine Prototype Design and Development	Textile Product Development	Textile & Fibre Process Engineering	Fibre and Textile Analysis and Testing	Advanced Fibre Materials and Composites		
Approx No of EFTs*	17.0	11.5	25.0	16.0	10.0	15.0	94.5	
% of total	18.0%	12.2%	26.4%	16.9%	10.6%	15.9%	100%	
Theme 1: Consumer Products								
Theme 2: Processing Efficiency								
Other Initiative 1: Emerging Science								
Other 2: Fee-for-service Consulting								

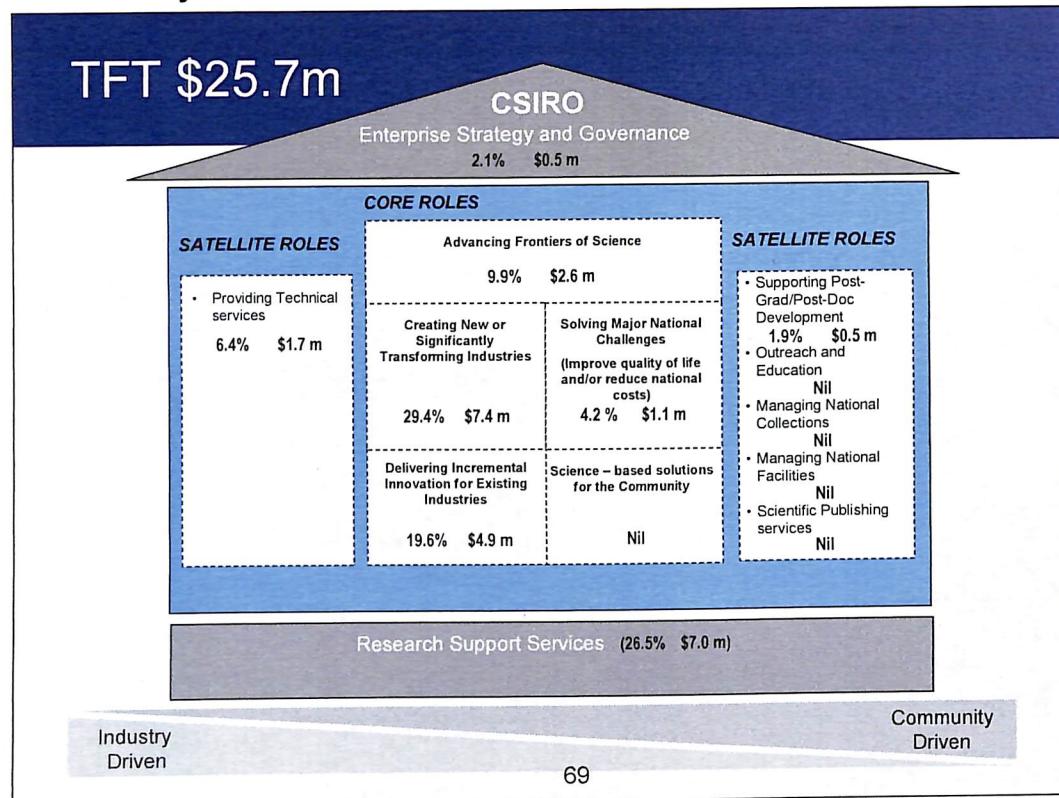
* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High' ≥ 50% 'Medium' 20 – 50 % 'Low' 0 – 20 %

Investment by Roles for 2005-06 – Textile & Fibre Technology



Staffing Profile 2005-06 – Textile & Fibre Technology**Planned Staffing Profile 2005 – 06 (EFTs)**

Functional Area	Total for Division
Research Scientist/Engineer	35
Research Consulting	2
Research Management	3
Research Projects	56
Technical Services	41
General Management	1
Communication and Information	8
Administrative Services	20
General Services	1
Specialist	0
Total Staff	167

Investment Profile 2005-06 – Textile & Fibre Technology**Planned Investment Model Position 2005 – 06**

\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	6,971	7,625	0	0	14,597
Research & Services	N/A *	8,024	2,085	500	10,609
Expenditure	7,910	15,649	1,701	374	25,634
Net Revenue	(938)	0	384	126	(428)
Other Revenue and Interest	580	0	0	0	580
Operating Result	(358)	0	384	126	152

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

Section 6 Information, Manufacturing and Minerals Group

Group Executive: Dr Rod Hill

Introduction

The Information, Manufacturing and Minerals (IMM) Group contains the core of CSIRO's research focus in the ICT, astronomy, services, health, manufacturing, minerals, chemicals and infrastructure sectors. The focus of the operational units in the IMM group is to:

- Understand the universe and its origins;
- Provide innovative mathematical and ICT tools and processes for industry and the community;
- Stimulate and support the creation of sustainable value from Australia's minerals resources over the full market value chain;
- Maximise value to the manufacturing, security and infrastructure sectors by developing and transferring innovative transformational technologies across the sectors including water and energy;
- Develop new materials and products for application in the health and chemical industries.

The prime objectives of the IMM group are to create new industries, and maximise job creation and exports through the development and transfer of novel technologies to the following key areas:

- | | | |
|--|--|--|
| <ul style="list-style-type: none">• Electronics• Communications• Sensing and response systems• Security• Minerals exploration and extraction | <ul style="list-style-type: none">• Minerals processing• Industrial Biotechnology• Polymers• Nanoscience• Biomaterials | <ul style="list-style-type: none">• Water• Energy• Aerospace• Transport |
|--|--|--|

The IMM Group will exploit the cross-discipline expertise across the full value chain to achieve these objectives, particularly through focussing on a number of major cross-discipline initiatives including the Light Metals and Minerals Down Under Flagships, the Synchrotron Science, Counter-Terrorism and Large Data Sets Major Programs, and new science developments such as the Extended Technology Demonstrator (xNTD) and the Square Kilometre Array (SKA).

Key components of the Group

The Group is represented by:

Divisions	<ul style="list-style-type: none">• Australian Telescope National Facility• Mathematical and Information Sciences• Information and Communication Technology Centre• Exploration and Mining	<ul style="list-style-type: none">• Minerals• Manufacturing and Infrastructure Technology• Industrial Physics• Molecular Science
Flagships	<ul style="list-style-type: none">• Light Metals	
Major Initiatives	<ul style="list-style-type: none">• SKA and xNTD• Large Data Sets• Minerals Down Under	<ul style="list-style-type: none">• Synchrotron Science• Counter Terrorism

Group Focus 2005-06 – Information, Manufacturing & Minerals Group

The main aim of the Group is to improve the competitiveness of Australian industry with particular emphasis on the service sector, manufacturing, ICT, pharmaceuticals, human health, chemicals and plastics, minerals exploration, mining and processing, and infrastructure.

The external drivers demanding research in these areas include requirements for products which are globally competitive, are cleaner, cheaper, smaller, faster and more power efficient, and for the delivery of sophisticated services which are available anywhere, anytime. The Group also delivers CSIRO's commitment to increasing our knowledge of the nature and origins of the Universe, through radio astronomy.

Key deliverables for Australia by 2015:

Sector	Deliverable
Astronomy	<ul style="list-style-type: none"> • Operation of a world-class facility for radio astronomy • Leading-edge technical innovation in receivers and signal processing • Solution of fundamental challenges of the Universe • The next generation of radio astronomy facilities such as xNTD and SKA
ICT	<ul style="list-style-type: none"> • Concept demonstrators for multi-gigabit-rate wireless networks of the future • Real time decisions for networked businesses • Demonstration of intelligent complex systems consisting of large numbers of networked sensors, actuators and agents
Minerals	<ul style="list-style-type: none"> • Discovery of a new 'giant' ore deposit of the calibre of Olympic Dam & Broken Hill • Cut mining costs by 25% and double ore reserves through lower cut-off grades • Trebling the exports of mining technology and services to \$10B pa • Doubled value of processed mineral resources with half the environmental impact • A new Titanium metal production and manufacturing industry • Attraction of 40% of worldwide minerals investment
Manufacturing	<ul style="list-style-type: none"> • New light alloys and elaborately transformed metals, hybrid materials and production processes • \$25M benefit to the new generation of transport vehicles through cost reduction, enhanced efficiency and reduction in environmental impact • Novel nano- and micro-structure controlled materials for new value-added products • Novel molecules with specific applications to pharmaceuticals and crops, et, using biological processes • Ultra-low maintenance sustainable processing technologies that optimise industrial efficiency and environmental performance • Technologies for the storage and production of renewable energies
Infrastructure	<ul style="list-style-type: none"> • Optimised whole-of-life performance of buildings and infrastructure systems • Automated and adaptive networks for specialised applications • Reduced ecological footprint of cities • Optimised urban water sustainability
Security	<ul style="list-style-type: none"> • Significantly improved detection, prevention and mitigation of potentially catastrophic events • A range of innovative overt and covert security technologies • A commercial 'customs scanner' system at Brisbane Airport for detection of contraband etc in air-cargo containers
Health	<ul style="list-style-type: none"> • Synthetic biomaterials for commercial application in artificial ligaments, hard coatings, extended-wear contact lenses and engineered tissue/polymer hybrids • A bioinformatics framework for exploring temporal associations for rare events in large linked health data • New techniques for the prediction and diagnosis of diseases • Remote/virtual-reality, socially appropriate health services
Environment	<ul style="list-style-type: none"> • Resolution of major issues through implementation of new statistical methodologies for smarter information use • A new process for the photoelectrical conversion of water to hydrogen and oxygen

Reflections on 2004-05 – Information, Manufacturing & Minerals Group

For the IMM Group, 2004-05 saw the start and implementation of significant structural changes for much of the group, including:

- The movement of the National Measurement Laboratory from CSIRO (part of Industrial Physics) to the National Measurement Institute;

- The appointment of a new Director, Alex Zelinsky, to lead the Information and Communication Technology Centre (ICTC), the commencement of Bart Follink as Chief in the Division of Minerals (CM) and the appointment of Raj Rajakumar as the new Director for the Light Metals Flagship (LMF);
- The decision to merge the existing Division of Molecular Science (CMS) and the health component of the Division of Health Science and Nutrition (CHSN) to form a new Division, with Graeme Woodrow appointed as Chief for the new Division; and
- The completion of the review of the Division of Textile and Fibre Technologies (CTFT), which resulted in the decision to maintain the Division with a refocussed science direction under the oversight of a new Chief;
- The completion of the review of the Division of Industrial Physics (CIP). The implementation plans for the recommendations from the review are still being considered, however it is likely that the Division will remain as a business unit;
- The commencement of recruitment for a new Chief of the Division of Exploration and Mining (CEM) and an internal restructuring of the Division to reinvigorate its science portfolio.

There was considerable success for the IMM Group in 2004-05 on the commercial and relationship fronts with several successful spin out companies formed and major collaborative ventures initiated. These included PolyNovo from CMS, to develop new applications for polymers inside the human body, Epitactix ICTC to develop new compound semiconductor production processes and wireless products and the Intellection spin out of CM to market the QemScan minerals characterisation technology. The highly innovative magnesium casting technology developed in CMIT was licenced to MIL.

The year ahead 2005-06 – Information, Manufacturing & Minerals Group

High priority cross Divisional and Flagship actions and deliverables during the year ahead are: Minerals Down Under, Counter-Terrorism, Large Data Sets, xNTD and the Australian Synchrotron.

In 2005-06 the Group will be focussed on developing the business case for a Minerals Down Under (MDU) Flagship. The vision is to add a trillion dollars and 200 years to the value of Australia's mineral endowment by 2020. It is proposed to achieve this through the development of breakthrough exploration science and extraction and processing technologies. MDU will integrate research along the whole of the minerals industry value chain by drawing together key research groups from within CSIRO, academia, government and end-users in the minerals industry. The focus of 2005-06 will be active engagement with the industry to develop a Minerals Forum Roadmap to identify and agree on the key science and technology challenges that need to be addressed to meet the vision. Also in 2005-06 an early initiative on Drilling technology will be commenced with potential early major returns to the industry.

The development of two new major one-CSIRO initiatives in Counter-Terrorism and Large Data Sets is being led by the IMM group. Also looking ahead, the Group is confident of the successful completion of the Customs Scanner trial at Brisbane Airport and of the further consolidation of our commercialisation of the associated RIPPER project. CSIRO are very hopeful that the negotiations to locate a new titanium metal production plant in WA, using CSIRO technology, will be successfully concluded and that this will herald the formation of a whole new industry for Australia, through the Light Metal Flagship. The IMM Group will continue to play a significant national role in the Water for a Healthy Country Flagship, particularly in the contribution through the Urban Water Research in CMIT.

The Waterford Minerals Precinct concept, which was triggered by the decision to expand CSIRO facilities at Waterford and the WA Government's decision to relocate the Chemistry Centre to Waterford, will be further developed in 2005-06. CSIRO will be taking advantage of the Clayton site development plans to consolidate existing and future research support and collaboration across the site.

CSIRO will continue its engagement in the Australian Synchrotron through the development of a Major Cross Divisional Program, and the submission of a bid to become the Operator/Manager of the new facility. In NSW plans will be finalised for the consolidation of the Marsfield/ North Ryde/ Lindfield sites to maximise the synergies with the local research community. Also in North Ryde, the Centre for Critical Infrastructure Protection – a joint initiative with the NSW Fire Brigade and CMIT will commence the first stage of development in mid 2005.

The Divisions of CMIS and CMS will have their science programs reviewed in the coming year. The Group will also be focussed on the development and implementation strategies for manufacturing in CMIT and for the newly formed Division following the merger of Molecular Science and the health part of Health Science and Nutrition.

The proposed new technology demonstrator in Radioastronomy, xNTD, has been enthusiastically endorsed by the CSIRO Executive as vital in maintaining Australia's pre-eminent position in Radioastronomy now and into the future. In 2005/06 the ATNF and ICTC will focus on the development of focal-plane array technology in association with parabolic reflectors for the antenna systems. The xNTD team is aiming towards a Critical Design Review point in December 2005.

Strategy Implementation Goals for 2005-06 – Information, Manufacturing & Minerals Group

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
1.2 Build critical mass and ensure quality in our core research programs	Integrate structural biology capability formerly in CSIRO Health Sciences and Nutrition with Molecular Science to create a new Division with a coherent science and market strategy. Review and implement the recommendations from Divisional Science Reviews for: Industrial Physics; Minerals; Molecular Science
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Build the business case for the Minerals Down Under proto-flagship by November 2005 which, if approved, would result in full Flagship status for a July 2006 commencement date. Re-focus the Light Metals Flagship towards greater titanium research to achieve significant impact in this key success area.
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	Develop business cases for the Large Data Sets and Counter-Terrorism MXDPs for decision on funding by June 2006.
2.4 Maximise Australia's chances of hosting major international science facilities such as the SKA	Progress the proposal for a new technology demonstrator in radioastronomy ('xNTD') to the point of a critical design review by December 2005. Focus CSIRO's engagement with the Australian Synchrotron through development of the science program in the MXDP (4 post docs) and continuing to define CSIRO's potential for the role of Operator/Manager.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Substantially progress research collaboration with Monash University in Melbourne focussing on areas of interest to the State Government (Health and Advanced Manufacturing) and developing processes for joint appointments and collaborative agreements, building on the existing MOU. Substantially progress research collaboration with Curtin University through the finalisation of co-location plans in the Waterford chemistry precinct and the signing of an MOU for the WA Minerals Research Alliance (WA:MRA).
4.2 Structure deeper and more meaningful relationships with large corporation	Develop strategic relationships with BHP Billiton (Ti), Rio Tinto (sustainability), NASA (Communication), NAB (risk) and maintain existing engagement with duPont and Boeing.
5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research	Ensure cross-organisational engagement for the Synchrotron Science MXDP.
5.3 Adopt a unified approach to dramatically improve service and grow top accounts	Enhance engagement with the Victorian State Government through a focus on manufacturing, food, biosecurity, water and energy.
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Finalise plans for the successful consolidation of CSIRO's Victorian presence at the Clayton site, and progress towards construction of the first phase of building to accommodate CMIS Clayton staff and CMAR staff from Aspendale.

Capability Table 2005-06 – Information, Manufacturing & Minerals Group

The current core capabilities in the IMM Group, and the ones designated for growth, are summarised as follows:

Information, Manufacturing and Minerals Group Capabilities			
Division	Core Capabilities	Grow Capabilities	Reduce Resources
Australia Telescope National Facility	<ul style="list-style-type: none"> ▪ Telescope operations ▪ Signal processing 	<ul style="list-style-type: none"> ▪ Receiver technology ▪ mm-wave astronomy 	<ul style="list-style-type: none"> ▪ cm-wave astronomy
ICT Centre	<ul style="list-style-type: none"> ▪ Robotics ▪ Medical imaging ▪ Information retrieval ▪ Human use of ICT and e-Health ▪ Network science and web services ▪ Antennas & propagation ▪ Signal processing ▪ Microwave & millimetre-wave techniques 	<ul style="list-style-type: none"> ▪ Embedded systems and sensor networks ▪ Information security and privacy ▪ Distributed and mobile computing ▪ Communications theory 	<ul style="list-style-type: none"> ▪ Data Grids
Mathematical and Information Sciences	<ul style="list-style-type: none"> ▪ Model abstraction, simplification.. ▪ Image segmentation and classification ▪ Software engineering for numerical algorithms 	<ul style="list-style-type: none"> ▪ Numerical algorithm development ▪ Inference from integrated information ▪ Information discovery 	<ul style="list-style-type: none"> ▪ Exploratory data analysis
Industrial Physics	<ul style="list-style-type: none"> ▪ High Tc superconducting devices and systems ▪ Nanoscience ▪ Electromagnetic machines 	<ul style="list-style-type: none"> ▪ Intelligent systems ▪ Biophysics 	<ul style="list-style-type: none"> ▪ Precision, optical fabrication, coating & metrology (spin-out) ▪ Surface coating science and instrumentation
Manufacturing and Infrastructure Technology	<ul style="list-style-type: none"> ▪ Fire science ▪ Thermal and fluid dynamics ▪ Urban systems integration ▪ Optics and diffraction ▪ Ionic and electronic materials ▪ Interfacial science ▪ Sensing and interpretation 	<ul style="list-style-type: none"> ▪ Manufacturing informatics ▪ Soft condensed matter 	<ul style="list-style-type: none"> ▪ Metallurgy
Molecular Science (dependent on science review and merger)	<ul style="list-style-type: none"> ▪ Bioactive molecule discovery 	<ul style="list-style-type: none"> ▪ Biotransformation ▪ Biomaterials ▪ Product protection ▪ Nano-structure materials 	<ul style="list-style-type: none"> ▪ Specialized polymers ▪ Gene expression – discovery & analysis
Minerals	<ul style="list-style-type: none"> ▪ Bayer process technology ▪ Hydrometallurgy, including bioprocessing, leaching, EW and SX ▪ High temperature processing, ▪ Mineral beneficiation, especially iron ore beneficiation ▪ Materials characterisation ▪ Computational and physical modelling ▪ On-line Analysis ▪ Light metal production 	<ul style="list-style-type: none"> ▪ Bayer processing ▪ Biominerals processing ▪ Materials characterisation focussed on QEMSCAN and the new Australian Synchrotron ▪ On-line analysis and instrumentation (security) ▪ Light metals production (LM Flagship) ▪ Building and linking computational models at various scales ▪ Predicting process performance of ores 	<ul style="list-style-type: none"> ▪ Social and economic integration ▪ Industrial minerals

Information, Manufacturing and Minerals Group Capabilities

Division	Core Capabilities	Grow Capabilities	Reduce Resources
Exploration and Mining	<ul style="list-style-type: none"> ▪ Earth dynamics – from mantle to surface and atmosphere ▪ Geoinformatics – gathering, integrating, simulating, visualising and interpreting ▪ Mechatronics – intelligent machine systems 	<ul style="list-style-type: none"> ▪ Geophysics and petrophysics as key sciences that underpin 3D geological understanding ▪ Data interoperability through expansion of the SEEgrid initiative ▪ Hyperspectral sensing ▪ Drilling technologies ▪ ICT technologies to support intelligent systems including robotics and automation 	<ul style="list-style-type: none"> ▪ Coal gasification ▪ Social and economic integration ▪ Generic ore deposit studies ▪ Regolith geology ▪ Biokinetics ▪ Nuclear logging ▪ Structural geology (coal) modelling and visualisation ▪ Airborne gravity gradiometry ▪ Strain monitoring

Role Table 2005-06 – Information, Manufacturing & Minerals Group

The research and development of the IMM Group is well aligned with all of the National Research Priorities, and due to the diversity of capability and science focus, the Group has impacts across many of CSIRO's core roles.

The table below highlights some of the major achievements and focus areas of the IMM Group across the core roles. However with the focus of the group on developing and transferring transformational technologies and maximising the value of Australia's mineral endowment, there is a heavy focus on delivering world-class scientific solutions to service the two core roles of "delivering incremental innovation for existing industries" and "creating new or significantly transforming industries". The Group's Flagship, Light Metals, in combination with the Minerals Down Under initiative, are providing a focussed strategy for redirecting some of the priorities for the minerals sector towards "significantly transforming industries".

Information, Manufacturing and Minerals Group Roles					
Division	Creating new or significantly transforming industries	Incremental innovation for existing industries	Solving Major National Challenges	Science-based solutions for the Community	Frontier Science
Australia Telescope National Facility	<ul style="list-style-type: none"> ▪ Multibeam radio telescopes ▪ Mm-wave imaging 	<ul style="list-style-type: none"> ▪ Antennas for space communications ▪ Multi Directional Array 			<ul style="list-style-type: none"> ▪ Astrophysics
ICT Centre	<ul style="list-style-type: none"> ▪ Patient Centred Virtual Enterprises for Preventative Mental Health ▪ GigaBit wireless ▪ Health Data Integration 	<ul style="list-style-type: none"> ▪ Panoptic enterprise search engine ▪ Mm wave imaging ▪ Multibeam and multiband antenna systems ▪ Vital signs monitoring ▪ ViCCU medical Telepresence ▪ Annodex Continuous Media Web ▪ Automation of Mining ▪ Understanding neurodegenerative diseases through improved medical imaging 	<ul style="list-style-type: none"> ▪ Coalition information sharing to improve public safety ▪ Water Resources Observation network information gathering and decision support ▪ Location technologies for first responders ▪ Intelligent agents for demand side energy management 	<ul style="list-style-type: none"> ▪ Extended New Technology Demonstrator 	<ul style="list-style-type: none"> ▪ Networks Management Research ▪ Complex dynamic networks ▪ Terahertz imaging

Information, Manufacturing and Minerals Group Roles

Division	Creating new or significantly transforming industries	Incremental innovation for existing industries	Solving Major National Challenges	Science-based solutions for the Community	Frontier Science
Mathematical and Information Sciences		<ul style="list-style-type: none"> ▪ Process optimisation for wine industry ▪ Optimal scheduling of vehicles for hire ▪ Landsat/AGO 	<ul style="list-style-type: none"> ▪ National Carbon accounting ▪ P-Health statistics ▪ Disease prediction and diagnosis ▪ Enterix Bowel Cancer Phase 3 	<ul style="list-style-type: none"> ▪ Bio-terrorism and public health surveillance 	<ul style="list-style-type: none"> ▪ Expression Quantitative Trait Loci ▪ Complex models ▪ Hyperspectral imaging in biotechnology ▪ eScience
Industrial Physics	<ul style="list-style-type: none"> ▪ Ecommodore hybrid vehicle ▪ Landtem geophysical exploration tool ▪ ▪ Plasma CFC waste destruction ▪ Magnetic gradiometer for mineral exploration 	<ul style="list-style-type: none"> ▪ High efficiency electric motors 	<ul style="list-style-type: none"> ▪ MAGSAFE ▪ OceanMAG ▪ Security radar 	<ul style="list-style-type: none"> ▪ Formation and control of NoxNOx ▪ High power ultrasound for Marinessoil remediation 	<ul style="list-style-type: none"> ▪ Molecular electronics ▪ Quantum engineering ▪ Water splitting ▪ Intelligent sensing systems
Manufacturing and Infrastructure Technology	<ul style="list-style-type: none"> ▪ Ceramic fuel cells ▪ Innovative materials ▪ Titanium alloys ▪ Transformational processing ▪ New production processes for Ti sheet ▪ Adaptive networks ▪ Biodegradable packaging ▪ Pixelgram security technologies ▪ X-ray Technologies 	<ul style="list-style-type: none"> ▪ Hyssil - a highly innovative material solution for building and construction ▪ Coldspray surface technologies ▪ Magnesium sheet processing production 	<ul style="list-style-type: none"> ▪ Water ▪ Energy ▪ Transport ▪ Security ▪ Sustainability 	<ul style="list-style-type: none"> ▪ Environmental enhancement ▪ Safety ▪ Sustainable indoor environments 	<ul style="list-style-type: none"> ▪ Hybrid materials ▪ Molecular detection and separation ▪ Sentient systems ▪ Human behaviour and integrated systems
Molecular Sciences	<ul style="list-style-type: none"> ▪ Polymer bank notes ▪ Biocompatible polymers ▪ 30-day contact lenses 	<ul style="list-style-type: none"> ▪ Quickstep – rapid composite fibre layup 		<ul style="list-style-type: none"> ▪ Modification of volatile substance products subject to inhalant abuse 	<ul style="list-style-type: none"> ▪ RAFT polymerisation ▪ Molecular engineering ▪ Molecular electronics ▪ Gene expression ▪ Biotransformation ▪ Product protection
Minerals	<ul style="list-style-type: none"> ▪ DCC Al smelting ▪ Carbothermic Mg and Al smelting ▪ Bioleaching of heaps ▪ New Ti metal industry 	<ul style="list-style-type: none"> ▪ Iron ore beneficiation and performance ▪ Alumina processing ▪ Processing technologies for new, often lower grade resources 	<ul style="list-style-type: none"> ▪ Extended security scanning – Bigger, Better, Faster 		<ul style="list-style-type: none"> ▪ Multi-scale, multi-physics modelling ▪ Bioprocessing with new organisms

Information, Manufacturing and Minerals Group Roles					
Division	Creating new or significantly transforming industries	Incremental innovation for existing industries	Solving Major National Challenges	Science-based solutions for the Community	Frontier Science
Exploration and Mining	<ul style="list-style-type: none"> ▪ Coal seam gas (with CPR & CET) ▪ New technologies for resource discovery through 100m cover ▪ Advanced mining methods: ▪ Remote ore extraction (ROES) ▪ Top coal caving methods for thick seams 	<ul style="list-style-type: none"> ▪ Hyperspectral mapping products ▪ Development and commercialisation of logging tools ▪ Pit slope design criteria ▪ e-Mining – intelligent systems for mine control ▪ New drilling methods ▪ Sirovision 	<ul style="list-style-type: none"> ▪ Integrated geoscience data systems (SEEgrid) 		<ul style="list-style-type: none"> ▪ Extreme ore fluid geochemistry ▪ Geological inversion ▪ Mining robotics

6.1 Australia Telescope National Facility

Chief: Dr Brian Boyle

Overview

The ATNF aspires to enhance its status as a world-class radio astronomy observatory. In so doing, its primary aims are to provide world-class facilities for radio astronomy and to support and foster a vigorous astronomical community within Australia.

Until 2009 the Australia Telescope Compact Array will be the world's largest radio telescope with access to Southern skies that is sensitive to radio signals at millimetre wavelengths. In addition, by 2006/07 the ATNF will have improved the current performance of the Compact Array for wide-band observations by a factor of 10; further enhancing the scientific output of the Array and its use for internationally-competitive research programs. Users of the Compact Array will also have important scientific leverage in accessing the international Atacama Large Millimeter Array (ALMA), when ALMA is commissioned at the end of the decade.

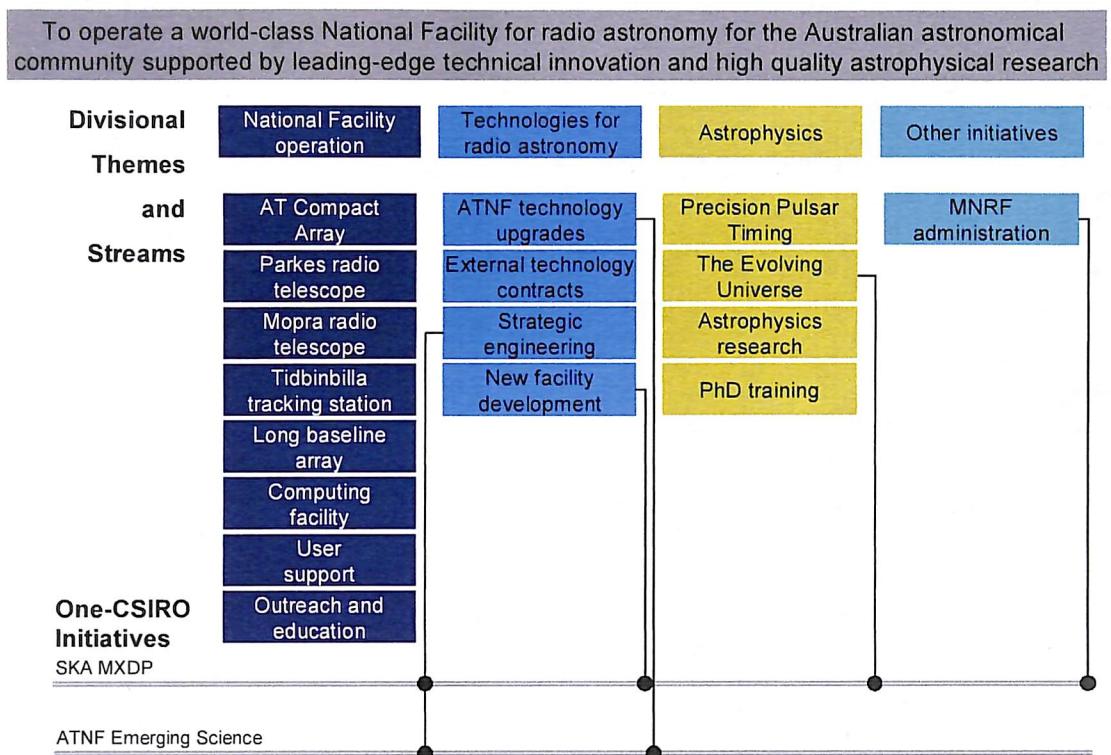
The ATNF also aspires to be one of the leaders in the international effort to design, build and operate the next generation of radio-astronomy facilities through its involvement with the Square Kilometre Array (SKA). The SKA is a billion-dollar project that will provide a radio telescope with a collecting area of about one square kilometre, making it a hundred times more sensitive than any existing radio telescope. The ATNF will seek to facilitate, wherever possible, scientific, technical and political engagement in the SKA by all other stakeholders (CSIRO, Universities, Industry and Government) within Australia.

By the early years of next decade the ATNF, together with Australian and international partners, aims to have built and be operating a major "pathfinder" instrument for the SKA (ISKAP). As part of the roadmap towards ISKAP, ATNF plans to work with other CSIRO divisions and Australian Universities to develop infrastructure (the extended New Technology Demonstrator or xNTD) at the proposed Australian site for the SKA. This will enable Australia to consolidate its position in the SKA by establishing local capabilities and technical leadership influencing key decisions of site choice (2006) and technology choice (2009) over the coming years. Once completed in 2008-09 the xNTD will be operated as part of ATNF and deliver key science outcomes to the Australian community in survey astronomy.

During the next decade the ATNF will continue to play a key role in frontier astrophysical research with ISKAP that will further influence the design of SKA, in particular relating to wide-field applications such as the nature of dark energy, the evolution of galaxies in the early universe, and the use of pulsar observations as probes to test general relativity.

The ATNF also aspires to consolidate its position as one of the world's major suppliers of radioastronomy services; including instrumentation, astronomical data products and spacecraft tracking. Through its ongoing technology program, the ATNF will grow and develop its existing capabilities in strategic areas of antenna design, receiver technology and signal processing and will invest in emerging areas such as the Virtual Observatory. It will continue to build strategic links with industry partners to maximise the returns from its technology development to Australian industries. It will work with international agencies, including NASA and European Science Agency (ESA), to play a key role in the development of the next generation Deep Space Network. The ATNF will also explore a strategic partnership with other Australian astronomy institutions (including the Anglo-Australian Observatory, the ANU Research School for Astronomy and Astrophysics and the CSIRO ICT Centre) to build critical mass in the area of astronomical instrumentation.

Divisional Alignment Diagram



Research Themes – 2005-06

The Australia Telescope National Facility's first three Themes and Theme goals for 2005-06 are unchanged from 2004-05. An, "Other Initiatives" category has now been included for the purposes of administering the 2001 MNRF.

Theme 1 – National Facility Operation (\$13.62 m)

Goal: To serve the Australian and international scientific community by providing radio astronomy facilities to conduct world-class research programs in astronomy.

Theme 2 – Technologies for radio astronomy (\$8.07 m)

Goal: To provide a platform for the development of front-line technology for the advancement of radio astronomy in Australia.

Theme 3 – Astrophysics (\$3.99 m)

Goal: To conduct world-class research in astrophysics, furthering our understanding of the Universe through innovative use of our telescopes.

Other Initiatives (\$4.71 m)

Goal: To administer and ensure the success of the 2001 Gemini and SKA Major National Research Facility (MNRF) in order to maximise Australia's engagement in the new generation of optical/infrared and radio telescopes.

Capabilities by Theme 2005-06 – Australia Telescope National Facility

Theme	Capability					Total
	Telescope Operations	Receiver Technology	Signal Processing	cm-wave Astronomy	mm-wave Astronomy	
Approx No of EFTs*	61	29	19	14	4	127
% of total	48%	23%	15%	11%	3%	100%
National Facility Operations						
Technologies for Radio Astronomy						
Astrophysics						

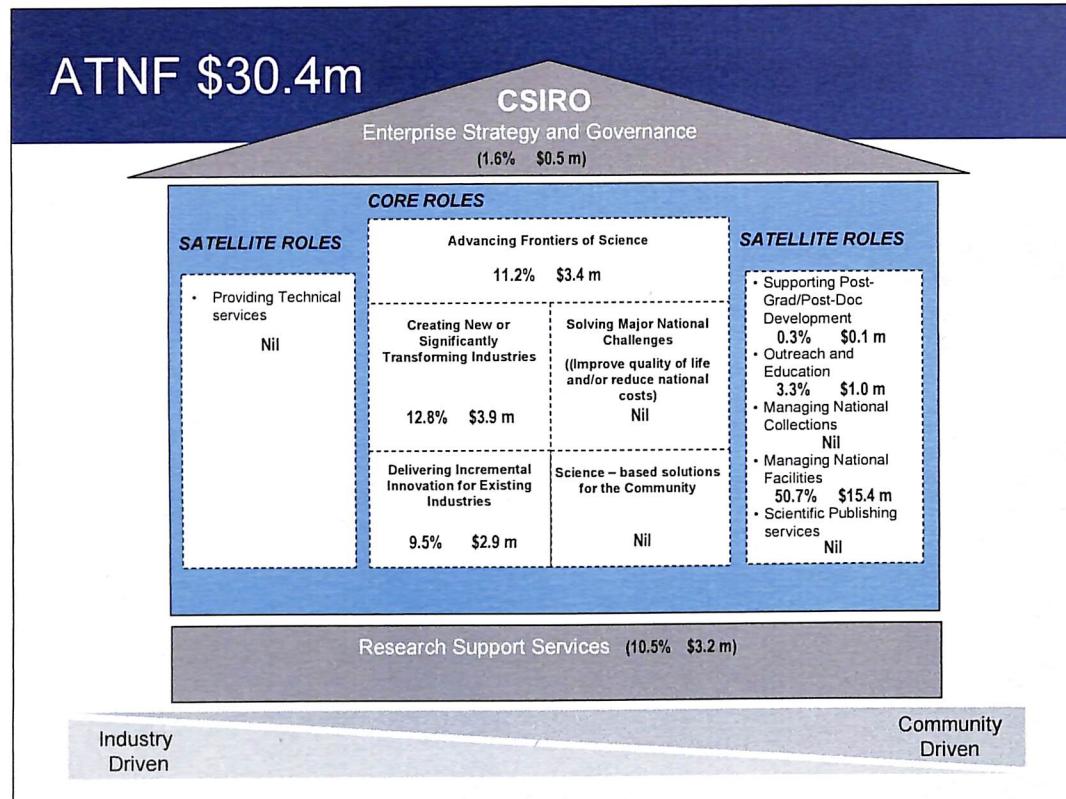
* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High' ≥ 50% 'Medium' 20- 50 % 'Low' 0- 20 %

Investment by Roles for 2005-06 – Australia Telescope National Facility



Staffing Profile 2005-06 – Australia Telescope National Facility

Planned Staffing Profile 2005 – 06 (EFTs)		Total for Division
Functional Area		
Research Scientist/Engineer		27
Research Consulting		1
Research Management		12
Research Projects		24
Technical Services		47
General Management		0
Communication and Information		6
Administrative Services		14
General Services		6
Specialist		2
Total Staff		140

Investment Profile 2005-06 – Australia Telescope National Facility

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co-Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	\$16,879	\$5,060	\$23	\$0	\$21,963
Research & Services	N/A *	\$7,615	\$155	\$0	\$7,769
Expenditure	\$17,554	\$12,675	\$178	\$0	\$30,407
Net Revenue	(\$675)	\$0	\$0	\$0	(-\$675)
Other Revenue and Interest	\$232	\$0	\$0	\$0	\$232
Operating Result	(\$443)	\$0	\$0	\$0	(-\$443)

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

6.2 Exploration and Mining

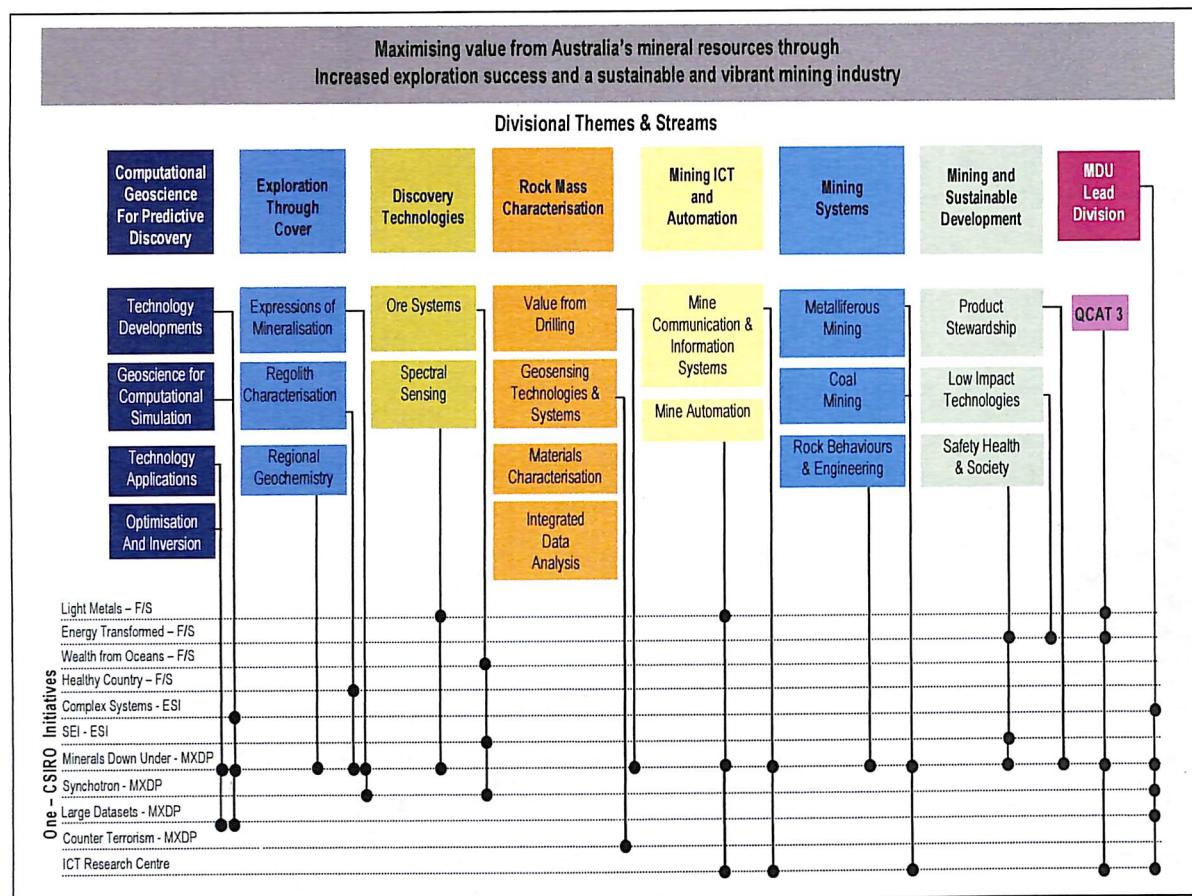
Acting Chief: Dr Cliff Mallett

Overview

The whole of the Division's research has been evaluated through 2003-05 and a new strategy is reflected in seven themes and streams.

The Division has in recent years included commercial pipeline criteria in making research investment decisions and this is beginning to bear fruit in a maturing range of commercialisation opportunities, as outlined in Part 1. The research activities of the Division fall mainly into the roles of *Significantly Transforming Industries* (23%) and *Delivering Incremental Innovation for Existing Industries* (42.7%). During 2005-06 the potential program for a future Minerals Down Under (MDU) Flagship will be developed. As flagships concentrate on horizon 2 and 3 targets, it can be expected that some of the Division's planned step change activities could be migrated into the new Flagship if it obtains funding. This could significantly alter the future profile of the Division, and increase the proportion of incremental research programs.

Alignment Diagram 2005-06 – Exploration & Mining



Research Themes 2005-06 – Exploration & Mining

Research which is part of the Predictive Mineral Discovery (pmd)*CRC and CRC for Landscape Environment and Mineral Exploration (LEME) has been assigned to two Themes, with a focus on the respective goals of those CRCs. All other exploration activities at ARRC and North Ryde have been consolidated into a single theme focussed on Discovery Technologies.

A review of mining research at QCAT in 2004 has resulted in the creation of four new Themes. Of these, Rock Mass Characterisation and Mining Systems represent ongoing core research areas where the Division already has a high profile. We will continue to evolve and develop programs in these areas. For example, the Rock Mass Characterisation Theme is reducing emphasis on the mature area of mine site geological modelling and growing investment in ground sensing technologies.

The other two mining Themes, Mining ICT and Automation, and Mining and Sustainable Development are areas targeted for growth. Mining ICT and Automation is providing a new generation of technologies that will fundamentally change the way mines are managed and controlled and the skill base required by mine staff. This Theme works very closely with ICT Centre staff at QCAT and, although not formalised, they cooperate and work together more like a single cross-divisional theme.

Sustainability is a growing concern for mining companies and the Mining and Sustainable Development Theme is planned to grow significantly from its current small base. It includes activities on the interaction of society with new mining and energy technologies, and is expanding studies in mining and energy futures for Flagships, the Centre for Low Emissions Technologies and government departments such as the Department of Industry Tourism and Resources and the Australian Greenhouse Office.

Theme 1 – Computational Geoscience for Predictive Discovery (\$6.94 m)

Goal: Double mineral discovery rate worldwide in the next 10 years - *through generating a paradigm shift in the global mineral exploration industry from empiricism to knowledge-driven prediction.*

Theme 2 – Exploration Through Cover (\$3.25 m)

Goal: 20% increase in the area of Australia amenable to exploration by 2014 - *through new or improved exploration techniques developed for prospective terrains beneath younger cover.*

Theme 3 – Discovery Technologies (\$6.56 m)

Goal: Make Australia the leading nation for global exploration investment in 2015 – *through the development of innovative discovery concepts and technologies designed to unlock and reveal Australia's concealed mineral wealth.*

Theme 4 – Rock Mass Characterisation (\$4.06 m)

Goal: Achieve a 25% improvement in mine productivity within 10 years by reducing the operational and investment risks in mining - *through new technologies and systems to delineate and characterise mineral resources and mining conditions before and during mining*

Theme 5 – Mining ICT and Automation (\$4.33 m)

Goal: 10% reduction in Reportable Incidents across the mining production sector and a 15% increase in Production Output per Person Shift - *through creation of technologies to build the nation's future mines based on high-tech, high speed, distributed intelligent network systems and automated mining processes which, over the next 5 to 10 years, will simplify the decision making processes, remove people from hazardous environments and generate step-change improvements in the consistency of production.*

Theme 6 – Mining Systems (\$7.60 m)

Goal: Deliver overall mining cost saving over 10-20%, and expand minable mineral and coal reserves by at least 20% - *through improved development (1-5 years) and commercial uptake (5-10 years) of advanced mining science and planning methods, and low cost, high tonnage and recovery mining systems.*

Theme 7 – Mining & Sustainable Development (\$2.29 m)

Goal: Increase environmental and social performance in mining over the next 10 years to match rising community expectations to maintain a 10% annual (historical) production growth - *through new environmentally sensitive extraction technologies and methodologies for social engagement.*

Other Initiatives – Minerals Down Under (\$0.52 m)

Goal: Lead collaboration with and beyond CSIRO to build the business case for the Minerals Down Under proto-flagship by November 2005, resulting in a decisions for full Flagship status for a July 2006 commencement date.

Other Initiatives – QCAT 3

Goal: Present a value proposition to Queensland Government for expansion of QCAT mining research facilities by 2008 with an expected contractual value of \$30M.

Capabilities by Theme 2005-06 – Exploration & Mining

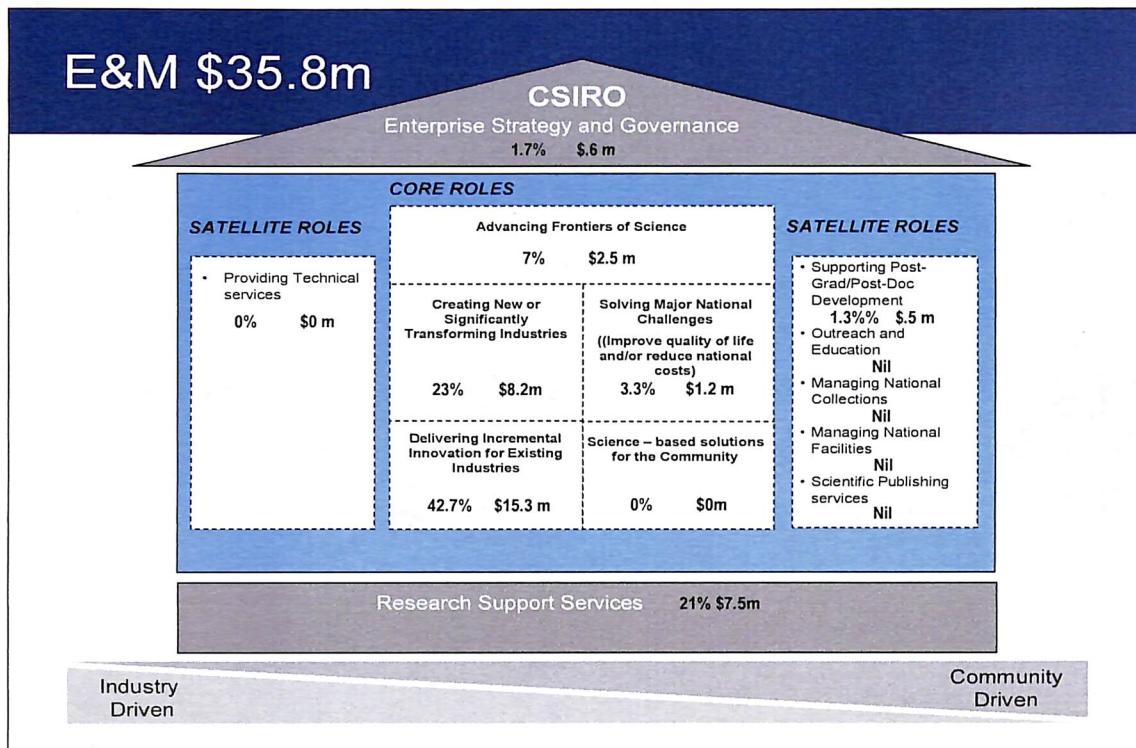
Theme	Capability						Total
	Geological Characterisation	Exploration Targeting	Exploration Technologies	Mine Equipment & Drilling Technologies	Mine Design & Sustainability	Mine Automation & ICT	
Approx No of EFTs*	36.5	26.5	20	15.4	26.6	17	142
% of total	25.7%	18.7 %	14.1%	10.8 %	18.7%	12 %	100%
Computational Geoscience for Predictive							
Exploration Through Cover							
Discovery Technologies							
Rock Mass Characterisation							
Mining ICT and Automation							
Mining Systems							
Mining & Sustainable Development							

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High' ≥ 50%	'Medium' 20 – 50 %	'Low' 0 – 20 %
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Investment by Roles for 2005-06 – Exploration & Mining**Staffing Profile 2005-06 – Exploration & Mining****Planned Staffing Profile 2005 – 06 (EFTs)**

Functional Area	Total for Division
Research Scientist/Engineer	69
Research Consulting	1
Research Management	14
Research Projects	52
Technical Services	15
General Management	3
Communication and Information	5
Administrative Services	29
General Services	0
Specialist	0
Total Staff	188

Investment Profile 2005-06 – Exploration & Mining

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	8,950	11,949	0	0	20,899
Research & Services	N/A *	13,644	1,400	556	15,600
Expenditure	8,950	25,255	1,300	356	35,861
Net Revenue	0	338	100	200	638
Other Revenue and Interest	0	-256	0	0	-256
Operating Result	0	82	100	200	382

6.3 Information and Communication Technologies Centre

Chief: Dr Alex Zelinsky

Overview

During 2005 the ICT Centre's Themes were reviewed by internationally renowned experts. The review found that while the Centre had pockets of research excellence, it also found that there were too many projects for too few people spread over too many sites. The review concluded that because of this wide focus, it was unlikely that the projects would deliver a sustainable globally competitive advantage. Consequently the Centre rationalised its activities from 6 research themes to 4 research themes and also closed 3 sites. Allowing the Centre to focus its efforts, consolidate and then grow.

The ICT Centre's four themes are:

- Wireless Technologies
- Information Engineering
- Networking Technologies
- Autonomous Systems

In 2005-06, the ICT Centre will develop a greater focus on the application domains, with particular emphasis on Health, Mining, Public Safety – Counter Terrorism, Environment, and also addressing the public administration agenda of e-government. The Centre will seek to grow its activities in Flagships, particularly in the proposed Minerals Down Under flagship.

Our Wireless Technologies Theme has focused its research program around four areas in communications, imaging, supporting radioastronomy and positioning and sensing. A new leader recruited internationally, will be commencing in August 2005, and has been tasked with the goal of reshaping projects to focus on short-term deliverables into relevant domain applications and flagships.

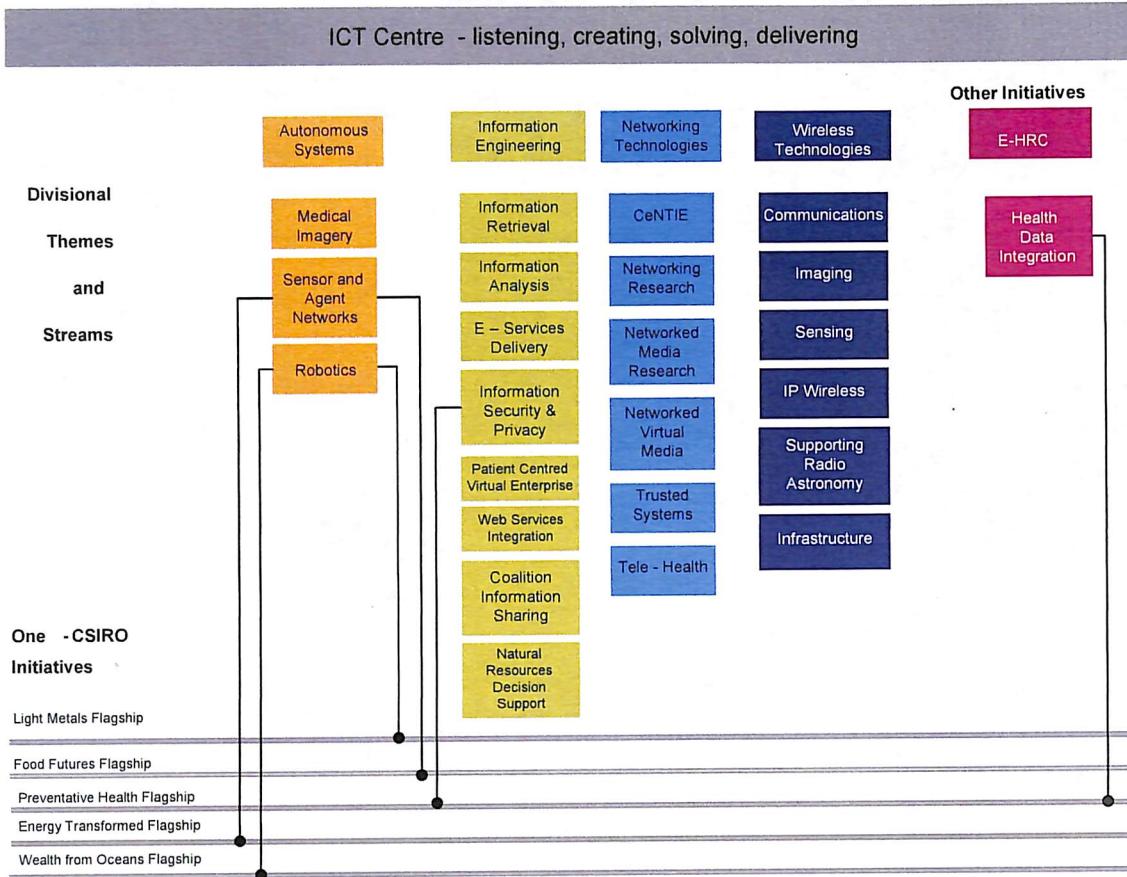
The Information Engineering Theme goal is to build technologies that enable enterprises to respond rapidly to unforeseen information needs across data, documents, and streaming information. The Theme is concentrating on five complementary technologies: enterprise search, information integration, information extraction, information delivery, and security and privacy protection. Two Themes have been integrated from last year, pulling together our data capability with our information capability, and have reduced our technology focus.

The major focus of the Networking Technologies Theme is the CeNTIE project, a three year \$23m initiative between the CSIRO and DCITA. The Theme conducts research supporting deliverables for CeNTIE milestones in: traffic management for fixed and wireless networks; the creation and delivery of networked digital content; Telepresence; secure networked data storage, and the delivery of complex broad applications such as health care and education. An international search for a new leader for this Theme will be conducted during 2005-06.

The Autonomous Systems Theme is concentrating on identifying and solving the problems that limit the uptake of wireless sensor network technology, and focus on applications for farm management and for water resource monitoring and control. The Theme will continue its mining robotics work and using this work as leverage on a significant international NASA project in collaboration with MIT. The Theme is also exploring new applications of medical imaging in health diagnosis and robot surgery.

The e-Health Research Centre (e-HRC) is a \$15 million joint venture between CSIRO and the Queensland Government. E-HRC undertakes research and development into chronic health conditions, with the aim of building knowledge on how the next generation of ICT can improve the delivery of patient centred health care. The Centre is planning to extend funding for a further three years to 2010. A rebid for funding will be made during 2005-06.

Alignment Diagram 2005-06 – ICT Centre



Research Themes 2005-06 – ICT Centre

Theme 1 – Autonomous Systems (\$7.0 m)

Goal: Deliver autonomous systems that transform productivity and quality in mining, agriculture, energy and health.

Theme 2 – Information Engineering (\$8.5 m)

Goal: Create three transforming technologies within five years

Theme 3 – Networking Technologies (\$8.2 m)

Goal: To be world leaders in real-time, human interaction over networks, based on our research into advanced networks, interfaces and human factors needed for natural interaction at a distance by 2010.

Theme 4 – Wireless Technologies (\$12.5 m)

Goal: To increase wireless connectivity by two orders of magnitude by 2010

Other Initiative – e-Health Research Centre (\$5.8 m)

Goal: Develop at least three new ICT products for utilisation in the health care sector in the next five years.

Capabilities by Theme 2005-06 – ICT Centre

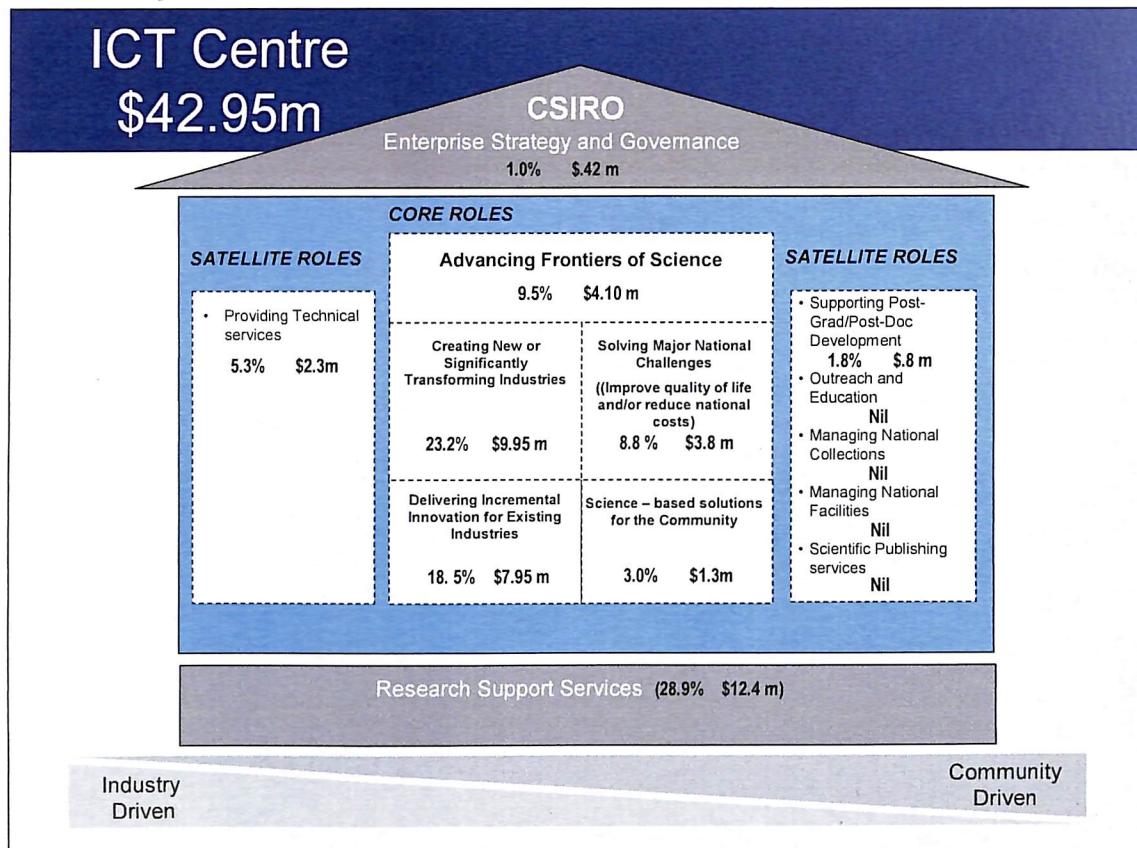
Theme	Capability												Total
	Robotics	Info Retrieval	Human factors in ICT	Web Services	e-Health	Network Engineering	Networked Media	Antennas & Propagation	Comms theory & signal	Microwave & mm-wave techniques	Distributive Intelligence	Integration Projects	
Approx No of EFTs*	17	21	16	14	20	21	14	15	15	15	9	20	197
% of total	8	11	8	7	10	11	7	8	8	8	4	10	100
Autonomous Systems	High				Medium						Medium		Medium
Information Engineering		Medium	High	Medium	Medium						Medium	Medium	Medium
Networking Technologies		Low	Medium	Medium		Medium	Medium						Medium
Wireless Technologies					Medium	Medium		High	High	High			Medium
Other		Medium	Medium		Medium								Medium

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High' ≥ 50% 'Medium' 20 – 50 % 'Low' 0 – 20 %

Investment by Roles for 2005-06 – ICT Centre

Staffing Profile 2005-06 – ICT Centre

Planned Staffing Profile 2005 – 06 (EFTs)	
Functional Area	Total for Division
Research Scientist/Engineer	75
Research Consulting	1
Research Management	13
Research Projects	95
Technical Services**	0
General Management**	5
Communication and Information**	0
Administrative Services**	5
General Services**	0
Specialist	8
Total Staff	207

** Some services in these functional areas are provided by the Division of Industrial Physics.

Investment Profile 2005-06 – ICT Centre

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	21293	10315.8	0	236.2	318.45
Research & Services	N/A *	6671.5	896.5	850	8418
Expenditure	24399.6	16987.3	771.1	695	42853
Net Revenue	-3106.6	0	125.4	391.2	-2590
Other Revenue and Interest	0	0	590	0	590
Operating Result	-3106.6	0	715.4	391.2	-2000

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

6.4 Industrial Physics

Chief: Dr Gerry Haddad

Overview

In May 2004 the Division reassessed and revised its long-term strategy resulting in a new Theme and Stream structure and new Divisional name. In March 2005 the new Division was reviewed by an international panel which recommended further focusing by spinning out the Space Optics capability and reducing research activity in hard coatings. The other research capability areas received a generally positive review with some specific recommendations. While these recommendations were still to be ratified, they prompted the refining of the structure to its current form at a divisional retreat held in May 2005. The nature of these changes is as follows:

The necessity for commercialising the activities in the Space Optics Stream, the identification of NASA Canberra Deep Space Communications Centre (CDSCC) management as Technical Services, plus the wind down of CRC for Satellite Systems in December 2005, made the Aerospace Systems Theme untenable going forward. This indicated that a reduction from 4 themes to 3 was appropriate with a medium term increase in The Facility Management "Other Activity" until the Optics and Instrumentation activities are commercialised.

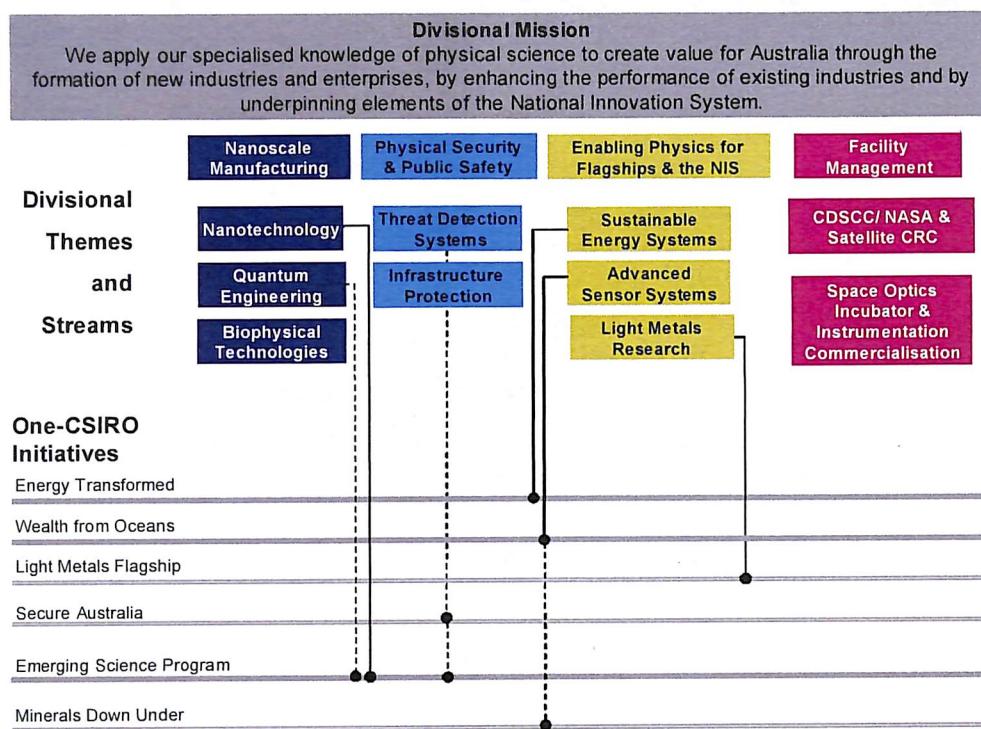
Indications are that the next application of Intelligent Systems is in the security area and so the emphasis of the outputs of this capability have been transferred to an Infrastructure Protection Stream within an expanded Theme called Physical Security & Public Safety.

An important step in defining the Division's commitment to Flagships and other areas of the Nation Innovation System (NIS) has been the formation of a new "Theme" called Enabling Physics for Flagships and the NIS, where our role as an enabler and solver of physics-based problems for Flagships is now clearly visible. It is our goal to increase this activity to 40% of science budget by 2007. Interaction with CRCs and other aspects of the NIS will also be managed here.

The strategic output for much of the Division's core research has been focused into Nanoscale Manufacturing, with the goal of creating new industries from the emerging technologies of the Nanotechnology, Quantum Engineering and Biophysical Technologies Streams. This change has brought considerable clarity to the strategic directions for the Division.

The line management structure for 2005-06 has shifted away from Stream Leaders to Theme Leaders in preparation for the 2006-07 Science Investment Process. This change also addresses the issue of too many management layers in the Division, raised in the recent Insight Survey. We will move to a structure where the 'hierarchy' will effectively be Chief – Theme Leader – Project Leader.

Alignment Diagram 2005-06 – Industrial Physics



Research Themes 2005-06 – Industrial Physics

Theme 1 – Nanoscale manufacturing (\$7.3 m)

Goal: Develop nanostructured multi-functional materials, devices and systems with specified electronic, mechanical and/or sensing characteristics, and techniques for their manufacture. Recognition of CSIRO as Australia's leading developer of nanoscale manufactured products by spinning out three companies contributing jobs, exports and revenue to the Australian economy by 2012.

Theme 2 – Physical Security & Public Safety (\$4.9 m)

Goal: Develop new detection and response systems that significantly reduce the vulnerability of Australian's people, infrastructure and interests to terrorist activities and major accidents. Deliver through major strategic partnerships with Australian Government agencies and leading companies by 2009.

Theme 3 – Enabling Physics for Flagships & the National Innovation System (\$5.3 m)

Goal: Be recognised as delivering world-class focused physics-based solutions to facilitate CSIRO's contribution to National Flagships, other major initiatives and the National Innovation System. Achieve 40% of CIP's appropriation science funding through contributions to one-CSIRO programs by 2007.

Other Initiative – Facility Management (\$11.2 m)

Goal: Position the Optics Incubator for successful separation from CSIRO in July 2007, successfully wind down the CRC operations by December 2005, maintain and develop the NASA relationship through successful oversight of the NASA/CDSCC and manage the Division's commercialisation portfolio for effective benefit.

Capabilities by Theme 2005-06 – Industrial Physics

Theme	Capability							Total
	Nano science	Intell. Sensing Systems	Superconductivity	Surface Science	Electrical Machines	Other**		
Approx No of EFTs*	17	14	16	23	9	20	99	
% of total	17%	14%	16%	23%	9%	20%		
Nanoscale Manufacturing	High	Medium	Medium	Medium	Low	Low	Medium	Medium
Physical Security and Public Safety	Medium	High	Medium	Low	Low	Low	Medium	Medium
Physics for Flagships and the NIS	Medium	Medium	Medium	High	High	Medium	Medium	Medium
Facility Management	Medium	Medium	Medium	Medium	Medium	High	Medium	Medium

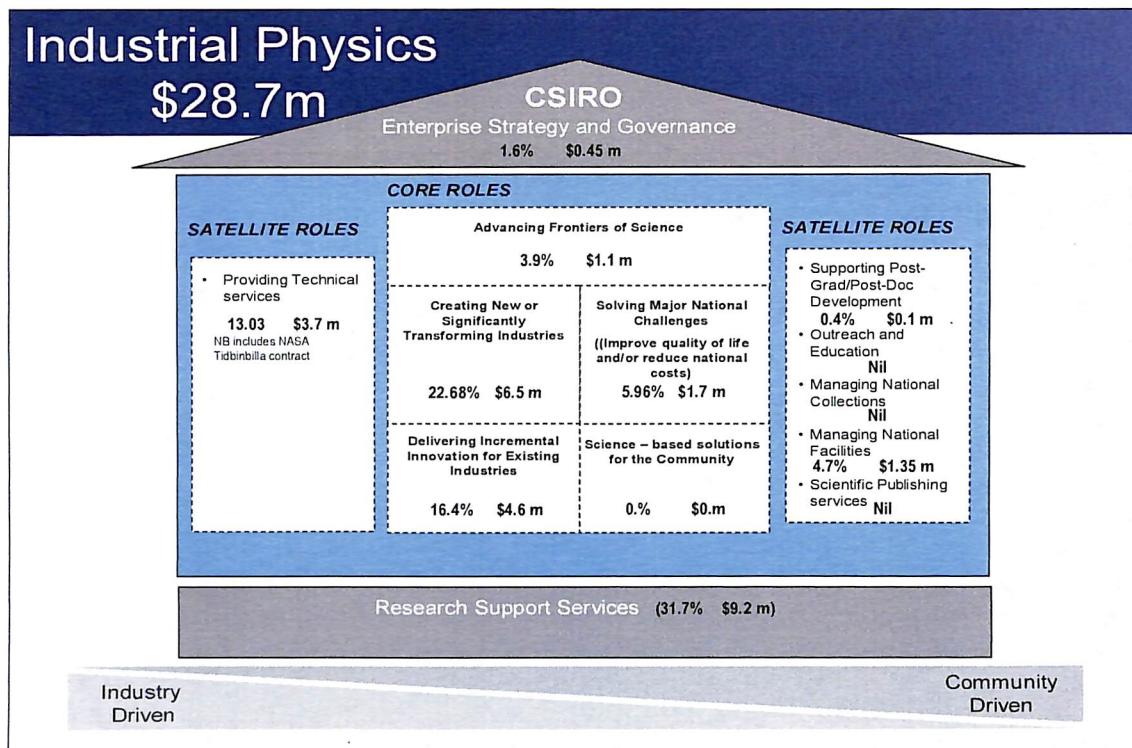
* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

** Includes Optics Incubation, NASA\CDSCC staff, Divisional and facility management

Key: Indicative Proportion of Capability allocated to each Theme.

'High' ≥ 50% 'Medium' 20 – 50 % 'Low' 0 – 20 %

Investment by Roles for 2005-06 – Industrial Physics

Note: Investment in Core Roles now allocated by Stream. Some Advancing Frontiers of Science activities occur in other Streams. Estimated total investment in Advancing Frontiers of Science (by project) would be 12% (\$3.2m).

Staffing Profile 2005-06 – Industrial Physics

Planned Staffing Profile 2005 – 06 (EFTs)		Total for Division
Functional Area		
Research Scientist/Engineer		43
Research Management *		7
Research Projects		45
Technical Services **		20
General Management **		2
Communication and Information **		4
Administrative Services **		28
General Services **		5
Specialist		1
Total Staff		155

* Includes NASA Canberra Deep Space Communications Centre management (5)

** Includes support service provision to CSIRO ICT Centre

Investment Profile 2005-06 – Industrial Physics

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	13,344	3,773	0	826	17943
Research & Services	N/A *	5,529	3,686	200	9,415
Expenditure	13,071	9,545	5,045	1,026	28,687
Net Revenue	273	-243	-1,359	0	-1329
Other Revenue and Interest	0	0	1600	0	1600
Operating Result	273	-243	241	0	271

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

6.5 Manufacturing and Infrastructure Technology

Chief: Mr Larry Little

Overview

Manufacturing and Infrastructure Technology's (MIT) science activity has been focussed into achieving research outcomes addressing the following identified National Research Priorities:

- Frontier Technologies for Building and Transforming Australian Industries
- An Environmentally Sustainable Australia
- Safeguarding Australia

Through the focus on the above National Research Priorities MIT is working towards following three major outcomes across the Themes:

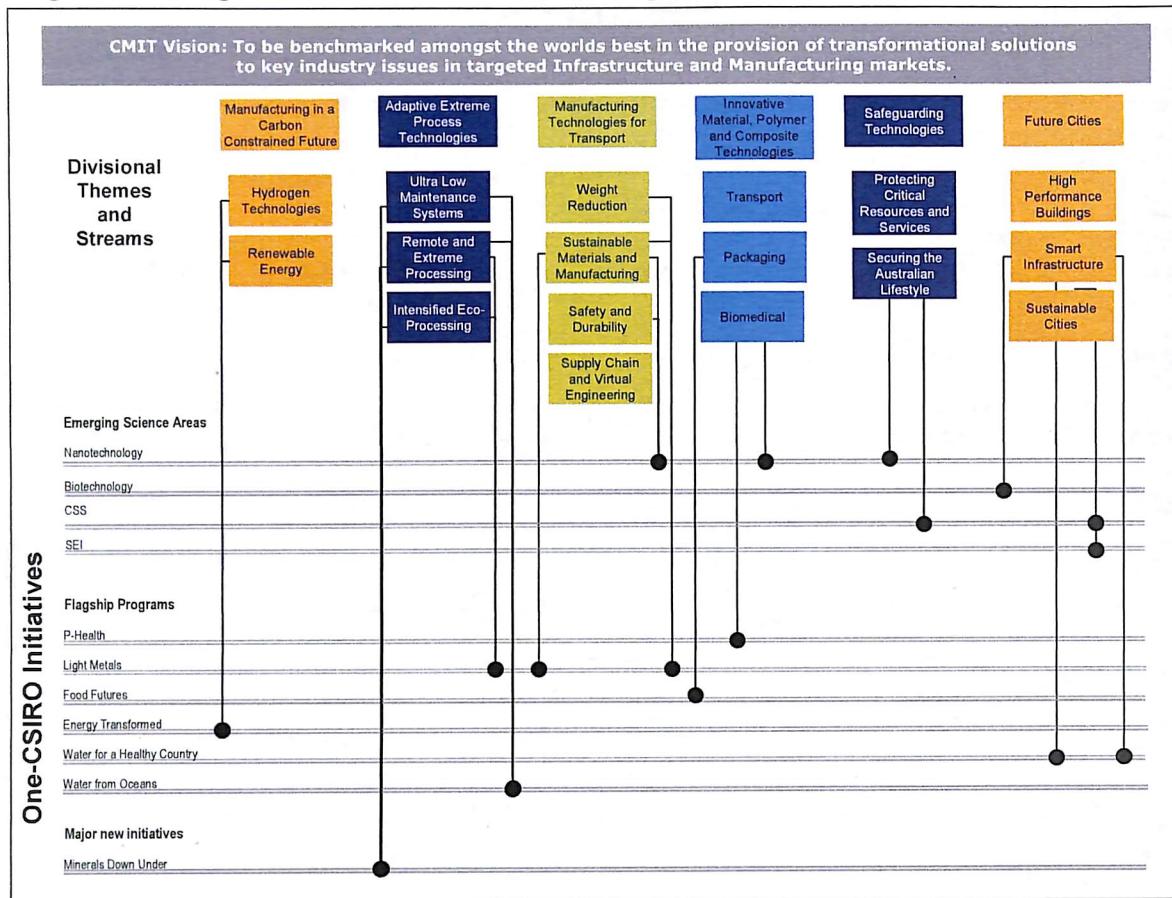
- Transformation of the Manufacture of Transport Vehicles, Infrastructure, Security and Oil and Gas by using frontier science to develop advanced materials and radical process technologies.
- Dramatic reduction of the footprint of manufacturing processes and urban activities through the development of sustainable manufacturing and infrastructure, alternative energies and urban water systems technologies.
- The minimization of security and natural threats on Australian institutions and lifestyle by protecting critical infrastructure and the detection of undesirable intrusions into Australia.

These major outcomes are delivered into targeted markets by our Themes. Over the past year these Themes have been significantly reviewed and refined in conjunction with internal stakeholders and industry to ensure that:

- They have a sharp market focus. MIT will be focussing activity into four/five more receptive key markets.
- They are based on and enhance MIT's key areas of world leading science. The quality of MIT's science edge is evidenced by MIT's involvement in eight of the 12 CSIRO Frontier Science Initiatives.
- All Themes are aligned with Group Strategy with its emphasis on Transformation Industry and meeting National Challenges and Frontier Science particularly at the nexus of Nano-Bio and IT.

As a result of this review two Themes were merged, two Themes were dramatically realigned to new more potentially opportunistic markets, six Streams were discontinued and across all Streams a number of focussed Frontier Science (often at the Nano/Bio/IT nexus) projects were developed.

Alignment Diagram 2005-06 – Manufacturing & Infrastructure Technology



Research Themes 2005-06 – Manufacturing & Infrastructure Technology

Theme 1 – Manufacturing in a Carbon Constrained Future (\$4.43 m)

Goal: To reduce Australia's GHG emissions that result from the consumption of hydrocarbons by 15% by 2015 - *Through new or improved technologies and manufacturing processes that enable Australia to build hydrogen fuel cells and infrastructure for production and distribution of hydrogen and to adopt low emission energy production, use and recovery technologies*

Theme 2 – Adaptive Extreme Process Technologies 'AdEPT' (\$11.55 m)

Goal: To reduce the cost of manufacturing and production processes in Australia's major process and extractive industries such as oil and gas by 10% whilst reducing environmental emissions by 5% by 2015 - *Through the application of new process and materials technologies that enable low maintenance and self-sustainable operations under extreme conditions*

Theme 3 – Manufacturing Technologies for Transport (\$17.24 m)

Goal: To achieve a \$100m pa increase in the value of Australia's automotive and other transport manufacturing industries by 2015 - *Through developing cost-effective and high-performing products and materials that are made primarily out of light metals*

Theme 4 – Innovative Material, Polymer and Composite Technologies (IMPACT) (\$12.15 m)

Goal: To achieve a 15% increase in Australia's annual export revenue of high value-added products in the transport, packaging and medical devices industries by 2015 - *Through the development of superior polymer materials and coatings using innovations in nanotechnology and ecotechnology*

Theme 5 – Safeguarding Technologies (\$13.85 m)

Goal: To increase Australia's preparedness through a 20% reduction in reportable threats to National security by 2015 - *Through the development of integrated engineered systems of materials, sensors and reasoning to build breakthrough manufactured security products that improve Australia's ability to secure its borders and minimise the impact environmental and infrastructure incidents*

Theme 6 – Future Cities (\$17.53 m)

Goal: To enable Australia's urban areas to meet the challenges of growth and climate change while achieving a 20% reduction in its ecological footprint by 2015 - *Through the implementation of smart buildings, and intelligent, integrated and affordable water, energy and transport systems that reduce the ecological footprint of our cities by 20% and save \$5 billion annually in infrastructure costs.*

Other Initiatives - Industrial Research Consultancy Services (IRCS) (\$4.55 m)

Goal: Technology transfer through consulting and services provides income in excess of \$3m and in turn supports Australian Industry. IRCS operates without appropriation or subsidisation and is the CMIT vehicle which enables technology transfer of ongoing research outcomes and mature technologies

Capabilities for the diagram on the following page.

Key: Capabilities

A - Fire Science	F - Optics & Diffraction
B – Thermal and Fluid Dynamics	G - Ionic & Electronic Materials
C - Metallurgy	H - Soft Condensed Matter
D - Urban Systems Integration	I - Interfacial Science
E - Decision Systems	j - Sensing and Interpretation

Capabilities by Theme 2005-06 – Manufacturing & Infrastructure Technology

Theme	Capability (see key on previous page)										Total
	A**	B	C	D	E	F	G	H	I	J	
Approx No of EFTs*	41	26	51	76	31	19	11	50	36	26	367
% of total	11	7	14	21	8	5	3	14	10	7	100%
Theme 1 **		Yellow					Orange	Yellow			
Theme 2		Orange	Yellow						Yellow		
Theme 3			Orange		Blue				Yellow	Yellow	
Theme 4	Blue					Orange		Orange	Yellow		
Theme 5	Orange	Blue		Yellow	Orange	Yellow	Yellow	Blue	Yellow	Blue	
Theme 6				Orange	Yellow				Blue	Yellow	
Other	Yellow									Blue	

*Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

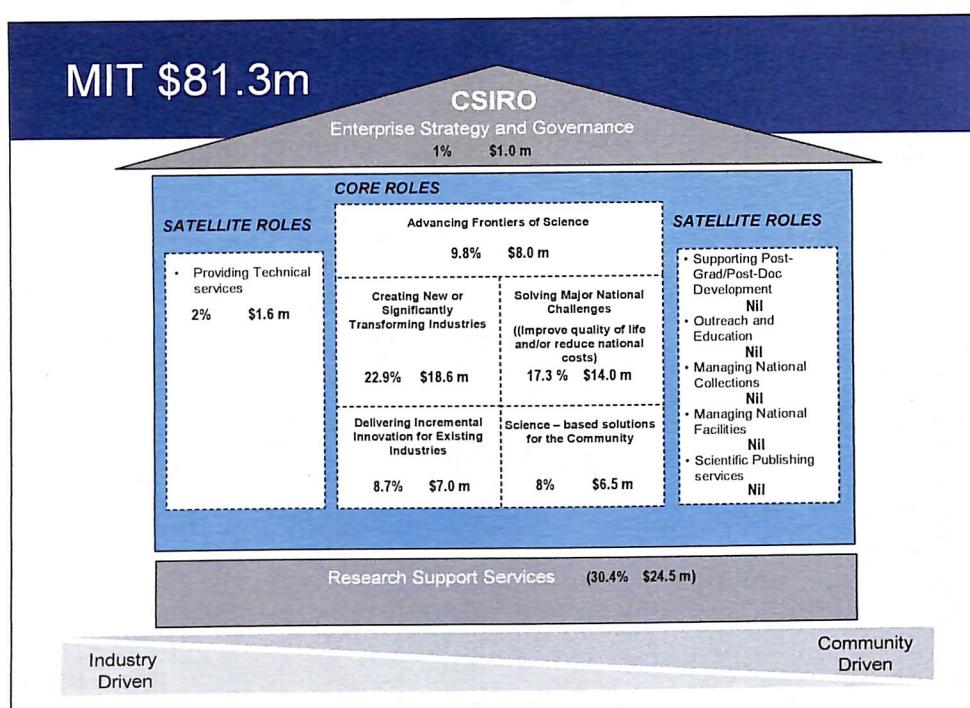
** See previous page for Theme and Capability names

Key: Proportion of Capability allocated to each Theme.

'High' ≥ 50%

'Medium' 20 – 50 %

'Low' 0 – 20 %

Investment by Roles for 2005-06 – Manufacturing & Infrastructure Technology

Staffing Profile 2005-06 – Manufacturing & Infrastructure Technology

Planned Staffing Profile 2005 – 06 (EFTs)	
Functional Area	Total for Division
Research Scientist/Engineer	158
Research Consulting	4
Research Management	9
Research Projects	200
Technical Services	17
General Management	14
Communication and Information	18
Administrative Services	46
General Services	1
Specialist	0
Total Staff	469

Investment Profile 2005-06 – Manufacturing & Infrastructure Technology

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	42,260	14,131	0	0	56,391
Research & Services	N/A *	14,131	9,661	1,208	25,000
Expenditure	44,511	28,262	8,400	158	81,331
Net Revenue	(2,251)	0	1,261	1050	60
Other Revenue and Interest	0	0	0	0	0
Operating Result	(2,251)	0	1,261	1,050	60

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

6.6 Mathematical and Information Sciences

Chief: Dr Murray Cameron

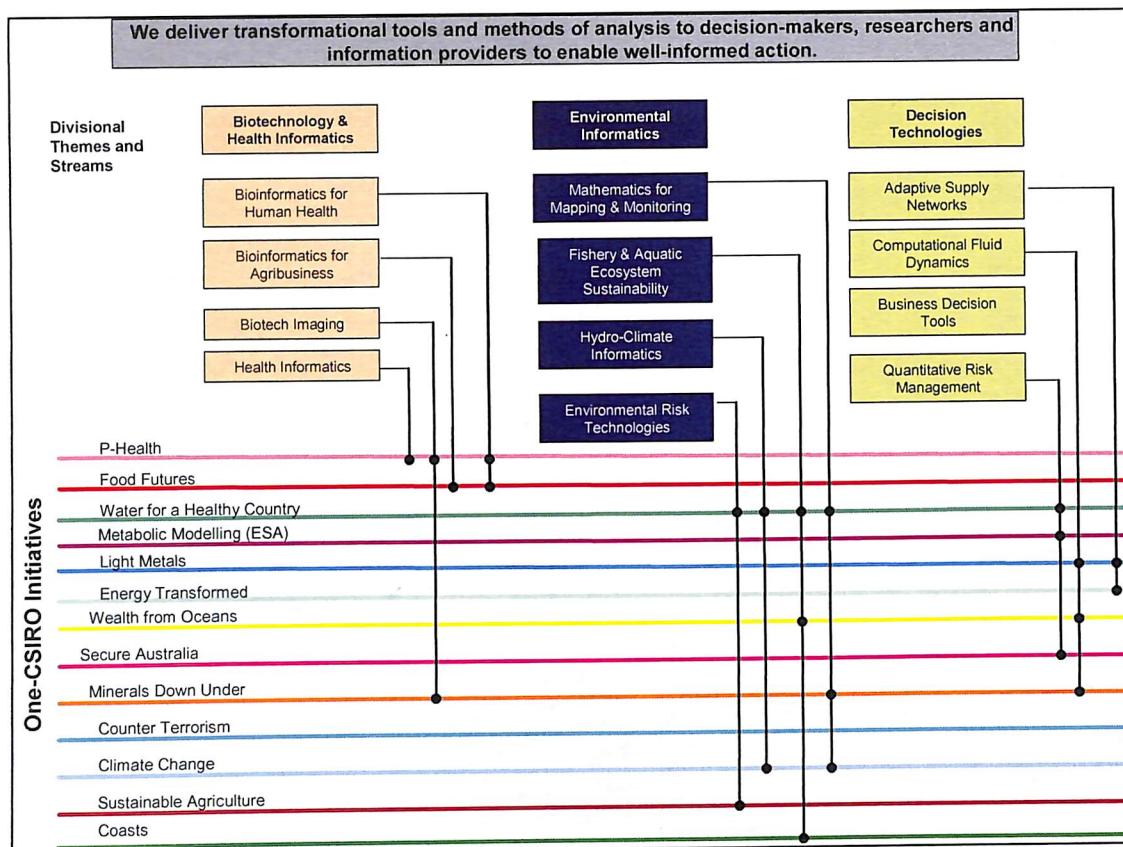
Overview

CMIS's research is directed towards three markets/sectors (biotechnology & health, natural resources & environment, and production & service industries) and are organised into Themes along those lines. These are consistent with the Themes of 2004-5. Within those Themes, however, there are significant changes:

1. Strategic research is focussing on a smaller number of larger projects, notably in the generation, management and analysis of the very large data sets arising from complicated systems, both natural and man made. Some of these strategic research projects cross Theme boundaries.
2. We are responding to industry and government needs and the concomitant research opportunities in the risk area, particularly in banking and finance.
3. We are increasing our engagement with Flagships and other CSIRO strategic initiatives.
4. We are developing projects in "Smarter Information Use" for possible inclusion in the Secure Australia initiative driven by the Information, Manufacturing and Mining Group.
5. We are trialling new arrangements for collaborating with other Divisions to increase the levels of our engagement with other parts of CSIRO.

We have redrafted our capabilities to make them more comprehensible to people outside CSIRO.

Alignment Diagram 2005-06 – Mathematical & Information Sciences



Research Themes 2005-06 – Mathematical & Information Sciences

Themes and their goals were set in 2004 and there have been no performance or environmental reasons to change them for the coming year.

Theme 1 – Biotechnology & Health Informatics (\$8.59 m)

Goal: Deliver \$3B in national benefit by 2010 in agriculture and health - by changing the way biological data is collected and analysed to improve downstream client investment decisions.

Theme 2 – Environmental Informatics (\$5.39 m)

Goal: Enable the effective identification, monitoring, remediation and resolution of major environmental issues by developing and applying new statistical and mathematical methodologies. By 2010 we will generate at least four internationally acclaimed, nationally significant technologies that are instrumental in providing a net benefit of at least a billion dollars to the Australian economy with our methodologies adopted by natural resource agencies throughout Australia.

Theme 3 – Decision Technologies (\$9.24 m)

Goal: By 2008, substantially reduce costs and improve quality and productivity of processes in manufacturing, mining, infrastructure and service industries through the development and adoption of at least 6 world-class analytical tools and technologies which have, embedded in them, advanced mathematical, statistical, simulation and optimization models for finding new patterns in and interpretations of data to turn it into "smarter information".

Capabilities by Theme 2005-06 – Mathematical & Information Sciences

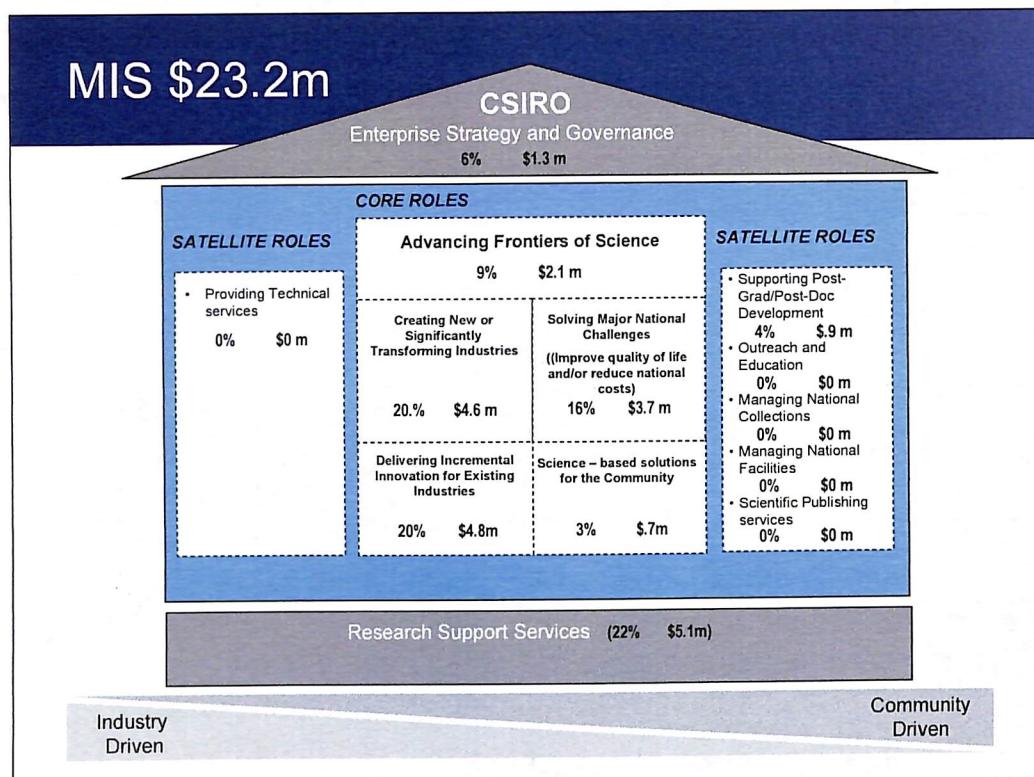
Theme	Capabilities				Total
	Computational Mathematics	Mathematical & Statistical modelling & Inference	Image Segmentation & Classification	Simulation & Optimisation	
Approx No of EFTs*	20	56	12	16	104
% of total	19%	54%	12%	15%	100%
Biotechnology & Health Informatics					
Environmental Informatics					
Decision Technologies					

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High' ≥ 50 %	'Medium' 20 – 50 %	'Low' 0 – 20 %
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Investment by Roles for 2005-06 – Mathematical & Information Sciences

Staffing Profile 2005-06 – Mathematical & Information Sciences

Planned Staffing Profile 2005 – 06 (EFTs)	
Functional Area	Total for Division
Research Scientist/Engineer	68
Research Consulting	0
Research Management	5
Research Projects	40
Technical Services	1
General Management	7
Communication and Information	6
Administrative Services	26
General Services	0
Specialist	1
Total Staff	155

Investment Profile 2005-06 – Mathematical & Information Sciences

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co-Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	11,529	3,685	0	0	15,214
Research & Services	N/A *	3,685	3,673	300	7,658
Expenditure	11,992	7,370	3,573	280	23,215
Net Revenue	-463	0	100	20	-343
Other Revenue and Interest	0	240	0	0	240
Operating Result	-463	240	100	20	-103

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

6.7 Division of Minerals

Chief: Dr Bart Follink

Overview

Minerals provides R&D contributing to the generation of wealth from Australia's minerals resources and mineral processing capabilities in an environmentally sustainable manner. The existing Theme/Stream structure has proven well suited to this mission, and apart from several refinements noted below, will remain essentially unchanged in 2005/2006.

In addition, a key strategic choice has been made to target a small but significant fraction of our capabilities-based efforts to new prospective application areas outside of the minerals industry. This will further optimise our benefits for the nation and will occur within the existing Theme/Stream framework.

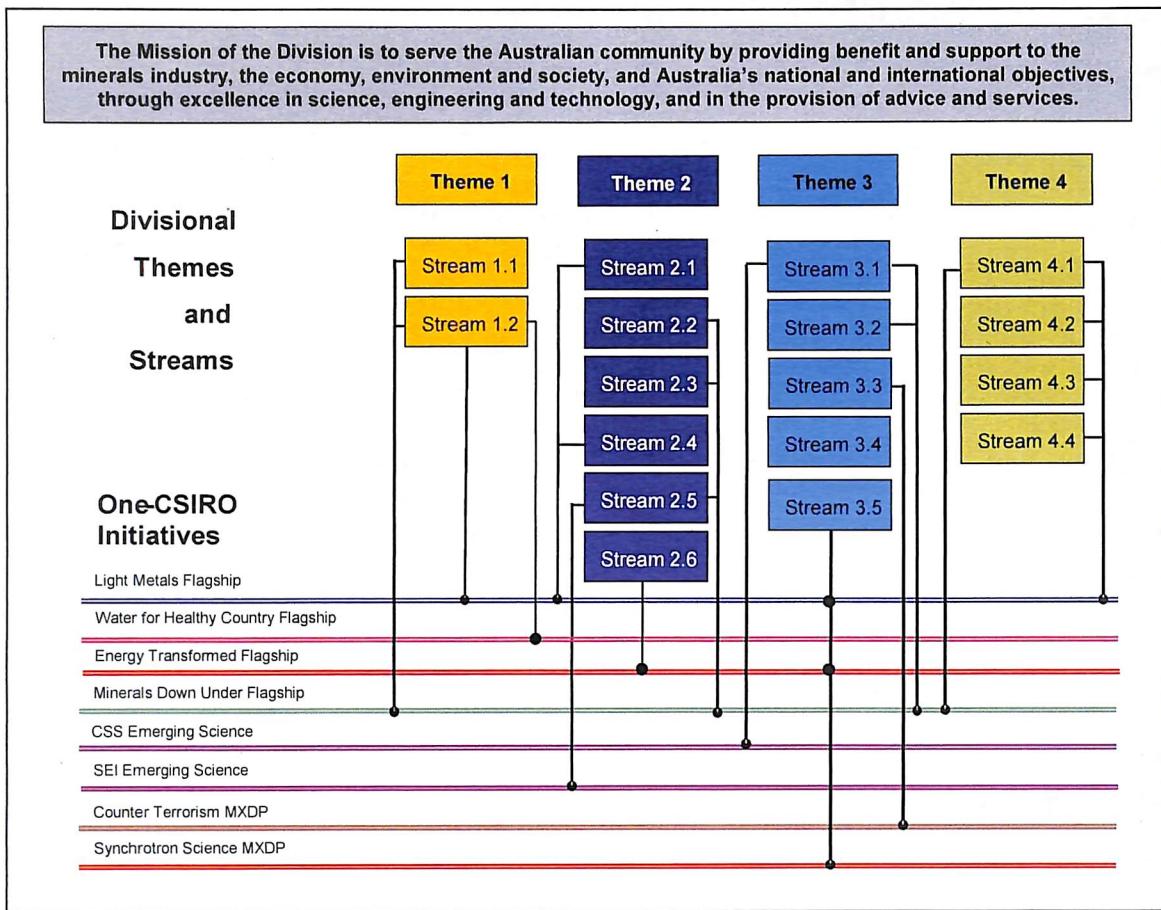
The Division's main scientific capabilities are:

- A. Bayer Process technologies
- B. Hydrometallurgy
- C. High temperature processing
- D. Mineral beneficiation
- E. Material characterisation
- F. Computational and physical modelling
- G. On-line analysis
- H. Light Metals

Significant changes relative to previous years are:

- Our efforts in security-based instrumentation (luggage, cargo, contraband scanners) will ramp up based on increasing significance of Counter Terrorism as a National Priority and on strong indicators of ongoing research success, both in technical and commercial terms.
- Our Divisional plan anticipates broad-based participation in the proposed Minerals Down Under cross-Divisional research initiative.
- We have established a Material Characterisation Stream within the 'Advanced technology platforms for the minerals industry' Theme in recognition of the increasing emphasis in developing and expanding the Division's capabilities in this area. It also recognises the Division's formal involvement in the developing area of Synchrotron Science.

Alignment Diagram 2005-06 – Minerals



Key to Themes and Streams

Themes	Streams
1. Value adding to Australia's minerals	1.1 Iron ore 1.2 Industrial minerals
2. Sustainable processing of minerals	2.1 Pyrometallurgical processing 2.2 Hydrometallurgical processing 2.3 Minerals beneficiation 2.4 Fluidised bed processing 2.5 Social and economic integration 2.6 Novel technologies for hydrogen production
3. Advanced technology platforms for the minerals industry	3.1 Process design and optimization 3.2 On-line analysis 3.3 In-line security scanning technologies 3.4 Modelling and measurement of high temperature systems 3.5 Materials characterisation
4. Australia leading the light metals age	4.1 Alumina 4.2 Aluminium 4.3 Titanium 4.4 Magnesium

Research Themes 2005-06 – Minerals

Theme 1 – Value Adding to Australia's Minerals (\$6.82 m)

Goal: Increase the value of exports of the Australian minerals industry from \$32bn in 2004 to \$50bn in 2012 through:

- Improvements to the quality, grade and recovery of mineral commodities
- Development of technologies to process difficult, complex and low grade mineral resources
- Development of new products from mineral resources
- with a particular focus on exports from iron ore, gold, base metals and mineral sands.

Theme 2 – Sustainable Processing of Minerals (\$12.88 m)

Goal: Attract mineral processing investment to Australia of \$20bn by 2012 by reducing total processing costs in balance with community values and the natural environment, with a specific focus on hydrometallurgical, high temperature and physical processing.

Theme 3 – Advanced Technology Platforms for the Minerals Industry (\$12.9 m)

Goal: Lead the development of advanced technology platforms in modelling, measurement and analysis for:

- The Australian minerals industry
- Other areas of National priority, especially counter terrorism.

Theme 4 – Australia Leading the Light Metals Age (\$16.77 m)

Goal: Double Australia's light metals income by 2012 while reducing environmental impact, by:

- Building on Australian bauxite resources to grow the share of global alumina production to 50%;
- Reducing the energy requirement and hence global Greenhouse impact by 30% whilst improving cost effectiveness;
- Growing first cost quartile Australian magnesium industry to 200ktpa;
- Creating of a world scale (20ktpa) titanium industry in Australia, based on continuous processing and integrated with downstream manufacturing.

Capabilities by Theme 2005-06 – Minerals

Theme	Capability								Total
	A **	B	C	D	E	F	G	H	
Approx No of EFTs*	30	24	28	33	20	17	33	26	212
% of total	14%	12%	13%	16%	9%	8%	16%	12%	100%
Theme 1**									
Theme 2									
Theme 3									
Theme 4									

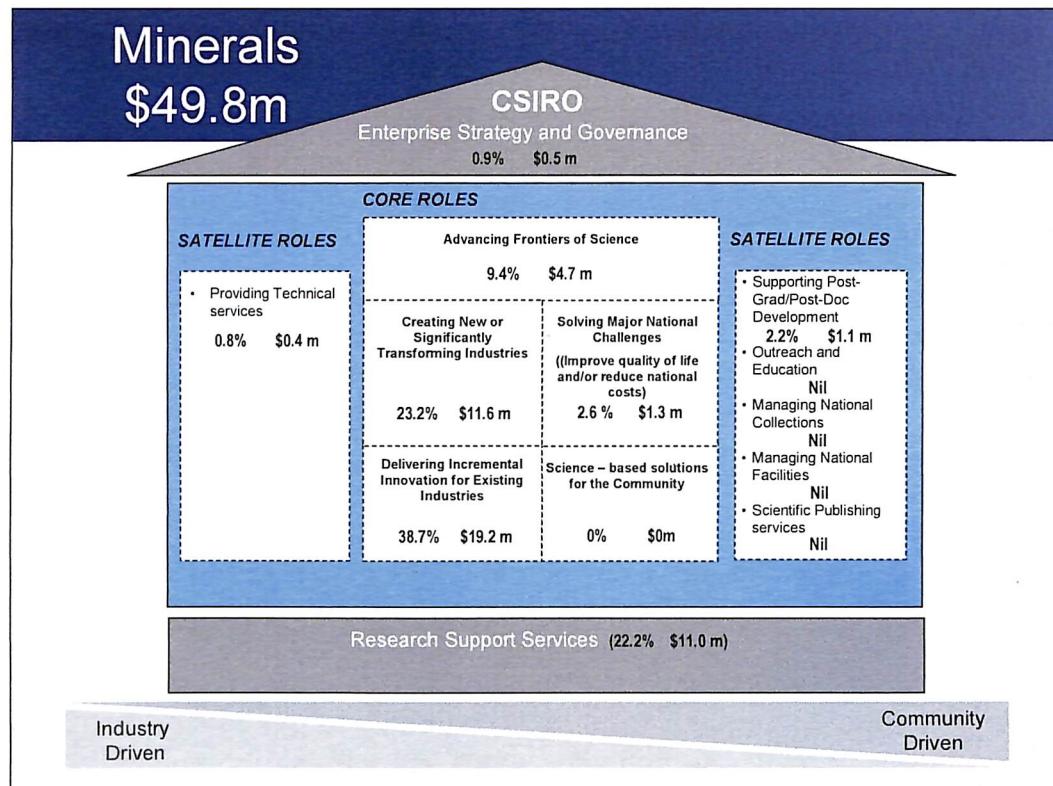
*Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

**See Previous pages for Theme and Capability names

Key: Indicative Proportion of Capability allocated to each Theme.

'High' **≥ 50%** 'Medium' **20 – 50 %** 'Low' **0 – 20 %**

Investment by Roles for 2005-06 – Minerals

Staffing Profile 2005-06 – Minerals

Planned Staffing Profile 2005 – 06 (EFTs)	
Functional Area	Total for Division
Research Scientist/Engineer	75
Research Consulting	2
Research Management	11
Research Projects	124
Technical Services	46
General Management	5
Communication and Information	6
Administrative Services	32
General Services	0
Specialist	2
Total Staff	303

Investment Profile 2005-06 – Minerals

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	16,767	13,718	0	0	30,485
Research & Services	N/a	8,623	8,876	925	18,424
Expenditure	18,548	22,341	8,876		49,765
Net Revenue	- 1,781	0	0	925	- 856
Other Revenue and Interest	489	0	0	0	489
Operating Result	- 1,292	0	0	925	- 367

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

6.8 Molecular and Health Technologies

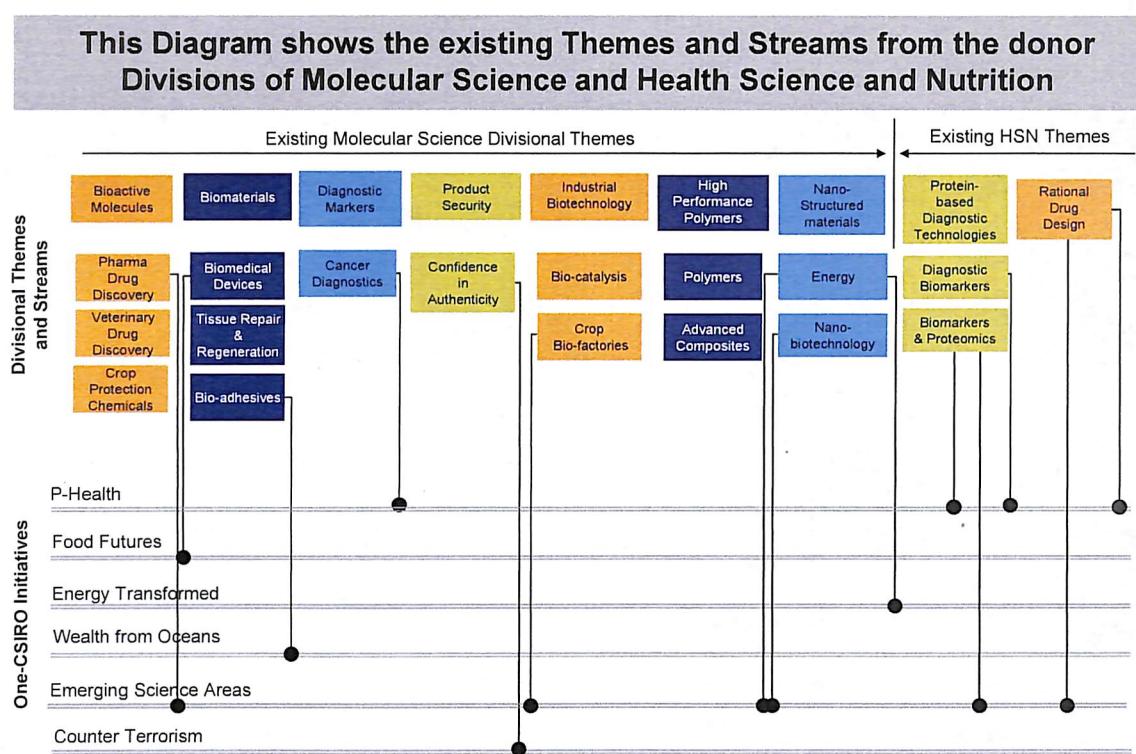
Chief: Dr Graeme Woodrow

Overview

The merger of the Division of Molecular Science with, primarily the Parkville Laboratory of the Division of Health Sciences and Nutrition, and the appointment of a new Chief to the reconstituted Division will result in a further examination of our Themes and Streams. The information presented here is a combination only of the Themes and Streams of the respective Divisions and is therefore of an interim nature.

The research profile of Molecular Science has been refined over the last three years following the introduction of the periodic project review process. The structure shown in the Divisional Alignment Diagram and the Theme goals expressed below are a result of recent discussions within the Molecular Science Divisional Management Team. They present a different perspective from our 2004/05 Themes and Streams but do not represent any major change of research direction.

Alignment Diagram 2005-06 – Molecular and Health Technologies



Research Themes 2005-06 – Molecular and Health Technologies

A listing of interim Themes and Theme Goals for the combined (but not yet integrated) Divisions of Molecular Science and Health Science and Nutrition for 2005-06 follows below:

Part A – Molecular Science

Theme 1 – Bioactive Molecules (\$8.4 m)

Goal: To advance three new compounds to pharmaceutical clinical trials, or the ag/vet equivalent, in the next five years and by 2015 to have developed a new bio-active compound registered for world sales.

Theme 2 – Biomaterials (\$7.9 m)

Goal: By 2015 to have partnered in the development of three commercially available biomedical products and procedures that will positively impact on human health and well-being.

Theme 3 – Diagnostic Markers (\$5.8)

Goal: To develop by 2010 a DNA based test for colorectal cancer in trial and to develop a predictive biomarker for identifying individuals at risk of developing colorectal cancer by 2015.

Theme 4 – Product Security (\$2.6 m)

Goal: By 2015 to have developed and commercialised two covert or overt security technologies for consumer products such as high risk pharmaceutical packaging and a third platform technology under development.

Theme 5 – Industrial Biotechnology (\$4.2 m)

Goal: Develop three new products and processes utilising novel bio-processing and bio-catalytic technologies and, by 2010, to have commercialised these opportunities through the establishment of a spin-out company or an out licensing arrangement for the benefit of Australian industry.

Theme 6 – High Performance Polymers (\$6.0 m)

Goal: To have developed by 2010 a commercialised product in the area of surface coatings using the RAFT technology platform.

Theme 7 – Nano-structured Materials (\$2.3 m)

Goal: By 2010 to have established CSIRO as a lead provider of expertise and innovation in the area of nano-structured materials - through the development and commercialisation of an advanced material for use as a drug delivery vehicle and a novel membrane for hydrogen fuel cells.

Part B – Health Sciences & Nutrition (Parkville)

Theme 8 – Protein-based Diagnostic Technologies (\$7.6 m)

Goal: To develop four new platform technologies that can be applied to the improvement of human health through the diagnosis and treatment of disease by 2008 and exploit these technologies in conjunction with industry.

Theme 9 – Rational Drug Design (\$8.7 m)

Goal: To have one new biological entity (NBE) and one new chemical entity (NCE) in clinical trials by 2010.

Capabilities by Theme 2005-06 – Molecular Science

Theme	Capability							Total
	Bioactive Molecule Discovery	Bio-transformation	Biomaterials	Polymeric Materials	Product Protection	Gene Expression	Nano-structured Materials	
Approx No of EFTs*	33	14	33	17	7	17	16	144
% of total	23%	10%	23%	17%	5%	12%	10%	100%
Bioactive Molecules	High	Medium	Medium	Medium	Low	Medium	Low	Medium
Biomaterials	Low	Low	High	Medium	Low	High	Medium	Medium
Diagnostic Markers	Low	Low	Low	Low	Low	High	Medium	Medium
Product Security	Low	Low	Low	Medium	High	Low	Medium	Medium
Industrial Biotechnology	Medium	High	Low	Low	Low	Medium	Low	Medium
High Performance Polymers	Low	Low	Medium	High	Medium	Low	Medium	Medium
Nano-structured Materials	Low	Low	Medium	Low	Medium	Medium	High	Medium

Capabilities by Theme 2005-06 – Health Sciences & Nutrition (Parkville)

Theme	Capability			Total
	Protein Engineering	Biomarkers & Proteomic Technologies	Protein Structure & Therapeutic Design	
Approx No of EFTs*	23.1	14.0	39.2	76.3
% of total	30 %	18 %	52 %	100%
Protein-based Diagnostic Technologies	High	High	Medium	High
Rational Drug Design	Medium	Low	High	High

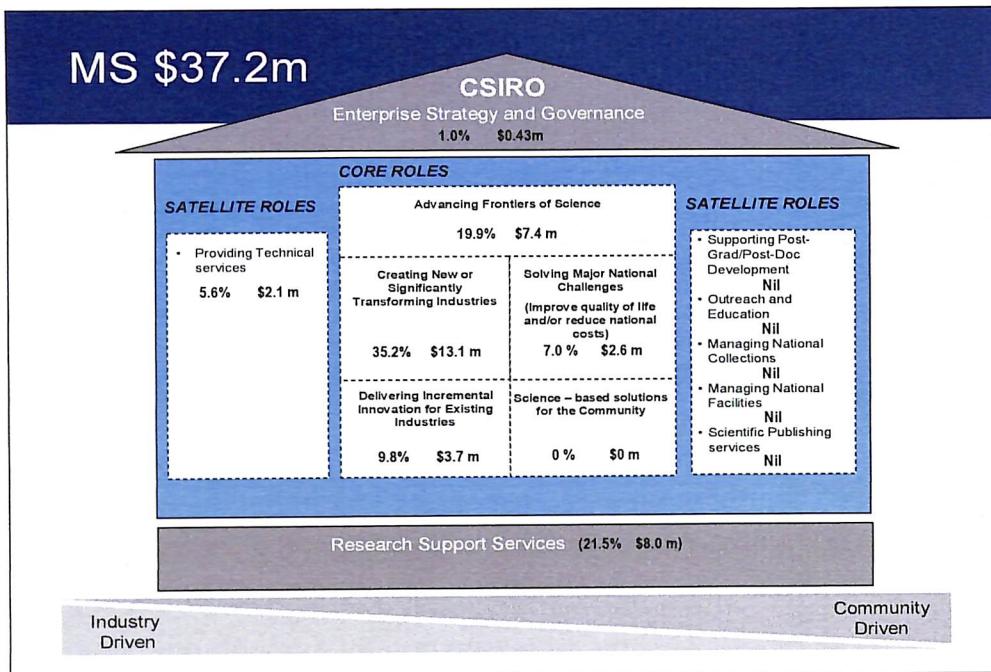
* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

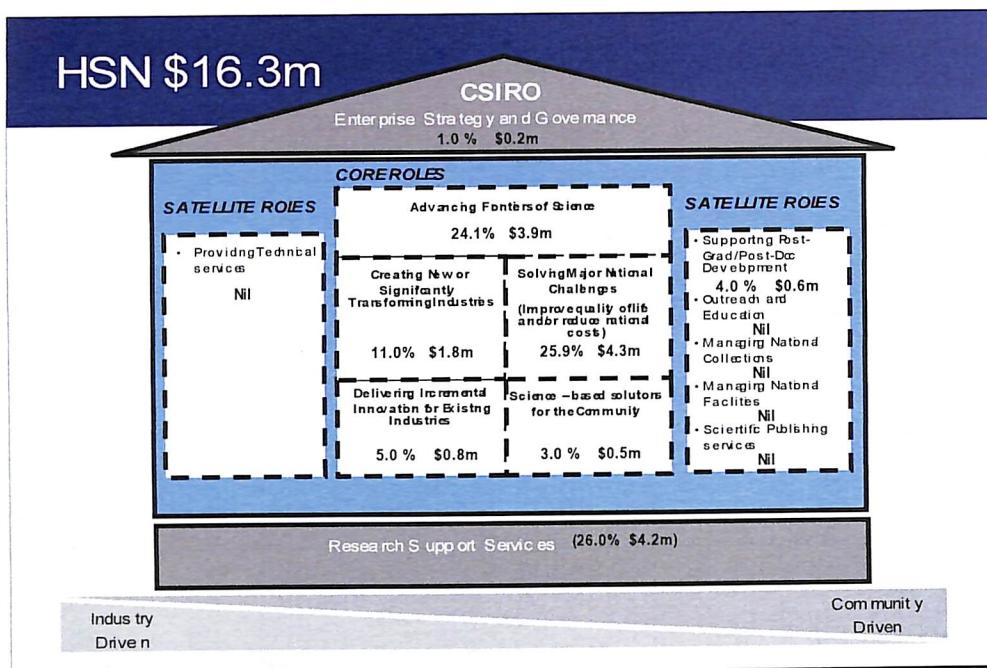
Key: Indicative Proportion of Capability allocated to each Theme.

'High' ≥ 50%	'Medium' 20 – 50 %	'Low' 0 – 20 %
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Investment by Roles for 2005-06 – Molecular Science



Investment by Roles for 2005-06 – Health Sciences & Nutrition (Parkville)



Staffing Profile 2005-06 – Molecular and Health Technologies

Planned Staffing Profile 2005 – 06 (EFTs)			
Functional Area	Molecular Science	Health Sciences & Nutrition	Total
Research Scientist/Engineer	79	36	115
Research Consulting	5	0	5
Research Management	5	2	7
Research Projects	65	38	103
Technical Services	8	3	11
General Management	4	2	6
Communication and Information	5	3	8
Administrative Services	20	9	29
General Services	2	2	4
Specialist	0	0	0
Total Staff	192	96	288

Investment Profile 2005-06 – Molecular Science

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co-Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	12,409	11,642	0	0	24,051
Research & Services	N/A *	10,661	2,413	50	13,124
Expenditure	18,789	17,505	956	0	37,250
Net Revenue	-6,380	4,798	1,457	50	-75
Other Revenue and Interest	0	0	75	0	75
Operating Result	-6,380	4,798	1,532	50	0

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

Investment Profile 2005-06 – Health Sciences & Nutrition (Parkville)

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co-Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	10,315	2,467	0	0	12,782
Research & Services	N/A *	2,900	815	250	3,965
Expenditure	10,920	4,675	700	0	16,295
Net Revenue	-605	692	115	250	452
Other Revenue and Interest	0	0	33	0	33
Operating Result	-605	692	148	250	485

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

Section 7 Sustainable Energy and Environment Group

Group Executive: Dr Steve Morton

Introduction

The future of Australia, the Asia-Pacific region, and indeed of the whole world, is being re-shaped by the forces of ongoing technological revolution, trade reform, energy demand, natural resource quality and security, greenhouse gas emissions, climate change and variability, biosecurity concerns, poverty alleviation and cultural disharmony. A positive CSIRO response to the interplay of these challenging forces involves effective and innovative deployment of knowledge. By capitalising on systems thinking, new enabling technologies in the mathematical and information sciences, and integration of biogeochemical and social sciences, sustainability science will contribute significantly to new industries, new employment opportunities, and new capabilities for managing natural and man-made systems. In the next decade, SEE sustainability science expressed through Team Australia partnerships will underpin a dynamic Australian economy and determine our future standard of living, while conserving intergenerational equity.

The prime objectives of the SEE Group are to:

- conduct leading edge R&D to underpin the development of the Australian economy by ensuring the well-being of its people through the provision of knowledge, ideas, and innovations that lead to
 - new industries and technologies,
 - delivery of clean and competitive energy,
 - better environmental health, and
 - new ways of managing complex systems.
- enhance our capacity to develop path-breaking solutions by operating at the interfaces of the biological and physical disciplines, the social sciences, economics and the information sciences.

Key components of the Group

The Sustainable Energy and Environment Group comprises the following five Divisions and three Flagships:

Divisions	<ul style="list-style-type: none"> • Energy Technology • Land & Water • Marine & Atmospheric Research 	<ul style="list-style-type: none"> • Petroleum Resources • Sustainable Ecosystems •
Flagships	<ul style="list-style-type: none"> • Energy Transformed • Water for a Healthy Country 	<ul style="list-style-type: none"> • Wealth from Oceans

The SEE Group Executive also has management responsibility for the CSIRO Climate Cross-Divisional Program.

Group Focus 2005-06 – Sustainable Energy & Environment Group

This integration of SEE intellectual capital aims to result in further development of new science frontiers that will underpin the economic, environmental and social future of Australia. By taking a systems perspective, the SEE Group and its partners will be able to increase understanding of how entire ecosystems, regional economies, and societies work best, enabling us to deliver a unique capability in describing, modelling, managing, and predicting those functions. In this coming year, particular attention will be focused on linking our expertise in the production and processing of energy resources, in energy systems, and in environmental management. CSIRO's continued investment in

the SEE domain will result in a more internationally competitive Australia. In the coming five years we will focus our investment in seven key areas: climate, coasts, oceans, water, gas, renewable energy and cities.

Key deliverables over the coming decade will be:

- Innovation in energy production and use providing for 15% reduction in greenhouse gas emissions
- Innovation in coal gasification science for syngas production, placing Australia in a world leadership position on a transitional methane economy
- Creation of ACCESS, an Australian Community Climate Earth-System Simulator, providing for the transformation of CSIRO's climate modelling capability to underpin impact assessment and adaptation by government, industry and the wider community
- Innovation in water management to assist in the creation of resilient and environmentally sound urban and rural water systems to cope with population growth, climate change, and increased economic productivity
- Delivery of economic, social and environmental benefits in marine ecosystems: wealth based on knowledge of ocean systems and processes
- Better diagnostic tools, strategies and designs to drive sustainable development in cities
- Knowledge, tools, policy options and new institutional arrangements to maintain and enhance the social, economic and environmental value of Australia's assets.

Existing SEE capability cannot meet the challenges of the 21st century without the injection of new ways of doing science. We aim to deliver on the pathways in the previous section by enhancing our science and delivery capability in six areas.

Data capture and integration

More and more information is becoming available from a wide range of sensors. In concert, we must enhance our capacity to gather and interpret such data by growing capabilities in data assimilation, integration, and modelling. Advances are needed in four areas: data-model assimilation methods; methods for computing and communicating uncertainty; methods for accessing distributed data bases, and methods for sharing computational burden across local area networks using grid-computing methodologies.

New enabling information and communication technologies

The future lies in simulating the performance of entire systems rather than their individual components. Hence, we need to revolutionise our capacity in enabling information and communication technologies, so as to provide improved capability and affordability of environmental instrumentation, and web-based decision support tools and adaptive management techniques for policy and decision makers.

Systems modelling

Fuller integration across physical, chemical, geological and biological disciplines needs better theory, modelling and deployment at whole-of-system scale. Our advances in systems modelling will need to be supported by the two capabilities noted above.

Social and economic integration

CSIRO must contribute to the sustainability challenge. We will continue to develop our ability to integrate the social and economic sciences with our biogeochemical sciences at appropriate scales and levels of detail. Such capability is best developed by embedding our work in real-world practice rather than applying science conceived in theoretical environments. Thus, we will develop our ability to engage industries, communities, and policy makers in dialogue around alternative futures, in situations where science has a role.

Integrated renewable energy systems

CSIRO must develop science capability in areas relevant to new materials for renewable energy, given the vital importance of this field to Australia in coming decades. The capability developed for traditional energy storage systems now needs to be applied to new systems such as lithium metal

batteries and supercapacitors. Further, investment in the National Solar Energy Technology Centre has created a platform for solar research. Capability will also be built in integrated, economy wide modelling of the impact of changing energy mixes, backed up with an existing capability in technology evaluation and costing.

Gas processing

Because of the urgent requirement for more effective extraction and cleaner use of fossil fuel resources, CSIRO will need to grow currently embryonic capability in gas processing and conversion, particularly in chemical and process engineering. Additionally, capabilities in geoscience and geo-engineering will increasingly focus on geological sequestration of CO₂. Skills in mathematical and numerical modelling will be a necessary part of this mix, as indicated above.

Reflections on 2004-05 – Sustainable Energy & Environment Group

Five developments stand out from the hard work of 2004-05.

- Leadership of each of the Divisions and Flagships was stable during the year. Each Chief and Flagship Director has thereby been able to grow even more firmly into his or her job.
- The enterprise approach adopted by the Chiefs and Flagship Directors allowed the ENR Group to move staff and resources among several Divisions in a relatively seamless fashion. We have thereby focused and targeted scientific effort successfully in the fields of farming systems, environmental biotechnology and soil biology. The cooperative spirit that allowed these moves to take place, the patient communication with staff, and the one-CSIRO strategic thinking that it unleashed, were most positive aspects of the year.
- The decision to merge CAR and CMR into a new Division, Marine and Atmospheric Research, and the preparatory planning to bring the new Division into being on 1 July 2005, provided one of the most significant efforts of the year. One of the most significant outcomes of the decision will be the creation of a resilient business unit in which our climate and atmospheric science will be able to continue development on behalf of the nation.
- Very substantial effort has been invested in creating highly important external partnerships. Exploration of a potential alliance with the Bureau of Meteorology in climate and atmospheric research continued throughout the year. Proposals to the Western Australian Government for a Western Australian Marine Science Institution were successful. The Western Australian Energy Research Alliance has begun to function successfully. Significant partnerships aiming at infrastructure and science developments in Brisbane, Townsville and Cairns have been built with the Queensland Government and Queensland Universities.
- Further investment allowed the Wealth from Oceans Flagship to scale up its activities to a level comparable with other Flagships. Both this Flagship and the Water for a Healthy Country Flagship have undergone extensive development and repositioning of their portfolios, and although challenges still remain in creating seamless scientific and support interactions with the Divisions, the progress has been impressive.

The year ahead 2005-06 – Sustainable Energy & Environment Group

The major opportunities and challenges for the year ahead are as follows.

- Effort will be devoted to maintaining and cementing in the cross-Divisional links created by transfers of staff and resources among several Divisions. We will be working to ensure that the focusing and targeting of scientific effort is successful in the fields of farming systems, environmental biotechnology and soil biology. We will continue throughout 2005-06 to examine our portfolio for any other cases where greater focus could be achieved in similar ways.
- Every Division will continue the process of redirecting resources towards more focused Streams and Themes. CSE and CLW will press ahead with refocusing in new Themes and Streams; CMAR will be working on a repositioning of its science portfolio in the first six months of the year, as the merger provides stimulus for focusing; CPR will continue investing further effort in its Gas Theme; and CET will continue building its business in renewables.

- Effort will continue in building some particularly important external partnerships and alliances. We anticipate that the alliance with the Bureau of Meteorology in climate and atmospheric research will come to fruition. The Western Australian Marine Science Institution will come into being. The Western Australian Energy Research Alliance will achieve its full potential with the inclusion of further industry partners. Significant partnerships with infrastructure and science will be confirmed and built upon with the Queensland Government and Queensland Universities.
- Work will continue to ensure that each of our three Flagships is operating smoothly and is well into the delivery of substantial results.
- Collaboration with BD&C through the new Australian Government Business Manager should allow us to reach a more effective level of interaction with, initially, the Department of Environment and Heritage, and subsequently with further Departments. The focus will be on better provision of advice on scientific matters to Government, and better understanding in CSIRO of developing Government programs.
- The most important challenge of all is to begin identifying the scientific opportunities created by the linking of expertise in energy and environment. There is growing industry, community and political understanding of the three-way interaction among climate, water and energy, with spin-out effects in transport and cities. The presence in one Group of several key Divisions within this circle of interest provides an outstanding opportunity to identify major R&D gaps and to begin the process of building capability to fill them.

Strategy Implementation Goals for 2005-06 – Sustainable Energy & Environment Group

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
1.2 Build critical mass and ensure quality in our core research programs	Review and implement the recommendations from Divisional Science Reviews for Marine & Atmospheric Research, Sustainable Ecosystems and Energy Technology
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Confirm partnerships for infrastructure and science developments at Boggo Road and Coopers Plains in Brisbane, and at the James Cook University campus in Townsville. Bring the Western Australian Marine Science Institution into being and expedite development of governance arrangements by providing the Interim Director.
3.2 Service the needs of government for informed policy setting	Lift relationships with the Australian Government Department of Environment and Heritage to a new level in which scientific advice on policy is regular and effective.
4.2 Structure deeper and more meaningful relationships with large corporation	Attract new industry partners to the WA Energy Research Alliance and develop the Alliance to create \$3m in contracts.
5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research	Identify research gaps needing to be filled to link the three hard sustainability challenges among climate, water and energy.

Capability Table 2005-06 – Sustainable Energy & Environment Group

The current core capabilities in the SEE Group, and the ones designated for growth, are summarised as follows:

Sustainable Energy & Environment Group Capabilities			
Division	Core Capabilities	Grow Capabilities	Reduce Resources
Energy Technology	<ul style="list-style-type: none"> ▪ Chemistry Process Optimisation and Technology Development ▪ Integrated energy and economic systems modelling 	<ul style="list-style-type: none"> ▪ Renewable energy production, energy storage, energy distribution and control systems 	<ul style="list-style-type: none"> ▪ Remediation of air and water pollution from energy and mining (very selective change)
Land & Water	<ul style="list-style-type: none"> ▪ Hydrology to link groundwater behaviour to surface flows ▪ Water Quality and Aquatic Ecology ▪ Water and nutrients in dryland and irrigated ▪ Soil and contaminant science. ▪ Remote sensing - of water bodies. ▪ Spatial science – interpretative mapping of environmental attributes ▪ Economics - water allocation theory and practice., ▪ Social sciences - in relation to water services. 	<ul style="list-style-type: none"> ▪ Hydrology for urban water science ▪ Tropical Water Quality and Aquatic Ecology ▪ Linking remote sensing to environmental monitoring. ▪ Incorporate social dimensions in the consideration of water values. ▪ Software for the Water Resources Observation Network 	<ul style="list-style-type: none"> ▪ Agricultural Resource Science (migration to CSE) ▪ Climate Sciences (migration to CMAR)
Marine & Atmospheric Research (dependent on current science review and merger)	<ul style="list-style-type: none"> ▪ Marine ecology ▪ Management Strategy Evaluation ▪ Aquaculture, genetics, nutrition and husbandry ▪ Marine Biogeochemistry ▪ Climate Oceanography& weather prediction ▪ Air quality management ▪ Marine genomics ▪ Integrated Assessment ▪ Earth Observation 	<ul style="list-style-type: none"> ▪ Earth systems science ▪ Management Strategy Evaluation: approaches to sustainability and risk management 	
Petroleum Resources	<ul style="list-style-type: none"> ▪ Petroleum geoscience ▪ Petroleum geo-engineering 	<ul style="list-style-type: none"> ▪ Natural gas processing 	
Sustainable Ecosystems	<ul style="list-style-type: none"> ▪ Ecology 	<ul style="list-style-type: none"> ▪ Agricultural Systems (migration from CLW) ▪ Economics and Social Science ▪ Systems integration 	<ul style="list-style-type: none"> ▪ Biotechnology

Role Table 2005-06 – Sustainable Energy & Environment Group

The table presents a selection of highlights from the Divisions and Flagships comprising the Group, and does not aim to be comprehensive. Overall, though, we believe that the research and development effort is aimed effectively at contributing to the National Research Priorities, and with the incorporation of the energy field into this new Group we have a wide spread of activity across the industry and community oriented roles. The three Flagships are major means of delivering across the roles as well.

Sustainable Energy & Environment Group Roles					
Division	Creating new or significantly transforming industries	Incremental innovation for existing industries	Solving Major National Challenges	Science-based solutions for the Community	Frontier Science
Energy Technology	<ul style="list-style-type: none"> ▪ Low greenhouse emission electricity from coal and from solar/hybrid fossil systems 	<ul style="list-style-type: none"> ▪ Improved efficiency of cleaning coal and lower costs for coal preparation plants 	<ul style="list-style-type: none"> ▪ Science and technology to address greenhouse emissions from electricity production 	<ul style="list-style-type: none"> ▪ Development of renewables and storage technologies for distributed energy 	<ul style="list-style-type: none"> ▪ Development of new materials for renewables, energy storage and gas separation for hydrogen production
Land & Water	<ul style="list-style-type: none"> ▪ Biotech solutions for mining and environmental contamination 	<ul style="list-style-type: none"> ▪ Australian Water Conservation and Reuse Program 	<ul style="list-style-type: none"> ▪ Science to underpin the National Water Initiative 	<ul style="list-style-type: none"> ▪ Community-based water quality monitoring ▪ Science to support Catchment Management Boards 	<ul style="list-style-type: none"> ▪ Next generation environmental sensing and modeling
Marine & Atmospheric Research	<ul style="list-style-type: none"> ▪ Prawn domestication ▪ Development of salmon disease vaccine 	<ul style="list-style-type: none"> ▪ Value-added plant protein products for aquaculture 	<ul style="list-style-type: none"> ▪ Ocean model prediction system (BlueLink) ▪ Climate change, variability and risk 	<ul style="list-style-type: none"> ▪ Design, trial and implementation of bicatch reduction in the northern prawn fishery 	<ul style="list-style-type: none"> ▪ Development of next generation climate/earth systems science models
Petroleum Resources	<ul style="list-style-type: none"> ▪ Development of new approaches in gas-to-liquids technology 	<ul style="list-style-type: none"> ▪ Assessment of oil and gas exploration risks through integrated geology, geophysics and geomechanics 	<ul style="list-style-type: none"> ▪ Geological storage options for CO₂ sequestration 		<ul style="list-style-type: none"> ▪ Integrating micro-scale behaviour into macro-scale models of fluid behaviour in rocks
Sustainable Ecosystems	<ul style="list-style-type: none"> ▪ Redesign and reinvention of rural and regional industries in transition 	<ul style="list-style-type: none"> ▪ Triple-bottom-Line benefits for rural and regional enterprises 	<ul style="list-style-type: none"> ▪ Economic, ecological and social systems and frameworks for a sustainable Australia 	<ul style="list-style-type: none"> ▪ Enhancing biodiversity & ecosystem services in Australian landscapes 	<ul style="list-style-type: none"> ▪ Science of integration, intervention and impact

7.1 Energy Technology

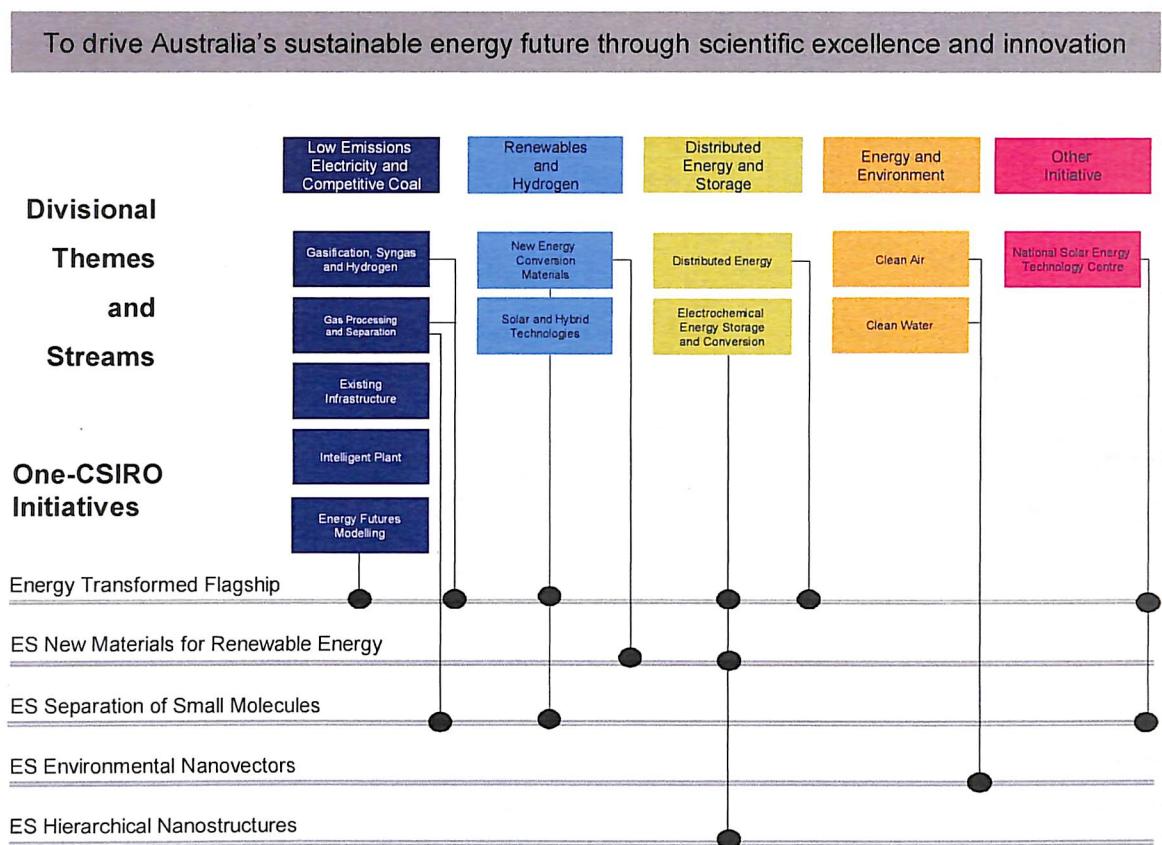
Chief: Dr David Brockway

Overview

The Division retains its four Theme structure for 2005/6. The main strategic drivers for the Themes are the alignment with the National Priorities, specifically those related to reducing emissions from the energy cycle and improved environmental performance.

During the last year, the Division has engaged with industry groups and governments to respond to the White Paper on Securing Australia's Energy Future announced in June 2004. The opportunities in the White Paper cover the support for industry and government participants to demonstrate Low Emissions Technology, deliver reduced Green House Gass emissions in the Solar Cities program and research and demonstrate Energy Storage to combat the intermittency in renewables generation. Together these challenges will require the significant transformation of the Australian energy scene and the solution of major national challenges to provide low or zero emissions energy at internationally competitive prices. CSIRO Energy Technology's investment continues to be increased in these core roles of research at every opportunity with the Energy Transformed Flagship.

Alignment Diagram 2005-06 – Energy Technology



Research Themes 2005-06 – Energy Technology

During 2004-05 the Theme structure was reviewed and retained in its current form, with further consolidation and clarity of the goals of the streams. Growth will occur in those streams and themes created to deliver Flagship outcomes.

The Centre for Low Emissions Technology has approved its research program for the next four years and this is focused on breakthrough science, collaboration and the partnerships created with the coal and generating industry. The reprioritisation of Energy Storage towards new technologies and energy conversion systems, in conjunction with the Energy Transformed Flagship, will be completed in 2005/6, with a number of technologies approaching the stage of seeking partners. Growth is also planned in the Renewables and Hydrogen Theme in the areas of solar thermal renewables, organic photovoltaics and water splitting for hydrogen production. This growth will occur through Divisional reprioritisation of appropriation spending from the Energy and Environment Theme which will increase its external earnings in response.

Theme 1 – Low Emission Electricity and Competitive Coal (\$13.4 m)

Goal: Demonstrate, through scientific breakthroughs, the technical and economic viability of implementing large scale low emission technology that can deliver a 5% reduction in national greenhouse gas emissions by 2020.

Theme 2 – Renewables and Hydrogen (\$5.7 m)

Goal: Achieve a 50% reduction in cost of solar renewable energy by 2015

Theme 3 – Distributed Energy and Storage (\$7.1 m)

Goal: Decrease greenhouse emissions by 5% by 2020 and increase the quality, reliability and security of supply of the Australian electricity supply through technology development and demonstration through science, technology development and demonstration.

Theme 4 – Energy and Environment (\$6.6 m)

Goal: To achieve an acceptable balance between environmental and industrial/urban sustainability by 2020 through the development and application of improved approaches to the risk-based assessment, management and remediation in air and water environments of contaminants from the energy, minerals and other urban and industrial activities.

Capabilities by Theme 2005-06 – Energy Technology

Theme	Capability					Total
	Chemistry process optimisation and technology development	Renewable energy production, energy storage, energy distribution and control systems	Coal preparation and instrumentation	Integrated energy and economic systems modelling	Remediation of air and water pollution from energy and mining	
Approx No of EFTs*	33	39	12	6	40	130
% of total	25%	28%	9%	5%	33%	100%
LE Electricity and Competitive Coal						
Renewables and Hydrogen						
Distributed Energy and Storage						
Energy and Environment						
Energy Transformed Flagship						
ES Initiatives						

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High'

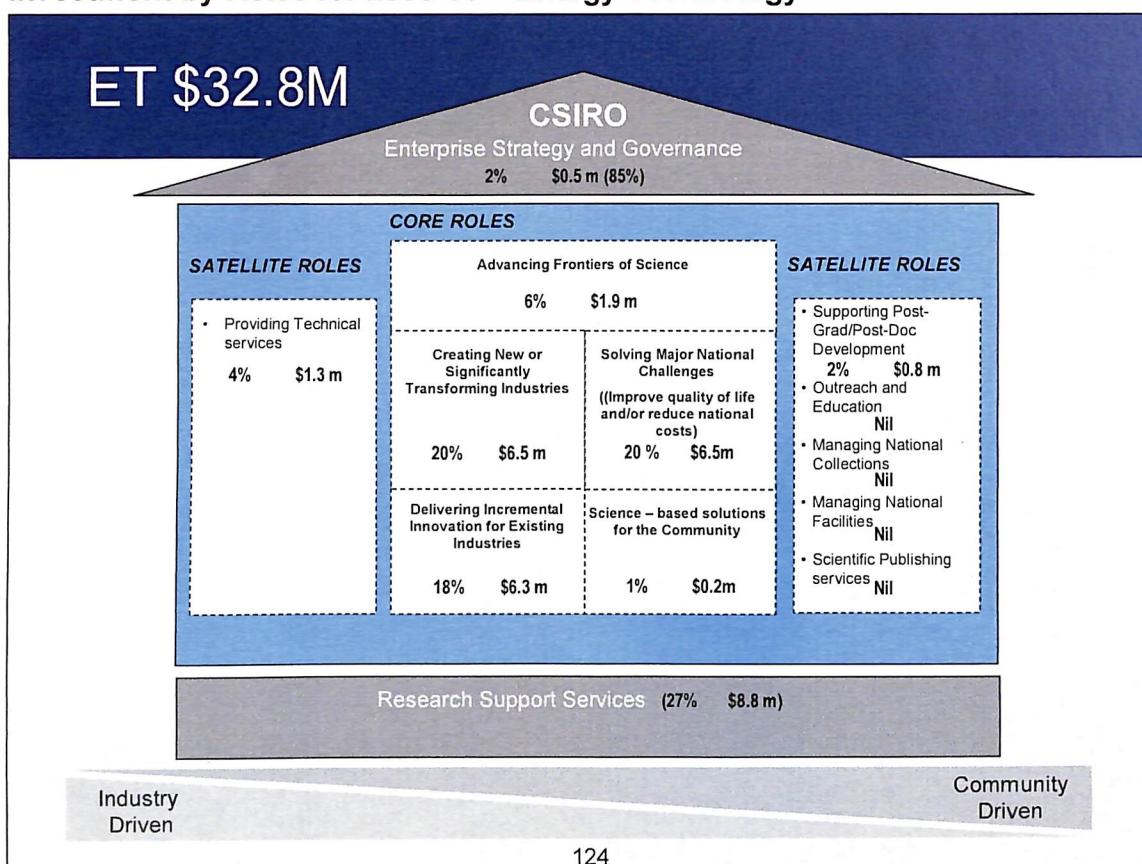
≥ 50 %

'Medium'

20 – 50 %

'Low'

0 – 20 %

Investment by Roles for 2005-06 – Energy Technology

Staffing Profile 2005-06 – Energy Technology

Planned Staffing Profile 2005 – 06 (EFTs)		Total for Division
Functional Area		
Research Scientist/Engineer		49
Research Management		12
Research Projects		69
Technical Services		4
General Management		1
Communication and Information		4
Administrative Services		19
General Services		0
Specialist		3
Total Staff		162

NB: Research Projects includes 15 students; CSIRO IT staff not included; Includes new cLET Program Manager.

Investment Profile 2005-06 – Energy Technology

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	6,902	16,161			23,063
Research & Services	N/A *	7,549	1,831	506	9,886
Expenditure	6,927	23,735	1,626	506	32,794
Net Revenue	-25	-25	204	0	154
Other Revenue and Interest	25	25			50
Operating Result	0	0	204	0	204

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

7.2 Land and Water

Chief: Dr Rob Vertessy

Overview

The strategic directions of Land and Water (CLW) for 2005-06 and beyond have been profoundly transformed from 2004-05. They are now strongly focussed in response to the imperatives of the CSIRO Strategic Plan and our external opportunities to make a difference in the science and adoption of improved knowledge and practices throughout the Australian community.

During planning for 2005-06, CLW concluded the following:

- Making a set of Themes congruent with our research management units would simplify our internal organisation within CSIRO as well as to clients and partners. We will therefore invest, manage and report by Theme starting in 2005-06.
- Creating a set of Themes emphasising *discipline* areas would make them more durable over time, as well as organising our science into like and coherent chunks for the Divisional Science Review in 2006. We have moved toward this goal to a great but not complete degree in our new themes. An additional benefit of this move was greater clarity in developing and presenting our Emerging Science intent across discipline-based Themes.
- Having made this change, we are still able to maintain a coherent 'outcome' focus for each Theme.
- Recognising CLW's need to focus and deepen its research, we concluded that we would benefit from fewer management units than we maintained in the past.

In creating a new set of Themes for 2005-06, CLW also responded to the imperatives of the Science Investment Process and Future C initiatives, and to directions set through the SEE Group Strategy. Changes included:

- Withdrawing from Farming Systems and Native Foods work (now led by CSE) and from soil biological work aimed at underpinning agricultural production and biological diversity (now led mainly by CSIRO Division of Entomology).
- Supporting the AVCA (A Vital Coastal Australia) initiative and scoping study
- Raising the profile and levels of CSIRO investment in urban water science
- Responding to the national need to enhance monitoring, forecasting and reporting of Australia's water resources, and scoping a national Water Resource Observation Network (WRON).
- Recognition of the need to make real advances in the integration of social and economic analyses for complete systems analyses of Australia's land and water resource management opportunities.
- Responding to CSIRO-wide commitment to flagships, in particular enhanced investment in core ecohydrological and water resource research to meet Water for a Healthy Country goals.

In addition, CLW plans to *lead the advancement* of science and technology in the following:

- advances in contaminant science and technology (with Energy Technology)
- model-data fusion in earth systems science, toward real-time representation and forecasting of hydrological systems (with Mathematics and Information Science and Marine and Atmospheric Research)
- science that integrates biophysical process understanding with economics and social sciences, toward a generalised framework for assessing the benefits of natural resource policy and management (with Sustainable Ecosystems)
- advances in water recycling systems analysis and technology (with Manufacturing and Infrastructure Technology)

- identification of emergent properties of environmental systems
- new indirect methods (based on isotope tracing and hydrochemical mixing models) for inferring catchment-scale processes
- linking aquatic ecology with the physical chemistry and hydraulics of rivers (with Griffith University and the Murray-Darling Freshwater Research Centre)

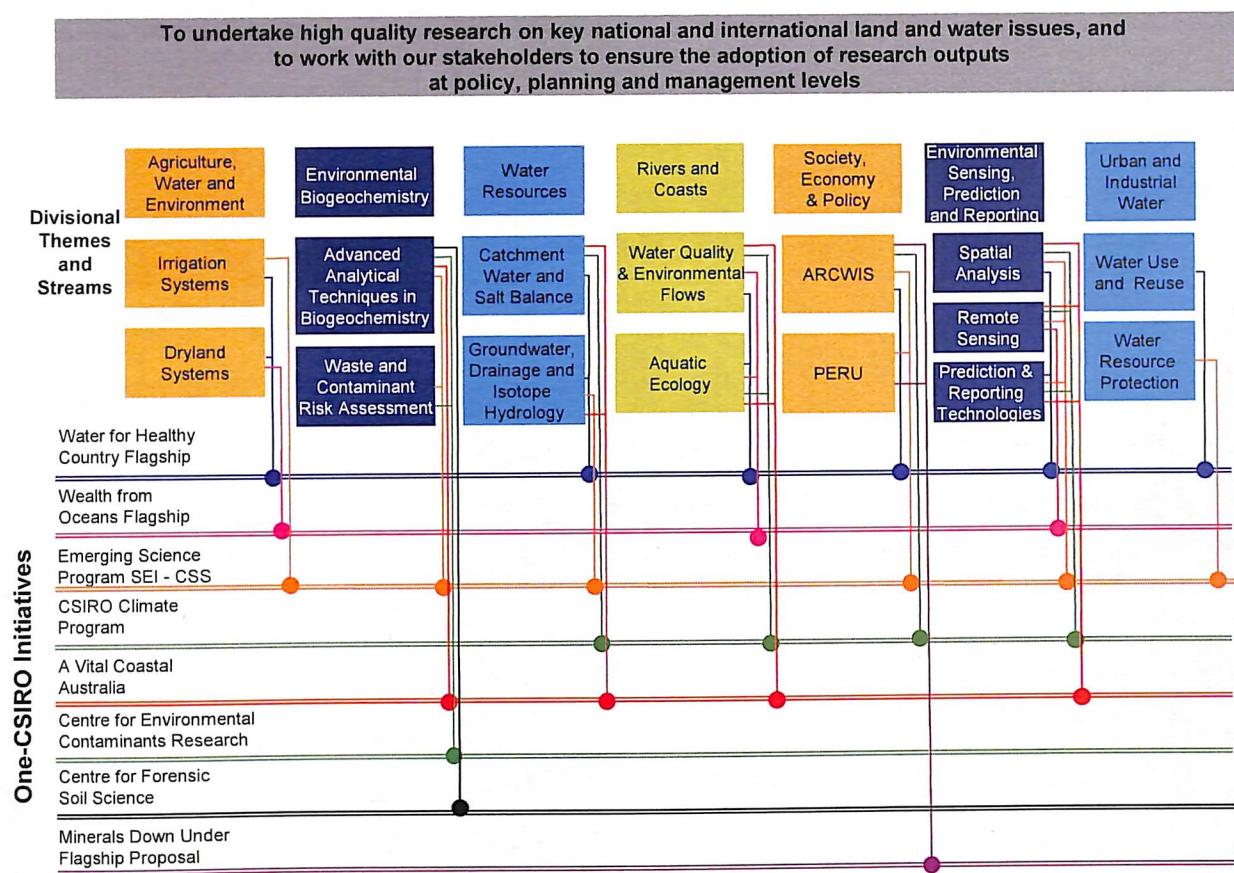
CLW plans to *stay at the frontier* of science in:

- scaling of biophysical processes, with particular reference to the fluxes of water, salt and sediment

CLW intends to move our science *toward the frontier* in:

- integrated environmental sensing, underpinning the Water Resource Observation Network (with Marine and Atmospheric Research and eWater CRC).

Alignment Diagram 2005-06 – Land & Water



Research Themes 2005-06 – Land & Water

The net result was a raft of changes and a new Project Management Framework for CLW, articulated in detail in the CLW Science and Technology Plan 2005-2010 and delivered through the following Themes -

Theme 1 – Agriculture, Water and Environment (\$18.03 m)

Goal: To enable natural resource managers to reduce the environmental footprint of dryland and irrigated agriculture by 25% of current levels by 2020.

Theme 2 – Environmental Biogeochemistry (\$7.67 m)

Goal: To underpin the maintenance and protection of Australia's land and water resources from contamination, leading to improved national regulations and guidelines which protect human and ecosystem health and allow safe use of chemicals and wastes.

Theme 3 – Water Resources (\$8.94 m)

Goal: To increase the long term benefits we get from catchment water for consumptive and environmental uses with new knowledge and tools that consider the quantity, timing and salinity of surface and ground water resources.

Theme 4 – Rivers and Coasts (\$10.67 m)

Goal: To provide management options to sustain and improve the health of aquatic ecosystems through the prediction of how our river, estuarine and coastal environments will respond to changes in landuse and climate.

Theme 5 – Society, Economy and Policy (\$4.70 m)

Goal: To develop new theory and techniques that integrate social, economic and policy research with that of biophysical disciplines to create innovative decision making processes and solutions for Australia's major land and water problems.

Theme 6 – Environmental Sensing, Prediction and Reporting (\$10.23 m)

Goal: To converge key technologies including simulation modelling, remote sensing, model-data assimilation methods, spatial analysis, automated instrumentation and sensor webs, and web information services to facilitate delivery of a national Water Resource Observation Network (WRON) to underpin national water management by 2010.

Theme 7 – Urban and Industrial Water (\$5.28 m)

Goal: To enable whole of water cycle management in urban areas, aimed at enhancing water quality and quantity.

Capability by Theme 2005-06 – Land & Water

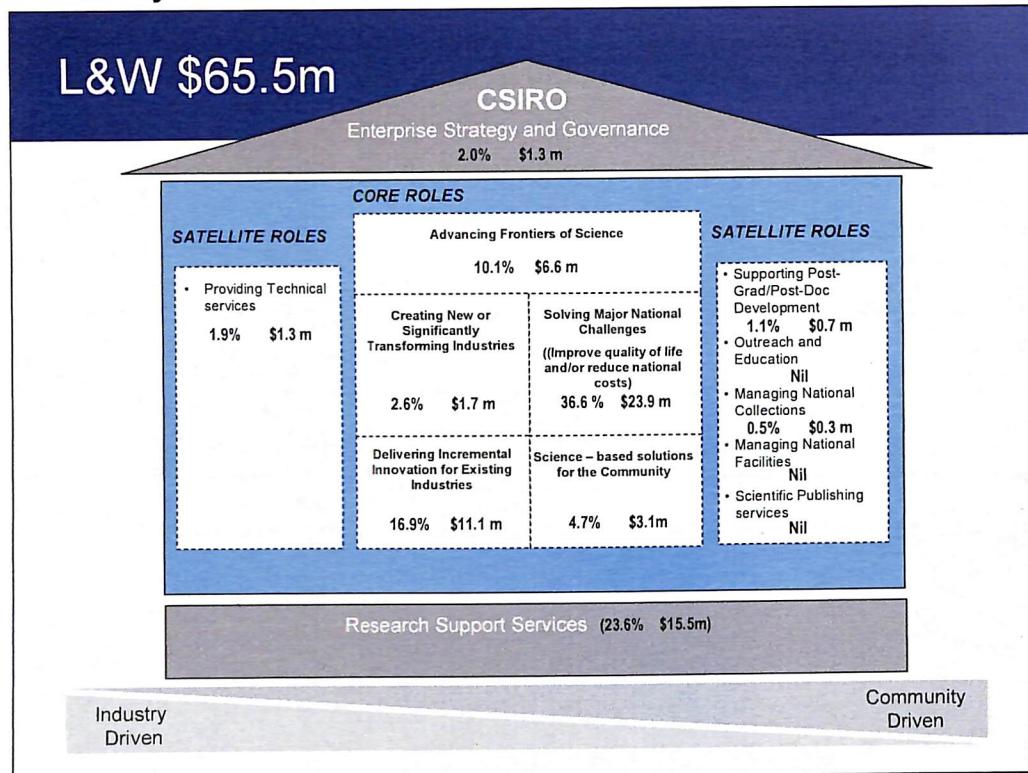
- | | | |
|--------------------------------------|---------------------------------|-------------------------|
| A. Hydrology | D. Soil and Contaminant Science | G. Economics |
| B. Water Quality and Aquatic Ecology | E. Remote Sensing | H. Social Science |
| C. Agricultural Resource Science | F. Spatial Science | I. Climate Science |
| | | J. Software Engineering |

Theme	Capabilities										Total
	A	B	C	D	E	F	G	H	I	J	
Approx No of EFTs	70	54	58	35	17	17	11	12	2	10	286
% of total	25	19	20	12	6	6	4	4	0.5	3.5	100%
Agriculture, Water and Environment	High	Medium	Medium	Medium	Low	Low	Low	Low	Low	Low	Medium
Environmental Biogeochemistry	Low	Medium	Medium	Medium	Low	Low	Low	Low	Low	Low	Medium
Water Resources	Medium	Low	Low	Low	Low	Low	Low	Low	Medium	Low	Medium
Rivers and Coasts	Low	Medium	Low	Low	Low	Low	Low	Low	Low	Low	Medium
Society, Economy and Policy	Low	Low	Low	Low	Low	Medium	Medium	Low	Low	Low	Medium
Environmental Sensing, Prediction	Low	Low	Low	Low	Medium	Medium	Low	Low	Low	Low	Medium
Urban and Industrial Water	Medium	Medium	Low	Medium	Low	Low	Low	Low	Low	Low	Medium

* Includes staff in three Functional Areas: Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme

'High' **≥ 50%** 'Medium' **20 – 50 %** 'Low' **0 – 20 %**

Investment by Roles for 2005-06 – Land & Water

Staffing Profile 2005-06 – Land & Water

Planned Staffing Profile 2005 – 06 (EFTs)	
Functional Area	Total for Division
Research Scientist/Engineer	136
Research Management	9
Research Projects	231
Technical Services	35
General Management	1
Communication and Information	16
Administrative Services	72
General Services	8
Specialist	2
Total Staff	510

Note: Includes Visiting Scientists (currently 15 EFTs), Students (currently 35 EFTs) & Research Fellows (currently 13 EFTs).

Investment Profile 2005-06 – Land & Water

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	20,321	19,299	0	0	39,620
Research & Services	N/A *	15,583	8,120	200	24,905
Expenditure	22,731	35,112	7,271	393	65,507
Net Revenue	-2,410	772	848	-193	-982
Other Revenue and Interest	999	0	0	0	999
Operating Result	-1,411	772	848	-193	17

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

7.3 Marine and Atmospheric Research

Chief: Dr Tony Haymet

On 1 July 2005 the Marine Research Division and Atmospheric Research Division will officially merge to create CSIRO Marine and Atmospheric Research.

The merger enables CSIRO to grow the relevance and impact of Australia's marine and atmospheric sciences by building critical mass and international leadership and will better serve the Australian community, especially in climate change predictions and impacts. A joint activity with the Bureau of Meteorology will also be pursued.

CSIRO Marine and Atmospheric Research will be based in five locations: Hobart, Melbourne, Brisbane, Canberra and Perth. The new Division will be led by Dr Tony Haymet and a new Theme and Stream structure will be implemented during 2005-06 and the operational plans will be harmonised.

The planning for how the new merged Division will operate and be configured is currently in progress. Accordingly for the purpose of this document we have chosen to outline separately the two Divisional components that will be merged to form the new Division.

7.3.1 Atmospheric Research

Chief: Dr Greg Ayers

Overview

CSIRO Atmospheric Research is Australia's premier research institution with a specific focus on the atmospheric environment, spanning research and applications from pollution to weather to climate, spatial scales from global to national to regional to local, and temporal scales from minutes and hours to days, weeks, seasons, decades and centuries.

Our capabilities derive from expertise in atmospheric physics, atmospheric chemistry, boundary layer meteorology and climate dynamics, and rely on further contributions from diverse areas including applied mathematics, computer programming and biology.

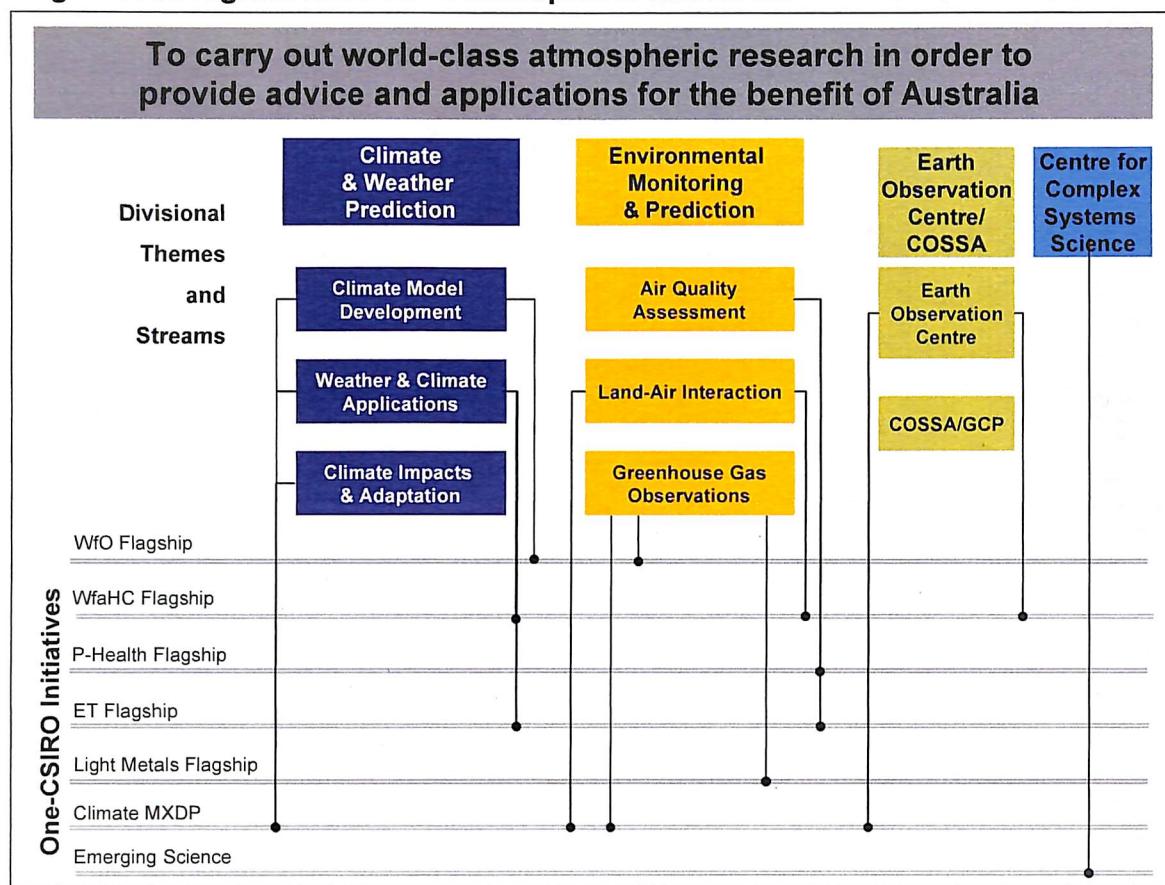
Our work depends on observations and process studies of the atmosphere, the climate system and the natural environment. Our enabling science and technologies range from a focus on space-based remote sensing to direct measurements from flux towers at Tumbarumba (NSW) and Virginia Park (Qld) and the Cape Grim Baseline Station (north west Tasmania).

Many of our research outputs are strongly dependent on partnerships and collaboration with other CSIRO Divisions, with CRCs and Universities, with the Bureau of Meteorology, and with international research teams and agencies.

Our delivery of research outcomes is likewise strongly dependent on partnerships with users and stakeholders, such as the Australian Greenhouse Office, Commonwealth and State Agencies, as well as individual industry clients. Increasingly we use CSIRO Flagships as vehicles for collaboration and delivery.

This delivery to stakeholders will be made even more effective from the new Division (CMAR)

Alignment Diagram 2005-06 – Atmospheric Research



Research Themes 2005-06 – Atmospheric Research

CAR's 3 Research Themes and 13 Research Streams from 2005-2006 have been reorganised into 2 Research Themes and 6 Research Streams for 2005-2006. The increased focus will assist in the planned merging of Themes and Streams for CAR and CMAR in the new CMAR.

In addition to the 2 Themes and 6 Streams, CAR has 2 'Other Initiatives': the Earth Observation Centre/COSSA and the Complex Systems Science Centre.

Theme 1 – Climate and Weather Prediction (\$11.8 million)

Goal: Development of tools for climate and weather prediction and methodologies for climate impact assessment that can lead to strategies for adaptation to variations in weather and climate.

Applications geared to management of climate- and weather-related risk and delivery of enhanced capacity to anticipate and respond to impacts of future climate change and climate variability in order to provide better natural resource management for Australian agriculture, natural environment and water resources; and more effective management of industries and market sectors whose operations are affected by climate and weather impacts.

Theme 2 – Environmental Monitoring & Prediction (\$10.3 million)

Goal: To determine the atmospheric properties required to predict environmental impacts and to facilitate the development of management strategies.

At local scales this involves the development of novel observational and modelling approaches to assess the risks of exposure to air pollution; determine surface exchange of greenhouse gases and the water use and CO₂ budgets of Australian ecosystems to underpin national management strategies for greenhouse gas inventories and natural resources.

At regional to global scales this is directed at greenhouse gas emissions, ozone depleting substances, aerosol and other trace gases in order to measure global change, and to provide critical information for the development of mitigation strategies.

Other Activity 1 – Earth Observation Centre/COSSA (\$4.5 million)

Goal: To conduct, facilitate and coordinate earth observation science throughout CSIRO using remote sensing and related tools, and to gather and interpret earth observations in support of monitoring, predicting and managing natural resources, production systems, emergencies, climate variability and climate change

Other Activity 2 – Complex systems Science (\$1.7 million)

Goal: The CSIRO Complex Systems Science activity has been established as an emerging science area to explore and exploit the links between different applications in which complex behaviour arises from the interaction of simple components.

Capabilities by Theme 2005-06 – Atmospheric Research

Theme	Capability			Total
	Climate & Weather Prediction	Air Pollution Assessment	Environmental Monitoring & Natural Resource Management	
Approx No of EFTs*	42	17	53	112
% of total	38%	15%	47%	100%
Climate & Weather Prediction	Orange			Orange
Environmental Monitoring & Prediction		Orange	Yellow	Yellow
Earth Observation Centre/COSSA			Orange	Blue
Centre for Complex System Science	Blue	Blue	Blue	Blue

* Includes staff in three Functional Areas:

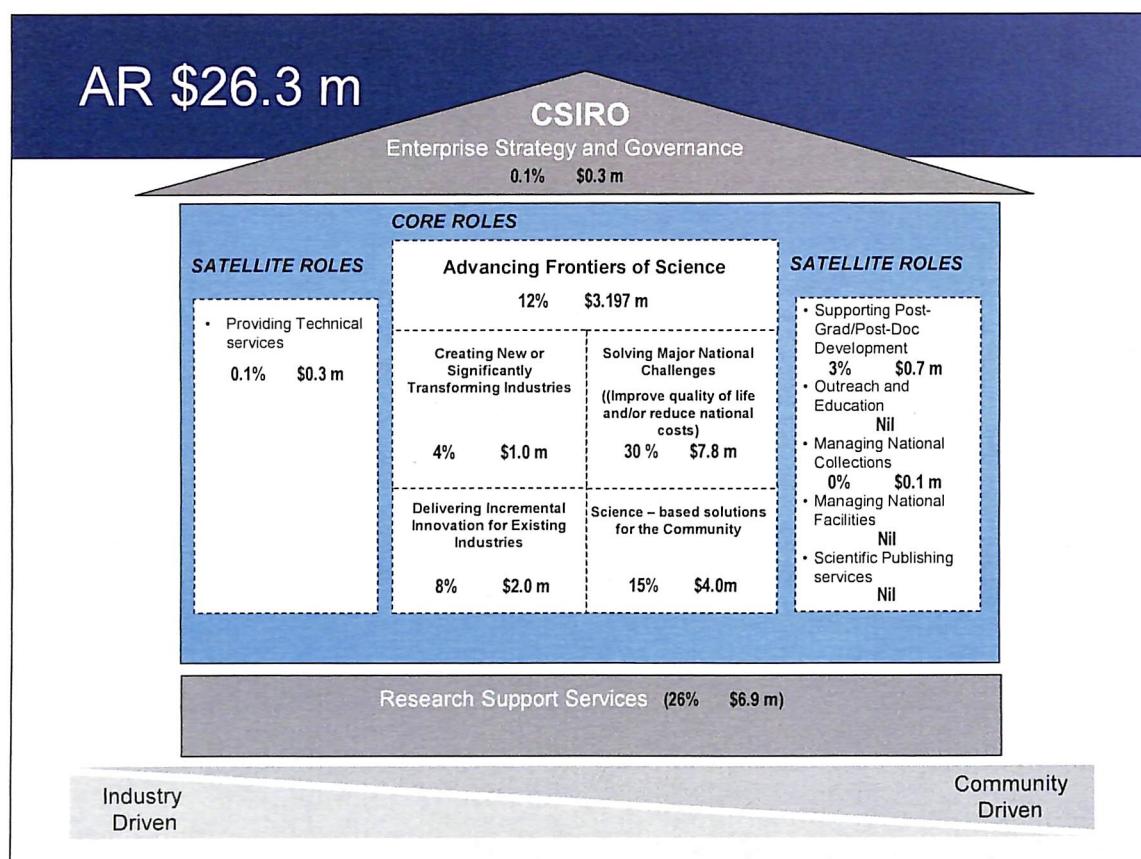
Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High' **≥ 50%**

'Medium' **20 – 50 %**

'Low' **0 – 20 %**

Investment by Roles for 2005-06 – Atmospheric Research

Staffing Profile 2005-06 – Atmospheric Research

Planned Staffing Profile 2005 – 06 (EFTs)	
Functional Area	Total for Division
Research Scientist/Engineer	58
Research Consulting	0
Research Management	4
Research Projects	50
Technical Services	6
General Management	0
Communication and Information	4
Administrative Services	17
General Services	0
Specialist	1
Total Staff	140

Investment Profile 2005-06 – Atmospheric Research

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	3,461	11,000	0	0	14,461
Research & Services	N/A *	7,350	3,365	160	10,875
Expenditure	6,108	17,148	2,918	123	26,297
Net Revenue	(2,647)	1,202	447	37	(960)
Other Revenue and Interest	166	0	0	0	166
Operating Result	(2,481)	1,202	447	37	(794)

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

7.3.2 Marine Research

Chief: Dr Tony Haymet

Overview

CSIRO Marine Research is Australia's largest marine science agency, and has a charter to explore and understand the marine system and its relationship with the climate system, the terrestrial environment and the utilisation of marine resources. Our international-calibre science capability, together with a diverse skills base, enables the creation of multi-disciplinary teams to address priority national needs in areas where no other research organisation in Australia can deliver the science leadership required.

Much of our work involves collaboration with other CSIRO divisions, CRCs, universities, and national and international research organisations. We have well developed partnerships that span state and commonwealth government and industry groups in joint ventures such as the recently announced WA Marine Science Initiative - a \$49m program. We work closely with our clients throughout the entire research process to ensure optimum uptake of our products and outcomes for Australia.

Marine Research has five themes and 16 streams of activity and manages three national collections – invertebrate, fish and algal, as well as the Marine National Facility, as represented in the Strategic Alignment Diagram below.

Marine Research will continue to play a lead role in the Wealth from Oceans Flagship with increased activity in ocean based regional development and growth. A key supporting role will continue in the Food Futures Flagship. Involvement in Water for a Healthy Country Flagship is being explored and links to both the coastal and management by region streams, but no funding is coming to the Division.

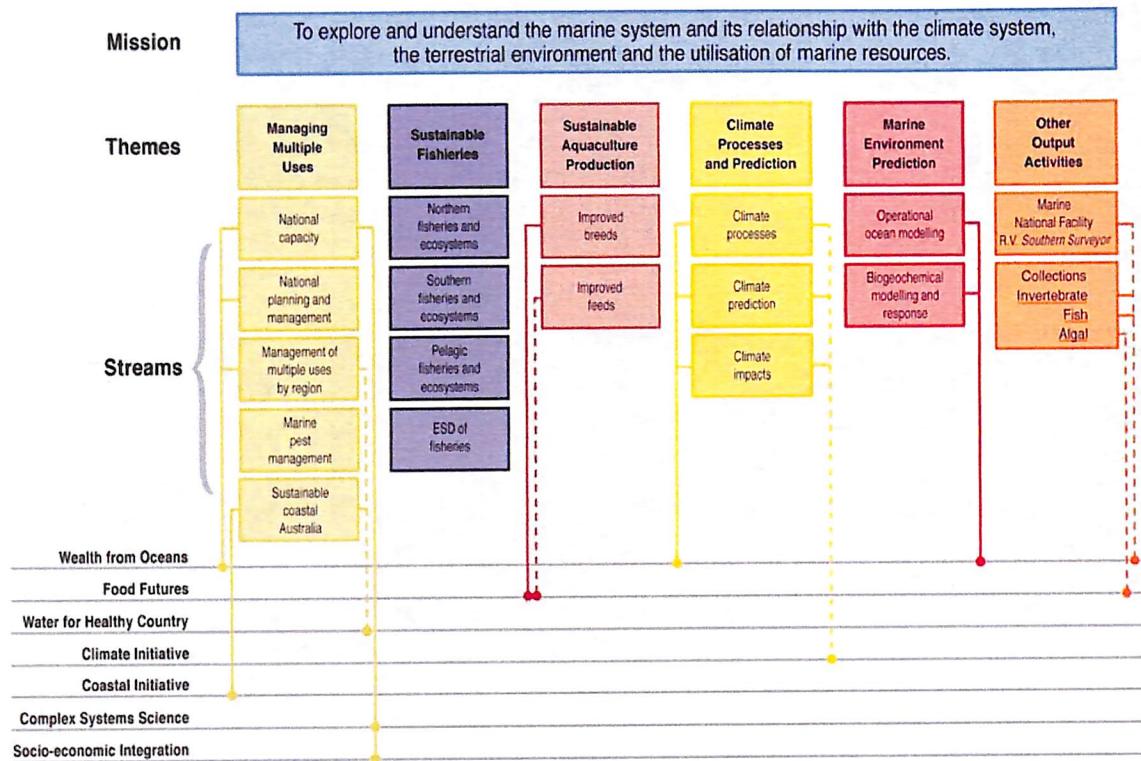
The Division will play a significant role in scoping CSIRO's new coastal initiative and the nature of our research involvement will become clear during the year. The CSIRO Climate initiative remains an important link which has been extended to encompass our climate impacts stream however there is no funding from the initiative. Our work in Complex Systems Science and Socio-economic Integration will focus on developing national frameworks for sustainable marine resources.

The Marine National Facility RV *Southern Surveyor* is also managed by Marine Research on behalf of the nation. It has a \$10M budget with a separate cost centre and its operations are overseen by a Ministerially-appointed steering committee with its own planning and reporting requirements. Key aspects of the research operations and management of the Facility are included in this plan.

The National Collections provide a unique information base about Australia's marine biodiversity and support research in the Wealth from Oceans and Food Futures Flagships but are not Flagship funded.

Alignment Diagram 2005-06 – Marine Research

CMR Strategic Alignment Diagram



Research Themes 2005-06 – Marine Research

The Theme structure represented below is the same as in 2004-05, however as foreshadowed above a new Theme structure will be implemented during the year.

Theme 1 – Managing Multiple Uses (of the marine environment) (\$14.8 m)

Goal: Develop the science and tools to characterise, monitor, predict and manage marine ecosystems at the whole-of-ecosystem level, recognising links across physics, biogeochemistry, trophodynamics, population and community ecology, and interactions across time and space scales. This work provides the scientific basis for the development, implementation and monitoring of Regional Marine Plans, a key objective of the Commonwealth under Australia's Oceans Policy.

Theme 2 – Sustainable Fisheries (16.2 m)

Goal: Improve understanding of the physical, biological and human processes affecting fisheries, provide risk assessments and quantitative models of fishery dynamics and ecosystems, and tools to build and test management strategies for Commonwealth and international fisheries. This work will lead to ecosystem-based management of ecologically sustainable fisheries, ensuring a balance between utilisation of the ocean's resources and conservation of ecosystem function.

Theme 3 – Sustainable Aquaculture Production (\$4.79 m)

Goal: Integrate the development of novel breeds and feeds to achieve a stepwise transition from wild genotypes to selectively bred superior genotypes adapted to maximise production efficiency, profitability, sustainability and market penetration. This will lead to enhanced profitability, competitiveness and sustainability of Australia's aquaculture industry.

Theme 4 – Climate Processes and Prediction (\$7.02 m)

Goal: Reduce uncertainty in climate predictions by advancing knowledge of ocean physics and biogeochemical cycling through observations and models to increase the credibility of predictions of

climate change and variability and lead to positive economic and environmental outcomes for Australia's terrestrial and marine sectors.

Theme 5 – Marine Environment Prediction (\$8.55 m)

Goal: Develop and support the delivery of systems for marine environment prediction in partnership with the Bureau of Meteorology, the Royal Australian Navy and state and federal governments (in particular the WA government through the SRFME partnership). The research will combine marine observations and models into state-of-the-art systems to interpret and forecast the state of the marine environment. This will provide timely, accurate and detailed information on the past, present and future state of the ocean and marine environment to support the exploration, use and management of Australia's marine jurisdiction.

Capabilities by Theme 2005-06 – Marine Research

Theme	Capability						Total
	MSE Modeling	Marine Ecology	Marine Biogeochemistry	Climate & Oceanography	Aquaculture Genetics, Nutrition & Husbandry	Marine Genomics	
Approx No of EFTs*	43	92	51	35	23	10	254
% of total	17%	36%	20%	14%	9%	4	100%
Managing Multiple Uses							
Sustainable Fisheries							
Sustainable Aquaculture Production							
Climate Processes and Prediction							
Marine Environment Prediction							

*Includes staff in three Functional Areas:

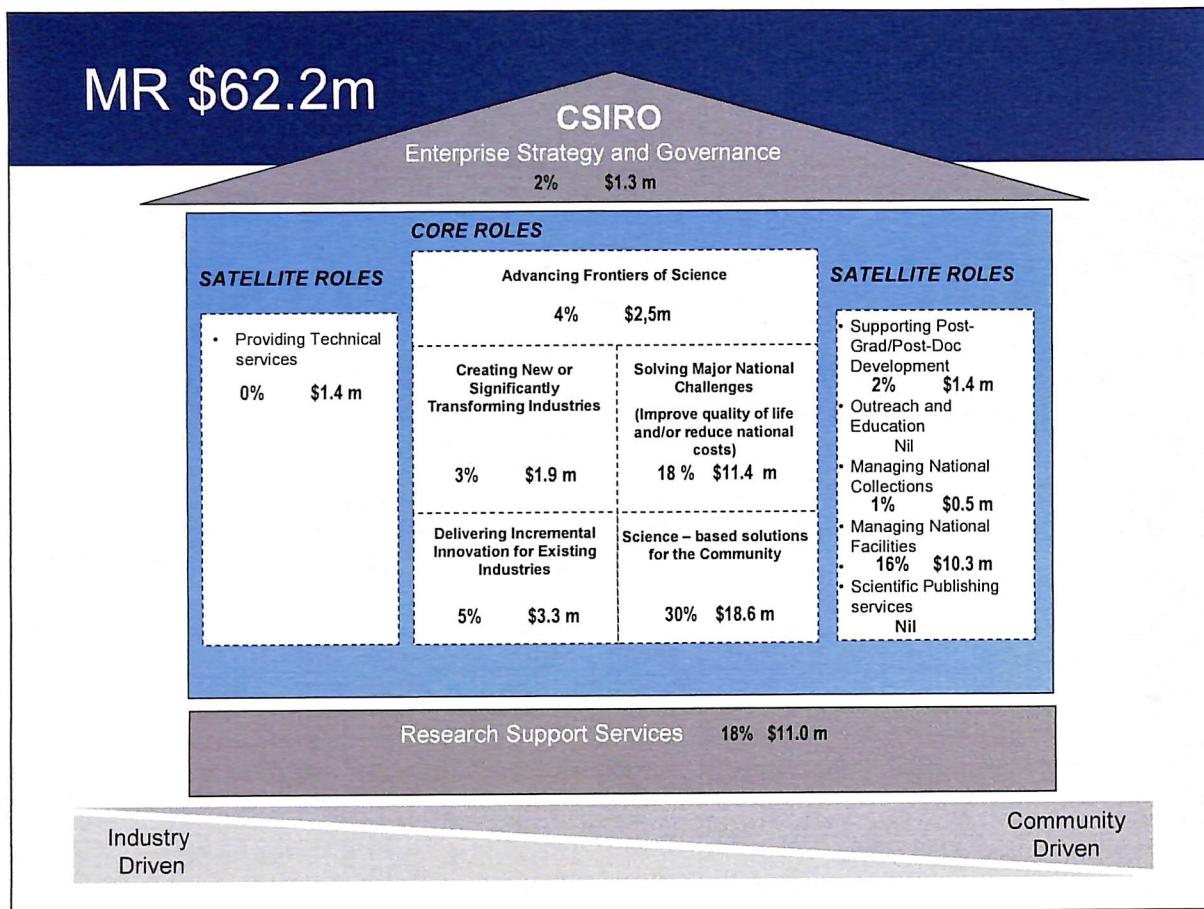
Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High' **≥ 50%**

'Medium' **20 – 50 %**

'Low' **0 – 20 %**

Investment by Roles for 2005-06 – Marine Research

This does include the Marine National Research Facility

Staffing Profile 2005-06 – Marine Research

Functional Area	Total for Division
Research Scientist/Engineer	98
Research Management	2
Research Projects	154
Technical Services	44
General Management	7
Communication and Information	8
Administrative Services	40
General Services	1
Specialist	0
Total Staff	354

Investment Profile 2005-06 – Marine Research**Planned Investment Model Position 2005 – 06**

\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	14,482	18,903	0	0	33,385
Research & Services	N/A *	17,559	800	0	18,359
Expenditure	14,799	36,462	743	0	52,003
Net Revenue	-316	0	57	0	-259
Other Revenue and Interest	259	0	0	0	259
Operating Result	-570	0	57	0	0

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

This does not include the Marine National Research Facility

7.4 Petroleum Resources

Chief: Dr Bev Ronalds

Overview

Oil and gas are critical elements of the Australian economy and our research is being undertaken against a backdrop of declining local crude oil production, record world oil prices, the presence of enormous indigenous gas reserves and a growing realization of the serious implications of CO₂-induced climate change, all coupled with the necessity to compete in a world economy still dominated by oil. This combination presents immediate challenges with respect to oil and enormous opportunities with gas. The challenge for Australia is to manage the oil situation in the short-to-medium term while developing a methane-based economy in the longer term, perhaps en-route to the hydrogen economy. An important aspect of the challenge is to achieve the transformation in an environmentally sustainable manner without massive economic dislocation in the process.

The direction of Divisional research is similar to that established following the major structural re-organisation instituted in 2004-05. In response to national priorities, four broad research strategies are being pursued aimed at:

- encouraging greater oil and gas exploration activity through the development of innovative exploration technologies that are environmentally sustainable and reduce exploration risk,
- enabling improved oil and gas (including gas in coal) recoveries through research into improved drilling, completion and reservoir management technologies leading to reduced production costs,
- developing a capability in natural gas conversion and gas processing technology that will underpin the development of Australian gas-to-liquids and gas to hydrogen industries, and,
- demonstrating the practicality of geological storage of CO₂ in deep saline aquifers and unmineable coal.

In response to the strategies outlined in the SME Group Strategic Plan, the Division is contributing towards major deliverables over the next decade including:

- Reduced Green House Gass (GHG) intensity by 15%
- World leadership position in an emerging methane economy
- Progression towards self sufficiency in transport fuels
- Discovery of new "world class" oil fields

The Division is significantly engaged in three major cross-Divisional programs including:

- The Wealth from Oceans Flagship initiative in oil and gas,
- Minerals Down Under in which Divisional capabilities in both geoscience and geo-engineering can contribute significantly to both mineral exploration and production, and,
- Natural Gas Technology Roadmap that is a core element of the Division's AusGas initiative and will be conducted under the auspices of the Energy Transformed Flagship.

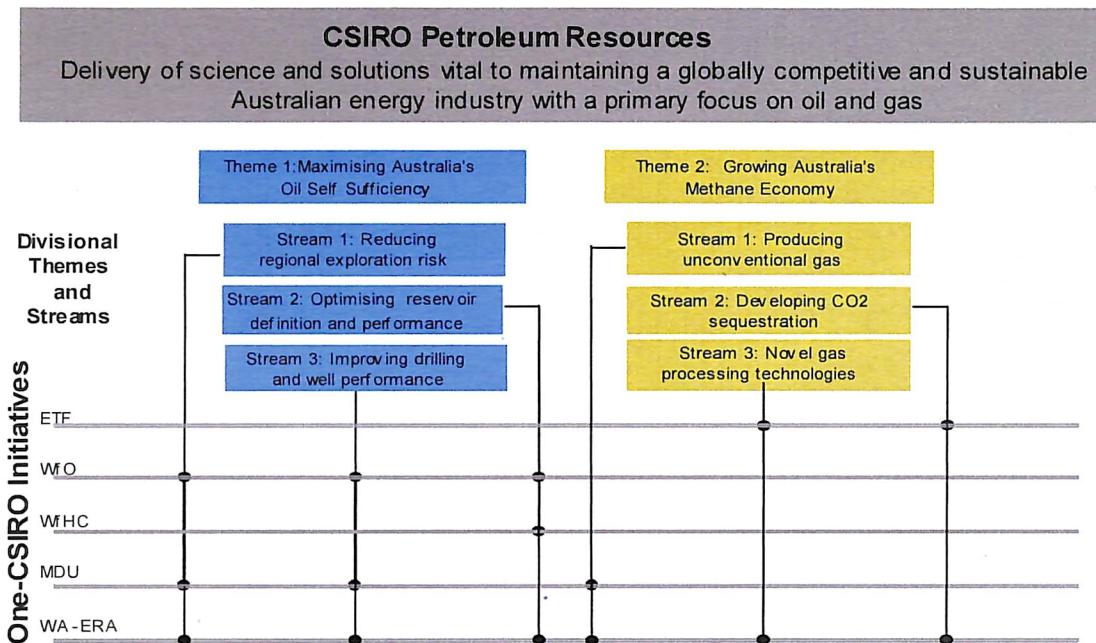
Furthermore, the Division leads CSIRO's engagement with Western Australia Energy Research Alliance (WA-ERA), a research partnership between CPR, Curtin University and the University of Western Australia that provides a framework for CSIRO as a whole to contribute research to the rapidly growing WA-based gas and oil industry.

The research portfolio balance differs between the two themes. Research in Theme 1 is mostly directed at existing industry and is dominated by Incremental Innovation with significant components of Transforming Industry and Solving Major National Challenges, research in the latter areas being dominated by contributions to Energy Transformed Flagship and Wealth from Oceans Flagships. Research in Theme 2 covers similar research domains but has a higher proportion directed at Solving Major National Challenges and Creating New Industry. An increase in Flagship engagement will be accompanied by a small relative decrease in the commitment to Incremental Innovation, particularly in Theme 1, with complementary increases in the domains of Transforming Industry and Creating New Industry.

All streams within both themes have relatively small but important contributions to Frontier Research that are seen as the underpinning of our future mainstream research effort. Appropriation funding contingent on the Divisional Emerging Science Plan will be allocated to provide seed funding to develop larger scale multi-Divisional proposals as well as supporting an existing Emerging Science initiative in complex systems science. Identified Emerging Science initiatives within the Division include:

- Complex systems science (post-Doc Fellow working on multi-scale modelling and upscaling)
- Digital core (high resolution X-ray tomography of rocks)
- Geomicrobiology ("deep life" and microbially enhanced oil and gas production)
- Nanotechnology (gas processing catalysis, chemical sensors)

Alignment Diagram 2005-06 – Petroleum Resources



Research Themes 2005-06 – Petroleum Resources

Theme 1 – Maximising Australia's Oil Self Sufficiency (\$17.8 m)

Goal: Research and development in exploration and production technologies to maintain or increase Australia's current 64% level of oil self sufficiency through:

- integrated predictive geoscience
- technologies to model petroleum systems
- technologies to increase recoveries from known reserves
- development of cost effective drilling, completions and production technologies

Theme 2 – Growing Australia's Methane Economy (\$6.8 m)

Goal: To provide enabling technology to increase the value of Australia's natural gas by a factor of 10 within 10 years as a low emissions energy source through:

- technology to increase Australia's use of gas as an economically attractive transport fuel
- science to increase the recovery of gas from coal and low-permeability reservoirs
- technology to reduce gas production, transportation and processing costs including gas-to-liquids
- technology and science to minimise atmospheric CO2 emissions

Capabilities by Theme 2005-06 – Petroleum Resources

Theme	Capability			Total
	Petroleum Geoscience	Petroleum Geo-Engineering	Natural Gas Processing	
Approx No of EFTs*	47.6	51.0	2.4	101
% of total	46%	50%	4%	100%
Maximising Australia's Oil Self Sufficiency				
Growing Australia's Methane Economy				

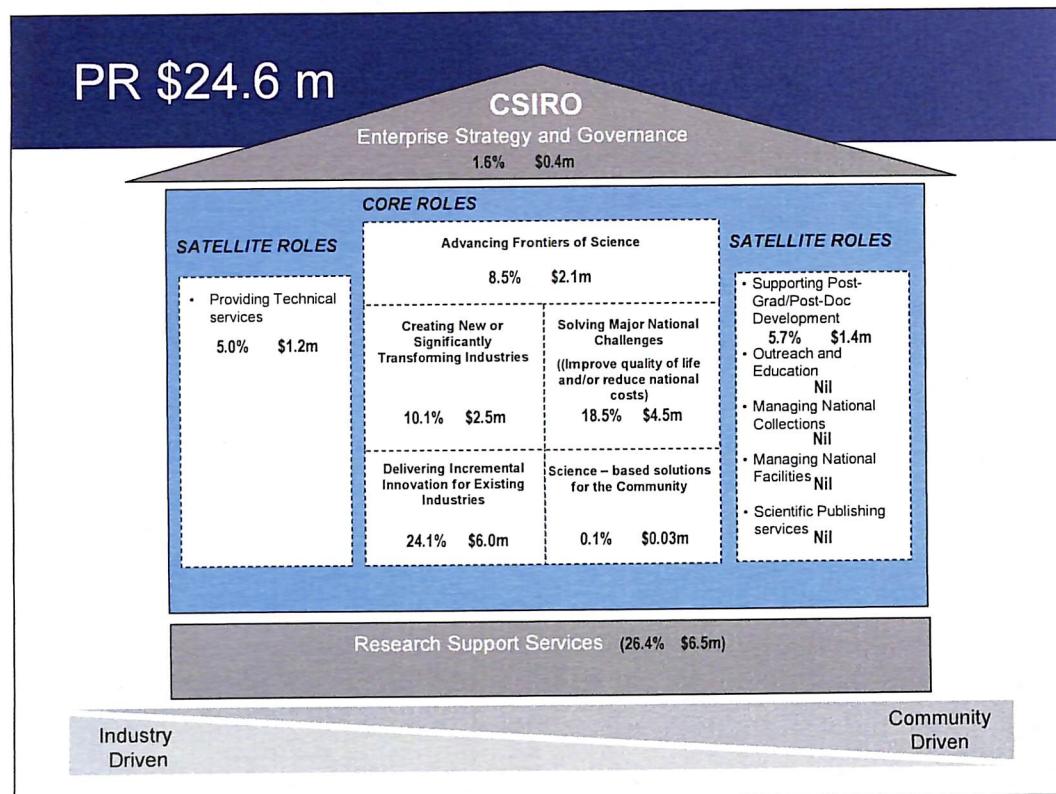
* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Indicative Proportion of Capability allocated to each Theme.

'High' ≥ 50% 'Medium' 20 – 50 % 'Low' 0 – 20 %

Investment by Roles for 2005-06 – Petroleum Resources



Staffing Profile 2005-06 – Petroleum Resources

Planned Staffing Profile 2005 – 06 (EFTs)		Total for Division
Functional Area		
Research Scientist/Engineer		61
Research Management		8
Research Projects		19
Technical Services		5
General Management		2
Communication and Information		2
Administrative Services		17
General Services		0
Specialist		2
Total Staff		116

Investment Profile 2005-06 – Petroleum Resources

Planned Investment Model Position 2005 – 06					
\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	10,024	4,852	0	0	14,876
Research & Services	N/A *	4,946	4,772	747	10,465
Expenditure	9,742	9,522	4,638	726	24,628
Net Revenue	282	276	134	21	713
Other Revenue and Interest	0	0	435	0	435
Operating Result	282	276	569	21	1,148

* Strategic Research and Development [CSIRO Investment] by definition contains no external earnings

7.5 Sustainable Ecosystems

Chief: Dr Andrew Johnson

Overview

2005-06 will see CSE implement a new framework of themes and streams which reduces our number of research themes from 6 to 4 and focuses our former 20 streams down to 12. In so doing, we are seeking to address pressures on the Division by (i) reducing the spread of our activity on to fewer strategically selected areas and (ii) managing for comparative advantage and financial viability in those areas in which we do invest. This new framework incorporates both resource shifts in the SEE group and synergies with divisions working in related areas. In particular, there have been significant shifts in resources around 2 areas:

Environment Biotechnology - where CSE staff in Canberra have moved to Entomology, which will be the locus of CSIRO's environmental biotechnology work. Animal virology and biosecurity risk assessment work will cease in CSE.

Farming Systems – where CLW staff in Adelaide have joined CSE. CSE will focus its effort on landscape scale integration of ecology and agricultural science in agricultural landscapes. This required redirection of some existing effort in Perth and Toowoomba, and an end to species specific conservation management and recovery in Canberra and Perth..

In implementing its Themes and Streams, CSE will increase its investment in areas where we have identified gaps in our scientific capability. The scale of reinvestment will be determined by the wider CSIRO science investment process and the science review planned for October 2005 . This reinvestment will occur via a mix of senior science leadership skills to fill key gaps in streams undergoing growth and post-doctoral positions aimed at catalysing our underpinning science capacity across all Themes and Streams.

Areas for reinvestment in senior science leadership will include:

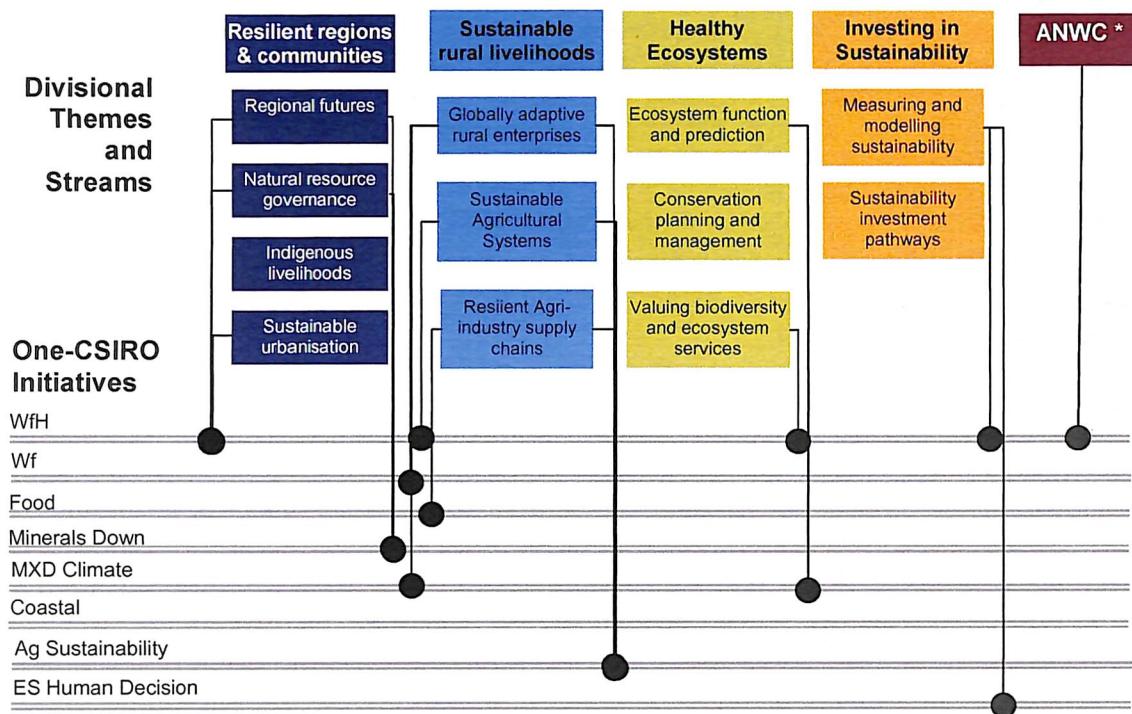
- Sustainable urbanization, including coastal landscapes in southeast Australia
- Measuring and modelling sustainability
- Indigenous livelihoods in northern Australia
- Sustainable agricultural landscapes (south-eastern Australia)

Areas for underpinning capacity investment will include:

- Complex systems analysis and modelling applied to urbanisation phenomena and climate change research.
- Information sciences applied to complex decision-making and value chain modelling.
- Quantitative and social geography relevant to regional scale systems analysis and indigenous livelihoods.
- Grazing ecology and participatory research skills in the rangelands, in the context of future multiple use trajectories.
- Wildlife biology/plant ecology skills for application to human/animal interactions in urbanising regions.
- Agricultural ecology/agro-forestry skills in the context of multi-functional landscapes.
- Spatial ecology skills to underpin quantitative approaches to conservation planning and management.
- Quantitative and predictive ecology in fragmented agricultural landscapes.
- Resource and ecological economics for landscape management and multi-functional landscape design in both urbanising and agricultural landscapes.
- Cross-disciplinary skills (ecology/farming systems/economics) in action research on landscape renewal/redesign.

Alignment Diagram 2005-06 – Sustainable Ecosystems

By understanding the connections between natural, agricultural, industrial and urban ecosystems and economic and social processes, and by building effective partnerships, we will underpin Australia's journey towards sustainability



* ANWC – Australian National Wildlife Collection

Research Themes 2005-06 – Sustainable Ecosystems

Over the course of 2004, CSE reviewed progress over the last 4 years in the development of our six CSE research Themes and one business Theme. We also reviewed the existing 21 Streams and focussed them down to a more manageable and integrative set of four research Themes and one business Theme comprising 12 research Streams and four business Streams. This new strategic framework will sharpen our science focus with fewer research Themes and Streams in 2005 than were developed for CSE in 2000.

In summary, three Research Themes *Resilient regions and communities*, *Sustainable rural Livelihoods and Healthy Ecosystems* represent a triple bottom line focus on implementing a better understanding of:

- The social factors behind long term wellbeing of people in regions and communities,
- The economic, environmental and productive factors sustaining rural livelihoods, and
- The ecological patterns and processes underpinning healthy rural, urban and industrial ecosystems.

The fourth Research Theme *Investing in Sustainability* is integrative and focuses on developing knowledge to support government, community and industry investments in sustainability at local, regional and national scales through enhanced systems understanding of the consequences of various development scenarios and investment pathways.

The fifth Theme, with a business focus, *Sustaining Innovation* refers to enhanced understanding and better performance in our business and governance operations both within CSIRO and with our external partners and stakeholders.

This new strategic framework of Themes and Streams will be adopted in 2005 to drive more collaboration across our existing research and business Programs. It aligns directly with the priorities of the SEE Group and will also assist in fostering collaboration with Divisions in the Agribusiness and IMM Groups. The six existing Programs remain the most effective means of implementing our science and delivery capacity at a local and regional scale around Australia and internationally.

Theme 1 – Resilient Regions and Communities (\$11.81 m)

Goal: Rural and regional communities with the knowledge, planning processes and policy options to prepare for and respond to economic, environmental and social change

Theme 2 – Sustainable Rural Livelihoods (\$17.36 m)

Goal: Prosperous and sustainable rural enterprises driven by innovative management, attuned to the Australian environment, and adapted to global change

Theme 3 – Healthy Ecosystems (\$11.05 m)

Goal: Ecosystem goods and services enhanced to underpin social and economic wellbeing

Theme 4 – Investing in sustainability (\$3.90 m)

Goal: An Australian society making well-informed choices about national resource policy, management and investment options.

Capabilities by Theme 2005-06 – Sustainable Ecosystems

Theme	Capability				Total
	Ecology	Farming Systems	Economics & Social Science	Systems Integration	
Approx No of EFTs*	85	85	69	26	265
% of total	32	32	26	10	100
1. Resilient regions and communities					
2. Sustainable Rural Livelihoods					
3. Healthy Ecosystems					
4. Investing in sustainability					
Australian National Wildlife Collection					

* Includes staff in three Functional Areas:

Research Scientist/Engineer; Research Management and Research Projects.

Key: Proportion of Capability allocated to each Theme.

'High'

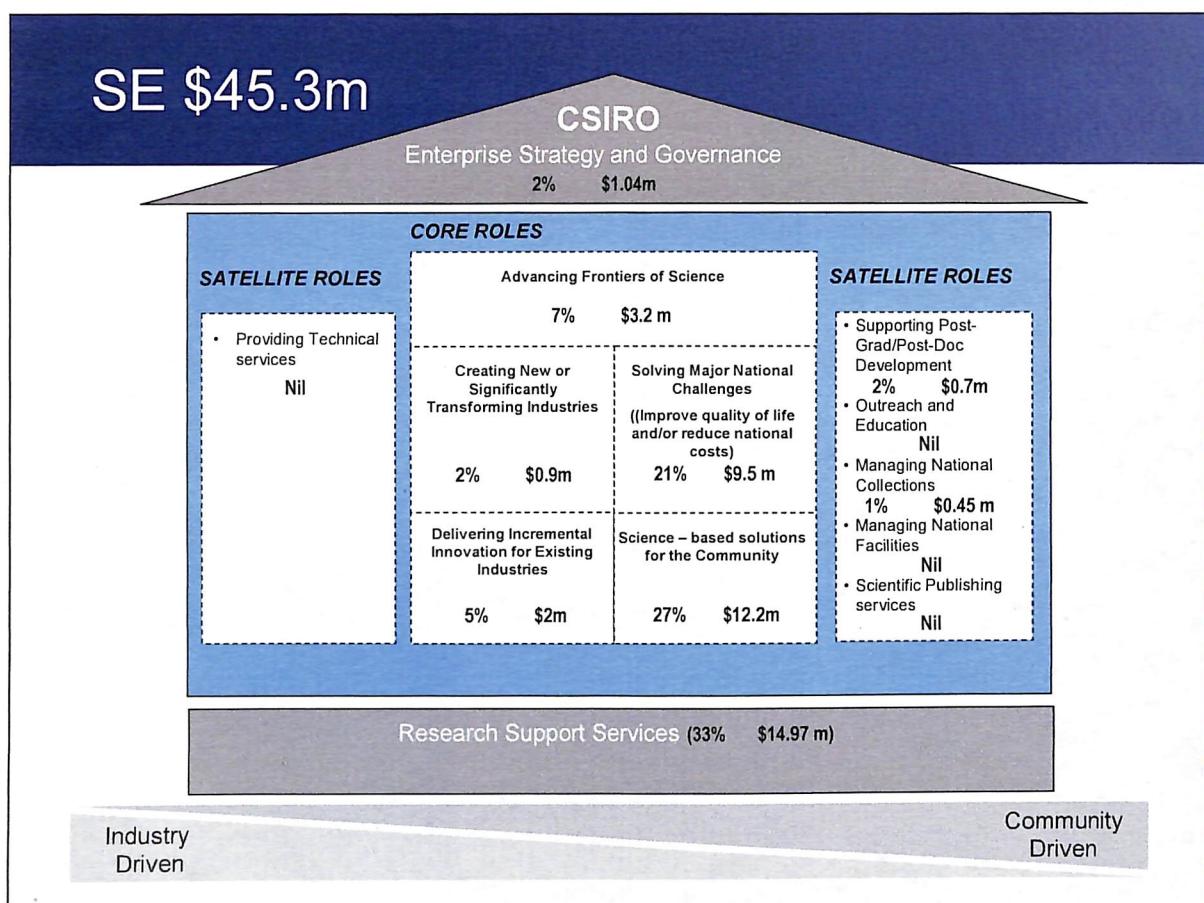
≥ 50%

'Medium'

20 – 50%

'Low'

0 – 20%

Investment by Roles for 2005-06 – Sustainable Ecosystems

Staffing Profile 2005-06 – Sustainable Ecosystems**Planned Staffing Profile 2005 – 06 (EFTs)**

Functional Area	Total for Division (CSOFs only)	Total for Division
Research Scientist/Engineer	113	131
Research Management	9	9
Research Projects	143	218
Technical Services	8	9
General Management	4	4
Communication and Information	17	19
Administrative Services	59	74
General Services	2	2
Specialist		
Total Staff	356	467

Investment Profile 2005-06 – Sustainable Ecosystems**Planned Investment Model Position 2005 – 06**

\$ '000	Strategic R&D [CSIRO Investment]	Strategic R&D [Co- Investment]	Research Services, Advice, Specialised Consulting and Testing	Licensing and Exploitation of Intellectual Property	Total for Division
Revenue					
Appropriation	16,382	14,199	0	0	30,581
Research & Services		12,588	1,300	60	13,948
Expenditure	17,297	26,787	1,200	45	45,329
Net Revenue	-915	0	100	15	-800
Other Revenue and Interest	800	0	0	0	800
Operating Result	-115	0	100	15	0

Section 8 Corporate Groups

8.1 Office of the Chief Executive

Chief Executive: Dr Geoff Garrett

Deputy Chief Executive: Dr Ron Sandland

Executive Director Science Planning: Dr Michael Barber

Overview

The mission of the Office of the Chief Executive is to:

- provide an effective leadership, governance and strategy framework for the Organisation
- ensure effective management of critical external relationships
- provide effective oversight and leadership for the Flagship initiative,
- ensure the sustained impact and scale of CSIRO's science base
- optimise CSIRO's science investment portfolio
- contribute effectively to Australia's science innovation policy
- ensure the effective implementation of CSIRO's operational development and change initiatives.

The Organisation's operational and strategic performance is overseen by the Executive Team (ET) chaired by the CEO. A standing agenda ensures regular review of operational performance (research delivery, financial and commercial), developments including progress against the strategic plan and risk assessment and audit findings.

The OCE's activities are supported by wider organisational processes including: policy development; Risk Assessment and Audit; and Performance Management and Reporting. The Flagship Implementation activity, the Board Office, the Science Planning Unit and the Science Investment Group report through the Deputy Chief Executive to the Chief Executive.

The establishment of the Program Office late in 2004 will better co-ordinate change projects across CSIRO, work to embed change more successfully and to provide the change management architecture to transform the Organisation and achieve the vision. This will involve close interaction of the OCE, Executive Management Council and Internal Communications.

The broader management group of the organisation, the Executive Management Council (Chiefs of Divisions, Flagship Directors and General Managers) meets six times a year and focuses on enterprise-level planning and activities.

In 2005-06, the formerly separate unit of Science Planning which includes responsibility for managing CSIRO's High Performance Science Computing Group (HPSC), has been incorporated into the Office of the Chief Executive (OCE). In addition, the former "C-Sharp" activity has been re-named Science Investment Process (SIP). The area of Strategic Transactions will be actively engaged in large and complex strategic initiatives such as CSIRO/ANU collaboration proposal and provide advice to the Chief Executive. A new Science Policy Unit, to be established during 2005-06, will work closely with Divisions and the Communications Group to strengthen the provision of 'one-CSIRO' policy advice to government.

Themes 2005-06 – Office of the Chief Executive

Theme 1 – Strategic Management (\$5.58 m)

(CEO, DCE, Board Office and Flagship Implementation Office)

Goal: To deliver highly effective leadership within a robust governance framework and specifically through effective and efficient implementation against the objectives set in the Strategic Plan with particular reference to Flagship Programs and portfolio investment.

Theme 2 – Science Planning and Investment (\$6.67 m)

(Science Planning, HPSC, SIP and Strategy Development)

Goal: To ensure that CSIRO's science base is enhanced to achieve focus, sustained impact and scale, that CSIRO's science investment portfolio is optimised and to position CSIRO as an effective and respected contributor to the development of science and innovation policy in Australia.

Theme 3 – Strategic Transactions (\$0.62 m)

(Strategic Transactions)

Goal: To provide advice and support to the Chief Executive and Board on large and complex strategic transactions of the Organisation.

Strategy Implementation Goals for 2005-06 – Office of the Chief Executive

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
1.2 Build critical mass and ensure quality in our core research programs	Complete at least six Divisional Science Reviews.
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	Implement an enhanced science investment process for enterprise wide priority setting to improve the relevance and impact of CSIRO's entire portfolio and to increase the number and impact of cross divisional initiatives.
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	Implement incentives (including Divisional targets and other drivers) to double the number of post-doctoral fellows (beyond the 04-05 target of 300 to 325 in 05-06, 360 in 06-07 and 400 in 07-08). Establish the 'CSIRO Science Leader Initiative' which has the objective of recruiting outstanding scientists to CSIRO.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Successfully establish the new Flagship Collaboration Fund through the disbursement of a significant proportion of budgeted funds in accordance with the agreed operating principles. Finalise details and execute an appropriate ANU-CSIRO collaborative partnership agreement.
3.2 Service the needs of government for informed policy setting	Establish the Science Policy Unit and develop strategies for providing one-CSIRO policy advice to Government. Develop and implement an engagement strategy for key government stakeholders and provide training and guidance to CSIRO scientists and management that enhances their capability to strategically engage with and influence Government. [This goal is also relevant to Strategic Objective 6.1 and is shared with the Communications Group].
5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research	Allocate funds for the proof-of-principle research phase for at least five cross-CSIRO emerging science proposals.

8.2 Business Development and Commercialisation

Executive Director: Mr Nigel Poole

Overview

Business Development, Commercialisation and Legal functions operate in a matrix. The specialist corporate group (located mostly in North Ryde and Parkville) works together with executives in every Division of CSIRO. It is a transaction group, but one that also builds and maintains relationships with the stakeholders outside CSIRO as a result of identifying, driving and closing those transactions.

The operating plan for this group for F05-06 is to continue building capability and impact and to increase delivery levels above those achieved in 2003-04 and 2004-05. The strategic plan calls for step changes in delivery for the organisation in these areas – over a \$71m increase (24%) in external earnings from contract and co-investment and a five-fold increase in IP earnings to \$72M by 2007.

The key objectives of the group are to:

- Deliver significant lifts in organisation revenue from external sources;
- Build CSIRO's impact by providing a business interface between the research functions and customers, intermediaries and capital providers who will use and implement the outcomes of the research;
- Manage the risk of those interactions via appropriate legal contracts;
- Provide a governance framework and governance process at an acceptable level for each and every transaction such that CSIRO's reputation and brand is protected and enhanced.

Business Development. The majority of CSIRO's Business Development resources are in Divisions, which increasingly work together to maximise enterprise-wide opportunities, including for Flagships. The 2003-07 Strategic Plan challenges CSIRO to grow external revenue (excluding IP) by 24% over the following three years. In contrast, CSIRO external revenue grew by just 10% from \$250m to \$274m over the past three years. Given limited appropriation available to co-invest, alignment of Corporate and Division resources is required around our best opportunities and revenue from existing relationships, while investing in new market development.

The Corporate Business Development function has three core roles:

1. **Relationship management** to defend and grow existing revenue base of government, major corporations and Rural Research and Development Corporations;
2. **Building business management capacity** through support for Client Service Teams pipeline management, business and impact analysis, monthly reporting of revenue from key clients, and marketing support;
3. **Opening new markets** such as major development foundations and funding agencies.

Commercialisation seeks to create both impact and income by transfer of intellectual property (IP) to external parties. For CSIRO, income from IP remains an important indicator for success in creating impact for Australia from science. Income is derived from a combination of licensing (royalty) income, new equity origination, and harvesting of the existing equity portfolio. In 2003-04, CSIRO's IP income increased 60% from \$14M to a record \$22M. The IP income budget for 2004-05 at \$29M, for F05-06 at \$46M and for F06-07 at \$72M are valid, but significant stretch targets.

Strategies for the commercialisation function for the 2005-06 and 2006-07 year are designed to increase the pace and the success of initiatives to date. Focused efforts on equity origination will continue, with appropriately structured and resourced teams for RIPPERs. Several other operating changes will be put in place during F05-06, including the establishment of a commercial office and more structured management of the IP portfolio. The corporate team will also lead and contribute to design changes to the Commercialisation function resulting from the Research Support Services review process.

Corporate Legal will continue to implement a number of strategic and structural initiatives through 2005-06 designed to address issues identified in the 2004 review of the legal function, including:

- a coordinated legal recruitment strategy for divisions to invest in additional resources to close gaps in divisional legal support under a shared lawyer model managed by Corporate Legal;
- formation of a one-CSIRO leadership team, with the addition of 3-4 deputy general counsel and a corporate patent counsel to: manage change in the legal function; create clear lines of responsibility and accountability; and coordinate cross divisional and Flagship legal support.

Corporate Legal is leading and managing the Research Support Services project in designing and implementing a one-CSIRO shared services model for the legal support during 2005-06.

Corporate Legal will maintain its governance and risk management focus and its legal environment monitoring and compliance role, including the roll-out of revised commercial operational policies and guidelines and implementing changes to the legal sign-off process and mid-tier transaction sign-off.

Corporate Legal is responsible for the management of disputes (both defensive and offensive) and will provide dedicated support to the WLAN litigation. A new panel of external legal advisers will be appointed and Corporate Legal will be responsible for managing external legal spend, developing one-CSIRO relationships with the panel firms and introducing guidelines for briefing external counsel.

Reflections on 2004-05

In addition to the decision to restructure the legal function described above, 2004-05 was a year of:

- Consolidation of the Commercialisation function with seed and series A capital raisings;
- Full implementation of the Shareholding Policy in the equity management function;
- Progress in developing commercial potential from CSIRO's intellectual property assets;
- Ongoing implementation across business transactions of corporate governance processes;
- Strong effort and results in Business Development engagements with State Government and RDCs;
- Exploratory activities in some other Business Development areas;
- Completion of the Fast-track contract simplification project with the roll-out across CSIRO Divisions of the system;
- Revision of the Commercial Operational Policies

At the end of 2004-05, a number of BD&C activities were reviewed for ongoing implementation in 2005-06 and some activities have been closed, or going forward will be conducted at a reduced level. The Themes described below represent a more focussed portfolio than 2004-05, particularly in relation to Business Development activities.

Themes – 2005-06 (\$9.463 Million – includes Flagship funding)

Theme 1 – Business Development

Goal: Grow major business segments by facilitating and supporting the enterprise in winning large oneCSIRO opportunities. Lead a process to define how CSIRO can increase its Client Impact.

Theme 2 – Commercialisation

Goal: To take the leadership role in reaching CSIRO's \$46M objective for IP and equity revenues in 2005-06.

Theme 3 – Legal

Goal: To ensure adequate legal support across the entire organisation and to increase value for money in legal services through improvements in the quality of legal services and reduction in the costs of delivery.

Theme 4 – Office of the Executive Director/Commercial Office

Goal: Increase impact of the CSIRO-wide BD&C function across the Themes, plus implementation of a range of governance systems and processes to the satisfaction of the Board, BCC Chairman and the Chief Executive.

Strategy Implementation Goals for 2005-06 – Business Development and Commercialisation

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
3.4 Partner with other agencies to advance Australia's global development contributions	Capture benefits from tendering for global development opportunities and capitalise on relationship building by bringing substantial global development projects to fruition.
4.1 Intensify engagement with rural research and development corporations to grow regional and new industries.	Generate additional large contracts (\$10m per annum in additional lifetime contract value) with RDCs through successful management of high-level one-CSIRO relationships with key RDCs.
4.2 Structure deeper and more meaningful relationships with large corporation	Generate additional revenue (\$5m per annum in additional lifetime contract value) from commercial contracts with corporations in Australia and overseas through successful management of high-level one-CSIRO relationships with key corporations.
4.3 Accelerate the growth of promising technology based SME's	Link more formally with SME technology transfer programs to make CSIRO's IP more accessible and transparent to SMEs
5.2 Be among the best in governance, OHS&E and performance management processes	Enhance the efficiency and effectiveness of the transaction approval process and of the legal function as a whole
5.3 Adopt a unified approach to dramatically improve service and grow top accounts	Manage relationships with RDCs, the Commonwealth Government and State Governments in Victoria and Queensland through dedicated Relationship Managers. Develop relationships with the corporate sector through facilitation of visits to CSIRO sites, challenge workshops and tours and active identification of key prospects.
6.2 Proactively manage patent portfolio to multiply IP-based revenue streams	Continue delivery of increased intellectual property revenues by larger scale spin outs and delivery of licensing initiatives.

8.3 Communications

Executive Director: Ms Donna Staunton

Overview

Communications will *"promote and enhance the reputation and influence of CSIRO by actively managing internal and external stakeholders so as to create an environment in which CSIRO is able to achieve its strategic objectives"*.

The Communicators' Network has the responsibility of enhancing the reputation and influence of CSIRO by actively engaging with key stakeholders and promoting the scientific and technological achievements of the Organisation. The Network consists of the Corporate Communications Group and Divisional Communicators and the stakeholders include CSIRO staff, Government (both Federal and State), media, the Australian- community (including teachers and students) and the research and business communities.

CSIRO's positioning will be informed by the Branding, Positioning and Performance Study and will be supported by a unified web presence which will provide an appropriate framework to enhance marketing and/or partnering opportunities with business and industry, research organisations, teachers, students and the media.

Reflections on 2004-05

Corporate Communications has achieved a great deal over the past year despite facing some significant internal and external challenges. Restructuring aimed at facilitating better delivery of the communication strategy occurred early in the year. Despite some staffing issues, we have now appointed experienced managers in Media and Internal Communications. Management of external issues (including relationships with the media) are improving. The following lessons were learnt in 2004-05:

- Major change initiatives require early and thorough planning to maximise delivery of timely information and support to external and internal stakeholders. The communications function needs to be involved in the initial planning phase.
- More proactive relationships with the media need to be developed to promote the reputation and influence of CSIRO across the enterprise and within the broader community.
- An issues management capability needs to be developed and more effective issue management tools need to be developed to strengthen the communication function across the organisation.
- Resources need to be better aligned to optimise communication activities across One-CSIRO projects, like Flagships.
- Clearer definitions of roles and responsibilities are necessary to enhance the capabilities of the communication function to strategically engage with stakeholders.
- Communication staff need to be better positioned with divisional management to ensure strategic communication advice is able to be given ("a seat at the table").

Themes 2005-06 –Communications

Theme 1 – Reputation Management (\$2.6 m)

Goal: Strategically position CSIRO as responsive, collaborative and innovative – and as the first and most trusted source of scientific expertise - thereby enhancing opportunities for partnering and for gaining internal, community, industry and government support.

Theme 2 - Marketing (\$3.8 m)

Goal: Support Business Development and Commercialisation to grow major business segments by providing strategic communication advice, support and tools. CSIRO's positioning will be informed by the Branding, Positioning and Performance Study and will be supported by a unified web presence which will provide an appropriate framework to enhance marketing and/or partnering opportunities with business and industry, research organisations, government and others.

Theme 3 – Internal Communications (\$0.6 m)

Goal: Provide strategic communications advice to support the Executive in addressing key internal stakeholders in a timely and effective manner. Ensure effective communications advice is provided to support the implementation of CSIRO's strategic plan and the change initiatives across the organisation.

Theme 4 - Position CSIRO as a trusted source of scientific advice to Government (\$0.9 m)

Goal: Inform and influence the public policy debate by anticipating the needs of Government and by providing scientific and evidence based information in a timely and objective way.

Theme 5 – Outreach Activities (\$6.3 m)

Goal: Play a key role in influencing science policy and raise awareness of the value of CSIRO and science with young people and teachers and promote science as a career of choice.

Theme 6 - Capability Building across the Communication Network (\$0.2 m)

Goal: Improve the internal efficiency, quality and capabilities of the communications function by developing and implementing a service delivery model that supports and enhances an enterprise approach to CSIRO's communication activities.

Strategy Implementation Goals for 2005-06 – Communications

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Implement an integrated Flagship marketing and communication strategy to engage, inform and enthuse internal and external stakeholders (government, research community and the public) about Flagship progress and achievements.
3.2 Service the needs of government for informed policy setting	Establish the Science Policy Unit and develop strategies for providing one-CSIRO policy advice to Government . Develop and implement an engagement strategy for key government stakeholders and provide training and guidance to CSIRO scientists and management that enhances their capability to strategically <i>engage</i> with and influence Government. [This goal is also relevant to Strategic Objective 6.1 and is shared with the Office of the Chief Executive].
3.3 Enhance communication to raise public and stakeholder excitement and trust in science	Deliver an integrated communications strategy which promotes CSIRO's science and develops strong partnerships and advocacy relationships within the community. Build the profile of CSIRO senior management and scientists by encouraging more public engagements (via media interviews, conferences etc). Raise the profile of CSIRO Education and Outreach in the community, specifically with teachers and with children.
3.1, 3.2, 3.3, 3.4, 4.2, 4.3	Deliver the results of regular stakeholder research to identify the attitudes and needs of these stakeholders and develop communication strategies to support CSIRO's initiatives.
5.4 Implement standard processes and IT systems to enhance collaboration and efficiencies.	Deliver a unified web presence for CSIRO.
6.1 Secure greater Federally funded support for CSIRO science investment	Cultivate championship of CSIRO and its positions across political parties and at all levels of Government and build on the unique strengths of CSIRO and create community interest, excitement and understanding of its work.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Develop a communication "community of practice" which facilitates the integration and rationalisation of communication services across CSIRO

8.4 Corporate Operations Group

Chief Financial Officer / Executive Director: Mr Mike Whelan

Overview

The Corporate Operations Group (COG) oversees a number of the key operational aspects of the organisation, including: Information Technology; Finance; Governance and Policy; Library Services and Records Management; Operational Performance and Planning; Property; and, Risk Assessment and Audit.

Beyond the themes associated with the operational structure of the group, activities are underpinned by a set of behaviours, encompassing service, productivity, accountability, transparency and risk mitigation.

The functional activities of COG can be broken into those that are conducted for the enterprise as a whole – Information Technology, Risk Assessment and Audit and Property, and those that are the “corporate” component of a distributed functional activity – Finance, Governance and Policy, Library and Records Management and Operational Performance and Planning. As we look forward these “corporate” activities are likely to be re-engineered as part of the wider review of the organisation’s research support services and the migration to a “shared services” delivery model. This will see greater integration with current divisionally based activities and rationalisation of current duplication.

Reflections on 2004-05

The Corporate Operations Group has had a challenging yet productive year addressing issues to help achieve organisational strategic goals:

- The Business Enabling Technologies Review (BETR) Project Business Case was positively received by both the ET and the Board in April and May. Pending the Board's final approval in June, BETR will issue a tender for implementation and ongoing hardware/software support for the SAP system. If all goes to plan, we would commence the implementation in November 2005 with a major emphasis on process re-design and with a Go Live in the last quarter of calendar year 2006.
- The Research Support Services (RSS) Review commenced in late 2004-05 following the Organisation's decision to migrate Divisional and Corporate based models for the delivery of research support services to an enterprise-wide shared services model. The RSS review is designed to address the strategic goals dealing with: 'adopting a unified approach to improve service dramatically'; 'implementing standard processes'; and, 'reducing overheads'.
- CSIRO IT officially began on July 1, 2004 and now has over 270 staff members. IT services are now delivered through five main avenues - self-service; the Enterprise Service Desk; Business Support Teams, Technical Specialist Teams, Projects and the Client Services Team. The unified structure is ensuring IT services and systems are more consistent and compatible for everyone across CSIRO. Streamlined day-to-day IT support is also enabling a redistribution of resources to support science and complete essential IT projects.
- The Procurement initiative has harnessed CSIRO's purchasing power, on a whole-of-organisation basis, to deliver optimal benefits to the organisation such as value for money, efficiency and effectiveness, probity and equity and effective competition.
- The follow-up audit on Project Management practices resulted in a positive outcome for CSIRO. In addition, project management policy and processes were reviewed and streamlined to recognise that different classifications of work require different levels of project management application.
- Reform of information service activities also continued over the course of the year but at a pace slower than originally intended. These activities have now been integrated into the Research Support Services Review with the full implementation of an enterprise wide information services function likely by end of the 2006 calendar year.
- Significant progress was also made in the development of the organisation's governance framework including significant improvements to the CSIRO policy framework, development of

an organisation wide incident management framework and associated business continuity plans. Initial engagement has also taken place with DEST and DoFA in regard to the implementation of the Government's Uhrig review of agency governance arrangements. This is expected to be completed by March 2006.

Themes 2005-06 – Corporate Operations Group

COG themes remain, for the most part, unchanged. However there will be a greater focus on delivering the outcomes planned throughout 2004-05. A new group and theme has been identified within COG for 2005-06. The new group, Governance and Policy, has been formed to deliver on the governance element of strategic goal 5.2.

Theme 1 – CSIRO IT (\$49.66 m)

Goal: To deliver IT services, information services and IT projects that support CSIRO's strategic directions and its science and business operations.

Theme 2 – Finance (\$3.76 m)

Goal: To deliver best practice financial management services to internal stakeholders (Board, Executive, Flagships, Divisions and Corporate Units) and external stakeholders (DoFA, DEST, and other government agencies).

Theme 3 – Governance & Policy (\$0.37 m)

Goal: To develop and continuously improve CSIRO's governance framework and its elements (including policy reform) to support CSIRO's strategic direction for best practice in governance.

Theme 4 – Library Services & Records Management (\$1.75 m)

Goal: To deliver a Library and Records Management service through a One-CSIRO approach to support capabilities that enhance CSIRO's science and business operations.

Theme 5 – Operational Performance Unit (\$0.65 m)

Goal: To facilitate recognition of CSIRO as a performance oriented Organisation through operational planning, performance measurement and project management processes that provide transparent links between strategy and operations.

Theme 6 – Property (\$2.24 m)

Goal: To provide effective and efficient property services (provision and management of accommodation and facilities) throughout the organisation to support CSIRO's science and business operations.

Theme 7 – Risk Assessment & Audit (\$1.55 m)

Goal: To deliver a high quality, cost effective audit and advisory service, ensuring significant risks are effectively managed, governance processes observed and valuable business improvements achieved.

Strategy Implementation Goals for 2005-06 – Corporate Operations Group

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
2.2 Optimise delivery of all research activities by improving project management	Actively facilitate and monitor compliance with the new project management policies and guidelines that recognise different classifications of work and corresponding levels of project management application.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Develop and pursue initiatives for sharing facilities and their management with universities and agencies based on an evaluation of potential opportunities.
5.2 Be among the best in governance, OHS&E and performance management processes	Develop and continuously improve the CSIRO governance framework and its elements in readiness for the assessment of the organisation against the recommendations of the government's Review of the Corporate Governance of Statutory Authorities and Office Holders (the Uhrig review). Implement a more integrated risk assessment and management framework that eliminates duplication in the current risk management framework and makes the risk assessment process a more value adding part of line management activities.
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Implement the Business Process and Enabling Technology Review (BETR) project and the associated support process re-engineering activities. Significantly progress the migration of research support services to a shared services model and the associated integration of corporate and divisional support activities. Deliver benefits and demonstrate savings arising from implementation of CSIRO IT.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Establish and implement a wider range of national procurement contracts and demonstrate realised savings.

8.5 People and Culture

Executive Director: Mr Peter May

Overview

During 2004-05 a review was undertaken of the people issues facing CSIRO. As the organisation strives to become a "research enterprise with global reach" it faces its most significant organisation development challenges of the last 20 years. Simultaneously, the organisation is adjusting its structure, research priorities, operating systems, culture and the way it delivers research outcomes, creating a pivotal role for the People & Culture function. A Change Program Office has been established to help "make sense" of and coordinate all of this change through an integrated engagement strategy. The Program Office seeks to build 'change readiness' so that implementation of strategic initiatives becomes easier. A high-level summary of the change plan is illustrated in Appendix 10.1. Over the coming (financial) year, the Change Program Office will co-ordinate *Strategy in Action* Workshops involving CSIRO's top 300 leaders.

The Strategic Plan compels the P&C team to focus on key people and business issues. These include: Flagship delivery, managing major change initiatives, talent management and leadership development, targeted skills development, workforce planning informed by the science investment process and increased effectiveness and efficiency in the delivery of People & Culture services.

In a nutshell our overarching goal is to *develop high performing teams that work across boundaries so that CSIRO becomes a research enterprise with global reach*. This focus provides increased emphasis on improving the ability of leaders and teams to work with increased effectiveness across CSIRO.

Given this goal, it is critical the P&C community models behaviours that are congruent with the goal. It too needs to work as a high performing team that is able to work across boundaries so as to deliver of the organisations strategic intent. To achieve this, and to provide greater integration and leverage across CSIRO, the People & Culture community (which includes OHS&E) have formed Leadership Teams (comprised of HR Managers and OHS&E Managers from each business unit and senior staff from the Group). These teams are critical to our success.

Themes – 2005-06

New Themes and Streams have been developed that are more closely aligned to the people issues that support the implementation of the Strategic Plan.

Increased emphasis and resourcing is provided for the transformational dimensions of culture, organisation development, leadership and targeted support to Flagships and cross-Divisional activities. The Organisation Development & Culture Theme comprises two streams: Flagship Consulting and Capability & Culture. The Research Leadership Initiative and the Enterprise Change Program Office are new initiatives.

The need to support Flagships and the introduction of BETR has provided the opportunity to review the effectiveness and efficiency with which services are delivered. The People Services Theme comprises four streams: Executive Services, People Systems & Delivery, Learning & Development and Occupational Health Safety & Environment. Four key areas have been targeted for improvement in 2004-05. They are talent management, performance improvement, risk management and health & well-being.

Theme 1 – Organisation Development, Leadership and Culture (\$2.07 m)

Goal: To strengthen the ability of leaders to manage change, develop high performing teams and identify and develop key talent.

Theme 2 – Program and Change Management Office (\$1.63 m)

Goal: To integrate, co-ordinate, facilitate and communicate major enterprise-wide change initiatives.

Theme 3 – People Services (\$5.38 m)

Goal: To deliver consistent, efficient and effective enterprise wide services aligned with strategy.

Theme 4 – Research Leadership Initiative (\$1.72 m)

Goal: To design, develop and deliver initiatives to embed the quality research leadership, practices and support that will ensure CSIRO is well-positioned to deliver greater impact and valued from its research initiatives.

Strategy Implementation Goals for 2005-06

Implementation of CSIRO Strategic Plan	
Strategic Plan Objective	Strategy Implementation Goals for 2005-06
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Strengthen capability to build strong cross-divisional teams
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	<p>Undertake Strategy-in-Action workshops with Management Teams to enable senior staff to participate in the successful implementation of strategy.</p> <p>Introduce an integrated leadership framework aligned to CSIRO's strategic direction for development, talent management, succession planning, recruitment and performance management for senior leaders.</p> <p>Introduce a new Enterprise Agreement that reinforces staff flexibility and supports the attraction, development, the retention of key talent and effective performance management.</p>
2.2 Optimise delivery of all research activities by improving project management	Design and pilot initiatives that aim to embed quality research leadership, with particular focus on cross-divisional programs, including Flagships.
5.2 Be among the best in governance, OHS&E and performance management processes	Identify health and well-being issues across CSIRO, especially work-related stress, and implement increased support and processes.
6.2 Proactively manage patent portfolio to multiply IP-based revenue streams	Develop and pilot approaches to enable the early strategic management of IP.

Section 9 Resources Summary and Financial Tables

Resources Overview

The 2005-06 Operational Plan sees a number of significant new investments. These include:

- Increased resourcing of Flagships from \$145m in 2004-05 to \$165m in 2005-06 incorporating an additional \$5m in new funding from the Government (direct new appropriation in total of \$35m)
- New Major Science Initiatives - including sustainable agriculture, coasts, counter terrorism, minerals down under and synchrotron science totalling \$4.12m
- Establishment of a Top Science Talent fund to enhance CSIRO's attractiveness to leading scientists both within Australia and Internationally with an initial investment in 2005-06 of \$2.0m
- Increased investments in high value IP protection and management arrangements totalling \$6.0m

To achieve the planned balanced operating result the plan also incorporates a number of measures to improve the efficiency and effectiveness of existing investments including measures to extend the coverage of enterprise procurement contracts, revised travel and conferencing arrangements, as well as the rationalisation and, where appropriate, standardisation of information technology infrastructure.

Detailed financial data reflecting the effect of these and other budget decisions is provided in the following financial tables. A high level overview of the distribution of resources by CSIRO role is provided in Section 1.4 and by National Research Priorities in Section 3.4.

Financial Tables

CSIRO's projected financial performance for 2005-06 is summarised in the following tables. 2004-05 budget figures are provided for comparative purposes.

The Statement of Financial Performance for 2005-06 also includes information on Strategic Plan targets for 2005-06 and CSIRO Group performance in 2005-06. The CSIRO Group includes CSIRO and its share of two joint ventures – Food Science Australia and the Ensis (the Forestry joint venture with New Zealand Forestry Research Pty Ltd that commenced operation on 1 July 2004). The "Group" concept enables CSIRO to review its overall performance against Strategic Plan targets.

- 1a. Statement of Financial Performance for 2005-06 - Summary
- 1b. Statement of Financial Performance for 2005-06 – Analysis of Expenses
2. Statement of Financial Position for 2005-06
3. Cash Flow Statement 2005-06
4. Financial Summary by Division 2005-06
5. Corporate Support Services – Total Expenditure 2005-06
- 6a. Capital Expenditure 2005-06
- 6b. Approved Major Capital Items
7. Major Enterprise Wide Research Initiatives 2005-06

1a. Statement of Financial Performance for 2005-06 – Total for CSIRO

CSIRO Operational Plan 2005-06

Statement of Financial Performance for 2005-06

	Budget 04/05	Budget 05/06	Variance	2005-06 CSIRO Group Budget ¹	2005-06 Strategic Plan	Variance CSIRO Group to Strategic Plan
	\$k	\$k	%	\$k	\$k	%
Total CSIRO						
REVENUE:						
Co-investment	208,070	217,356	4.5			
Consulting & Services	76,239	72,064	-5.5			
Co-investment, Consulting & Services	284,309	289,420	1.8	318,120	339,000	6.6
IP, Royalties etc	28,285	46,033	62.7	46,033	46,000	-0.1
Work in Progress Adjustment	1,022	-113	-111.0	-113		
Deferred Revenue Adjustment	2,182	-3,789	-273.6	-3,789		
Research and Services	315,799	331,551	5.0	360,251	385,000	6.9
Other External	10,712	11,792	10.1	11,792	9,000	-23.7
Interest	4,129	8,064	95.3	8,064	0	-100.0
Total External	330,640	351,407	6.3	380,107	394,000	3.7
Direct Appropriation	577,138	598,428 ²	3.7	598,428	612,000 ³	2.3
TOTAL REVENUE	907,778	949,835	4.6	978,535	1,006,000	2.8
EXPENSES:						
Salaries	537,232	547,148	1.8	547,148		
Travel	32,872	30,997	-5.7	30,997		
Other Operating	264,548	286,600	8.3	286,600		
Depreciation & Amortisation	82,445	85,148	3.3	85,148		
Doubtful Debt Expense	-212	137	164.5	137		
Expenditure funded by JV External Revenue				28,700		
TOTAL EXPENSES	916,885	950,030	3.6	978,730	1,006,000⁴	2.8
Profit(Loss)on Sale of Assets	9,106	195	-97.9	195		
Operating result	0	0	0.0	0	0	-100.0

Notes

1. Includes \$28.7m in external revenue budgeted as CSIRO's share of external revenues derived from the Food Science Australia (\$15.7m) and Forestry (\$13.0m) joint ventures.
2. 2005/06 includes \$4.5m anticipated appropriation for additional depreciation associated with revaluation of assets
3. \$612m comprises \$563m in baseline appropriation, \$9m in new appropriation and \$40m potential appropriation (as per Strategic Plan Target Financial Summary). Subsequent adjustments have reduced this amount to \$598.4m (transfer of National Measurement Laboratory appropriation from CSIRO amounting to \$11.9m, and lower than anticipated indexation).
4. The Strategic Plan records total expenses of \$1,026m minus \$20m in overhead savings = \$1,006m.

1b. Statement of Financial Performance for 2005-06 – Analysis of Expenses.**Statement of Financial Performance for 2005-06**

	Budget 04/05 \$k	Budget 05/06 \$k	Variance %
Total CSIRO			
ANALYSIS OF EXPENSES			
Salaries	537,232	547,148	1.8
Travel	32,872	30,997	-5.7
Laboratory & Workshop Supplies	42,464	53,202	25.3
Contract R&D	17,473	15,461	-11.5
Communications			
Telecommunications	8,460	9,343	10.4
Postage & Freight	3,034	2,742	-9.6
Computing / IT Costs	18,100	14,800	-18.2
Repairs & Maintenance	22,667	20,991	-7.4
Property	26,467	25,493	-3.7
Library	8,060	8,742	8.5
Joint Venture Contributions	26,506	35,644	34.5
Depreciation & Amortisation	82,445	85,148	3.3
Doubtful Debt Expense	-212	137	164.5
Recruitment & Relocation	3,799	4,884	28.5
Advertising & Promotion	1,694	1,271	-25.0
Cleaning	4,196	4,634	10.4
Security	1,284	1,618	26.1
Consultants	6,714	4,144	-38.3
Grants & Contributions	7,328	6,198	-15.4
Legal	4,109	9,730	136.8
Motor Vehicles	4,822	4,957	2.8
Operating Leases	1,013	778	-23.2
Office Supplies & Printing	6,103	6,655	9.0
Utilities	16,493	15,912	-3.5
Entertainment	1,003	842	-16.1
Training	8,081	8,600	6.4
Patents	4,397	4,089	-7.0
Insurance	3,143	2,832	-9.9
Investment Writedown	781	138	-82.3
Bad Debts	51	101	95.7
Internal Lease	-3,444	-1,630	52.7
Other	19,749	24,429	23.7
TOTAL EXPENSES	916,885	950,030	3.6

2. Statement of Financial Position for 2005-06.

Statement of Financial Position as at 30 June 05

	Budget 04/05 \$k	Budget 05/06 \$k	Variance %
Total CSIRO			
CURRENT ASSETS:			
Westpac Current Account	4,626	15,000	224.2
Divisional Imprests	70	70	-0.7
Other Cash on Deposit	157,417	130,941	-16.8
Divisional Current Account	0	0	-
Cash	162,113	146,011	-9.9
Trade Debtors	42,784	39,703	-7.2
Work in Progress	26,556	24,332	-8.4
Other Receivables	16,373	20,588	25.7
Inventory	797	817	2.5
Total Current Assets	248,624	231,450	-6.9
NON CURRENT ASSETS:			
Other Investments	12,056	11,958	-0.8
Plant Equipment & Intangibles	229,562	238,491	3.9
Land & Buildings	824,916	817,178	-0.9
Total Non Current Assets	1,066,534	1,067,627	0.1
TOTAL ASSETS	1,315,158	1,299,077	-1.2
CURRENT LIABILITIES:			
Trade Creditors	6,279	5,240	-16.5
Accrued Expenditure	18,780	15,973	-14.9
Deferred Revenue	43,162	52,792	22.3
Provision for Rec Leave	57,853	58,590	1.3
Trust Funds	10,121	17,218	70.1
Other Payables	29,556	21,161	-28.4
Total Current Liabilities	165,751	170,974	3.2
NON CURRENT LIABILITIES:			
Loans	0	0	-
Finance Leases	83,434	80,377	-3.7
LSL & Severance Provision	125,702	129,145	2.7
Total Non Current Liabilities	209,136	209,522	0.2
TOTAL LIABILITIES	374,887	380,496	1.5
NET ASSETS	940,271	918,581	-2.3
EQUITY			
Accumulated Results Operations	465,594	459,843	-1.2
Reserves	474,677	458,738	-3.4
TOTAL EQUITY	940,271	918,581	-2.3

3. Cash Flow Statement 2005-06.

Cash Flow Statement 2005-06

	Budget 04/05 \$k	Budget 05/06 \$k	Variance %
Total CSIRO			
OPERATING ACTIVITIES			
CASH RECEIVED			
Appropriation receipts (Dept & C'wealth Authorities)	577,138	598,428	3.7
Sales of goods and services	321,715	373,156	16.0
Interest	4,129	8,064	95.3
Other (funds held in trust)			-
Net GST received from/paid to ATO	0	0	-
Total cash received	902,983	979,648	8.5
CASH USED			
Employees	534,246	539,725	1.0
Suppliers	286,983	293,249	2.2
Interest and other financing costs			-
Other	33,152	46,472	40.2
Total cash used	854,381	879,446	2.9
Net cash from operating activities	48,602	100,203	106.2
INVESTING ACTIVITIES			
CASH RECEIVED			
Proceeds from sales of property, plant & equip & intangibles	22,442	4,554	-79.7
Proceeds of equity instruments			-
Total cash received	22,442	4,554	-79.7
CASH USED			
Purchase of property, plant and equipment	88,074	120,839	37.2
Purchase of equity investment			-
Other investments	0	20	37,635.8
Loan to external body			-
Total cash used	88,074	120,859	37.2
Net cash from investing activities	-65,632	-116,305	-77.2
FINANCING ACTIVITIES			
CASH RECEIVED			
Proceeds from debt	145	0	-100.0
Total cash received	145	0	-100.0
CASH USED			
Cash used for other financing activities			-
Dividend to Government			-
Total cash used	0	0	-
Net cash from financing activities	145	0	-100.0
Net Increase/Decrease in Cash Held	-16,885	-16,103	-
Add Cash at 1 July	178,999	162,113	-
Cash at 30 June	162,113	146,011	

4. Financial Summary by Division 2005/06

Financial Summary by Division 2005/06																
	Notes	Appropriation Revenue			External Revenue			Total Revenue			Ext Revenue/Total Revenue			Operating Result		
		Budget 04/05 \$k	Budget 05/06 \$k	change %	Budget 04/05 \$k	Budget 05/06 \$k	change %	Budget 04/05 \$k	Budget 05/06 \$k	change %	Budget 04/05 %	Budget 05/06 %	change %	Budget 04/05 \$k	Budget 05/06 \$k	change %
ENSIS	1	19,911	19,630	-1.4	9,149	900	-90.2	29,061	20,530	-29.4	31	4	-86.1	-419	900	314.7
Entomology		20,866	19,755	-5.3	16,278	14,415	-11.4	37,144	34,170	-8.0	44	42	-3.7	89	0	-100.0
Food Science Australia	2,3	29,700	30,864	3.9	2,464	2,719	10.3	32,164	33,583	4.4	8	8	5.7	-197	389	297.3
Livestock - AAHL		18,924	18,703	-1.2	12,270	12,427	1.3	31,194	31,130	-0.2	39	40	1.5	349	419	20.1
Livestock excl AAHL		35,337	34,997	-1.0	14,900	12,837	-13.8	50,237	47,834	-4.8	30	27	-9.5	127	-97	-176.3
Plant Industry		51,181	48,731	-4.8	38,610	37,062	-4.0	89,791	85,793	-4.5	43	43	0.5	472	-703	-249.1
Textile & Fibre Technology		14,990	14,597	-2.6	10,978	11,189	1.9	25,968	25,785	-0.7	42	43	2.6	326	152	-53.3
Agribusiness		190,908	187,277	-1.9	104,650	91,548	-12.5	295,558	278,825	-5.7	237	208	-12.3	745	1,059	42.2
Aust Telescope National Facility		22,109	21,963	-0.7	10,832	7,920	-26.9	32,941	29,883	-9.3	33	27	-19.4	3,222	-443	-113.8
Exploration & Mining		21,104	20,899	-1.0	14,936	15,344	2.7	36,040	36,243	0.6	41	42	2.2	100	382	282.0
Information & Communication Technology		31,719	31,845	0.4	10,153	9,008	-11.3	41,872	40,853	-2.4	24	22	-9.1	660	-2,000	-403.1
Industrial Physics		18,512	17,943	-3.1	9,862	11,015	11.7	28,373	28,958	2.1	35	38	9.4	146	271	85.3
Manufacturing & Infrastructure Technology		56,263	56,392	0.2	24,994	25,000	0.0	81,257	81,392	0.2	31	31	-0.1	710	61	-91.4
Mathematics & Information Sciences		16,347	15,214	-6.9	7,321	7,898	7.9	23,668	23,112	-2.3	31	34	10.5	117	-103	-187.8
Minerals		29,507	30,485	3.3	18,078	18,913	4.6	47,586	49,398	3.8	38	38	0.8	302	-367	-221.6
Molecular and Health Technologies		37,052	36,833	-0.6	15,639	17,197	10.0	52,691	54,030	2.5	30	32	7.2	608	486	-20.1
Information, Manufacturing & Minerals		232,614	231,573	-0.4	111,815	112,295	0.4	344,429	343,868	-0.2	32	33	0.6	5,864	-1,714	-129.2
Energy Technology		21,379	23,063	7.9	8,350	9,936	19.0	29,729	32,999	11.0	28	30	7.2	669	204	-69.4
Land & Water		40,426	39,620	-2.0	23,295	25,886	11.1	63,722	65,506	2.8	37	40	8.1	180	17	-90.4
Marine and Atmospheric Research		48,382	47,847	-1.1	25,300	29,660	17.2	73,681	77,507	5.2	34	38	11.4	-2,245	-794	64.6
Petroleum Resources		14,148	14,877	5.2	8,150	10,901	33.7	22,298	25,777	15.6	37	42	15.7	-417	1,149	375.2
Sustainable Ecosystems		31,402	30,581	-2.6	14,531	14,748	1.5	45,933	45,329	-1.3	32	33	2.8	-330	0	100.0
Murray-Darling	4	0	0	-	0	0	-	0	0	-	0	0	-	-50	0	100.0
Oceanographic Research Vessel		6,099	6,208	1.8	3,814	4,141	8.6	9,914	10,349	4.4	38	40	4.0	239	0	-100.0
Sustainable Energy & Environment		161,835	162,195	0.2	83,441	95,272	14.2	245,276	257,467	5.0	34	37	8.8	-1,955	577	129.5
Total Three Groups		585,357	581,045	-0.7	299,905	299,116	-0.3	885,262	880,160	-0.6	34	34	0.3	4,655	-78	-101.7
Capital Program		12,467	17,249	38.4	4,962	5,750	15.9	17,428	22,999	32.0	28	25	-12.2	9,625	2,690	-72.1
Discovery Centre		1,250	1,932	54.6	210	204	-2.9	1,460	2,136	46.3	14	10	-33.6	-543	0	100.0
High Performance Super Computer		4,080	4,135	1.3	175	410	134.3	4,255	4,545	6.8	4	9	119.4	-97	70	172.1
Publishing		2,607	170	-93.5	7,922	8,745	10.4	10,529	8,915	-15.3	75	98	30.4	536	705	31.4
Education Programs		2,805	3,230	15.2	2,963	3,177	7.2	5,768	6,407	11.1	51	50	-3.5	-35	0	100.0
CSIRO IT		54,583	51,406	-5.8	-344	0	100.0	54,238	51,406	-5.2	-1	0	100.0	0	0	-200.0
Corporate Activities		62,219	61,336	-1.4	575	933	62.3	62,794	62,269	-0.8	1	1	63.6	0	0	0.0
Total Other		140,010	139,457	-0.4	16,463	19,219	16.7	156,473	158,676	1.4	11	12	15.1	9,487	3,465	-63.5
Sub-total		725,367	720,502	-0.7	316,368	318,335	0.6	1,041,735	1,038,837	-0.3	30	31	0.9	14,142	3,386	-76.1
Corporate Writeback offset		-116,427	-111,954	3.8	0	0	-	-116,427	-111,954	3.8	0	0	-	0	0	150.0
Revenue/Expenses not allocated	5	-31,802	-10,120	68.2	14,272	33,072	131.7	-17,530	22,952	230.9	-81	251	407.9	-14,141	-3,386	76.1
Total CSIRO		577,138	598,428	3.7	330,640	351,407	6.3	907,778	949,835	4.6	36	37	1.6	0	0	-

Notes

1. CSIRO is a party to a 50:50 joint venture (ensis) between the division of Forestry & Forest Products and New Zealand Forestry Research Pty Ltd. For accounting reasons, CSIRO's share of revenues received through the joint venture (\$13.0m for 2005-06) is accounted for within the joint venture and not recorded as revenue by CSIRO. CSIRO will recognise in its accounts its share of the projected operating surplus of the joint venture. The impact on CSIRO's budgeted operating result in 2005-06 is \$900k.
2. CSIRO is a party to a 85:15 joint venture (Food Science Australia - FSA) between the division of Food Science & Technology and the Victorian Government. For accounting reasons, CSIRO's share of revenues received through the joint venture (\$15.7m for 2005-06) is accounted for within the joint venture, with CSIRO recording its share of joint venture profit in the form of equity. The impact on CSIRO's budgeted operating result in 2005-06 is \$340k. The joint venture external revenue will be included in CSIRO "Group" revenue.
3. FSA figures include Nutrition component from the former division of HSN due to divisional merger. 2004/05 figures have been restated accordingly for comparison purposes only.
4. CSIRO accounts for the operating result of the Joint Venture with the Murray Darling Basin Commission. The Joint Venture was established as a separate accounting entity in June 2004. The impact on CSIRO's budgeted operating result in 2005-06 is nil.
5. Corporately budgeted revenues and expenses including adjustments for operating surplus/deficit, and a provision for \$30.0m revenue from Intellectual Property in 2005-06 not attributable to Divisions.

5. Corporate Support Services – Total Expenditure 2005-06.

Corporate Support Services - Total Expenditure 2005-06

		Budget 04/05 \$k	Budget 05/06 \$k
Chief Executive Office			
Chief Executive Office	Geoff Garrett	2,667.0	2,744.0
DCE Office	Ron Sandland	1,061.5	747.8
Board/Corporate Executive	Ron Sandland	956.4	967.0
Flagship Implementation Office	Ron Sandland	969.7	834.1
Science Planning	Michael Barber	1,471.0	1,095.2
Science Investment Process	Ron Sandland	-	893.0
Strategy Development	Ron Sandland	744.8	419.0
Strategic Transactions	Ron Sandland	-	816.0
Executive Management Council	Ron Sandland	300.0	293.0
Flagship Directors	Ron Sandland	7,548.0	7,587.0
Business Development & Commercialisation ¹	Nigel Poole	17,400.0	9,463.0
Communications	Donna Stauton	6,391.0	6,285.1
Corporate Operations Group	Mike Whelan	15,643.9	16,323.3
People and Culture			
People Development (incl. OHS&E)	Peter May	7,462.8	8,350.0
Project Leadership	Peter May	-	1,724.0
Change Office	Peter May	-	1,650.0
Group Executives ²			
Agribusiness & Health Group		1,169.5	-
Environment & Natural Resources Group		688.3	-
IT, Manufacturing & Services Group		967.9	-
Sustainable Minerals & Energy Group		826.3	-
Agribusiness Group	Michael Eyles	-	1,238.9
Sustainable Energy & Environment Group ³	Steve Morton	-	1,752.8
Information, Manufacturing & Minerals Group	Rod Hill	-	1,144.0
Total Corporate Activities		66,268.1	64,327.2
CSIRO IT		54,582.5	51,406.0
Total Corporate Support Expenditure		120,850.6	115,733.2
			-4%

Notes

1. Business Improvement group (\$2.2m) transferred to People & Culture in 2005/06. 2004/05 figure also includes allocation of \$4.2M for legal costs associated with RIPPERS (this item not included in BD&C for 2005/06).
2. From 2005/06 onwards there will be three group executives only.
3. SEE Group budget includes funding for Publishing services

6a. Capital Expenditure 2005-06.

Capital Expenditure 2005-06

	Land and Buildings			Plant & Equipment incl Intangibles			Capital Expenditure Total		
	Budget 04/05	Budget 05/06	Variance %	Budget 04/05	Budget 05/06	Variance %	Budget 04/05	Budget 05/06	Variance %
	\$k	\$k		\$k	\$k	%	\$k	\$k	%
ENSIS	0	0	-	800	900	12.5	800	900	12.5
Entomology	40	40	0.0	1,200	1,200	0.0	1,240	1,240	0.0
Food Science Australia	0	0	-	1,098	1,050	-4.4	1,098	1,050	-4.4
Livestock - AAHL	0	0	-	300	240	-20.0	300	240	-20.0
Livestock excl AAHL	0	0	-	600	960	60.0	600	960	60.0
Plant Industry	300	129	-57.0	1,923	2,520	31.1	2,223	2,649	19.2
Textile & Fibre Technology	0	0	-	1,000	1,000	0.0	1,000	1,000	0.0
Agribusiness	340.0	168.9	-50.3	6,920.5	7,870.0	13.7	7,260.5	8,038.9	10.7
Aust Telescope National Facility	0	0	-	3,584	5,271	47.1	3,584	5,271	47.1
Exploration & Mining	0	0	-	1,041	1,122	7.8	1,041	1,122	7.8
Information & Communication Technology	0	0	-	1,476	1,400	-5.1	1,476	1,400	-5.1
Industrial Physics	0	0	-	750	1,000	33.3	750	1,000	33.3
Manufacturing & Infrastructure Technology	0	500	-	3,960	3,000	-24.2	3,960	3,500	-11.6
Mathematics & Information Sciences	0	0	-	300	200	-33.3	300	200	-33.3
Minerals	0	0	-	3,700	4,200	13.5	3,700	4,200	13.5
Molecular and Health Technologies	0	0	-	3,650	5,900	61.6	3,650	5,900	61.6
Information, Manufacturing & Minerals	0.0	500.0	-	18,461.0	22,092.8	19.7	18,461.0	22,592.8	22.4
Energy Technology	0	0	-	2,100	2,280	8.6	2,100	2,280	8.6
Land & Water	500	500	0.0	2,020	1,818	-10.0	2,520	2,318	-8.0
Marine and Atmospheric Research	12	12	0.0	3,520	2,384	-32.3	3,532	2,396	-32.2
Petroleum Resources	0	0	-	2	845	36687.1	2	845	36687.1
Sustainable Ecosystems	0	0	-	1,900	1,500	-21.1	1,900	1,500	-21.1
Murray-Darling	0	0	-	0	0	-	0	0	-
Oceanographic Research Vessel	0	0	-	160	160	0.0	160	160	0.0
Sustainable Energy & Environment	512.0	512.0	0.0	9,702.3	8,987.0	-7.4	10,214.3	9,499.0	-7.0
Total Three Groups	852.0	1,180.9	38.6	35,083.8	38,949.8	11.0	35,935.8	40,130.7	11.7
Capital Program	33,127	54,058	63.2	0	0	-	33,127	54,058	63.2
Discovery Centre	0	0	-	150	183	22.0	150	183	22.0
High Performance Super Computer	0	0	-	1,000	453	-54.7	1,000	453	-54.7
Publishing	0	0	-	51	65	26.5	51	65	26.5
Education Programs	0	0	-	10	73	637.2	10	73	637.2
CSIRO IT	2,000	2,000	0.0	5,189	4,500	-13.3	7,189	6,500	-9.6
Corporate Activities	0	0	-	500	16,418	3183.6	500	16,418	3183.6
Other	35,127.0	56,058.0	59.6	6,900.0	21,692.0	214.4	42,027.0	77,750.1	85.0
TOTAL CSIRO	35,979.0	57,238.9	59.1	41,983.8	60,641.8	44.4	77,962.8	117,880.7	51.2

Note: Plant & Equipment for Corporate Activities includes \$16.4m for software and hardware costs associated with implementation of ERP.

6b. Approved Major Capital Items.

Approved Major Capital Items

Division	Description	Budget 05/06 \$k
Land & Buildings > \$1M		
Capital Infrastructure Plan	Clayton - replacement of CMIS/ICT accommodation	4,900
Capital Infrastructure Plan	Urrbrae - CLW Bldg 3 refurb/refit	4,300
Capital Infrastructure Plan	Belmont - Limited Refurb works	3,600
Capital Infrastructure Plan	Clayton - (CMIT 3) Relocation of CMIT from Hightett to Clayton - Phase 1	3,400
Capital Infrastructure Plan	Floreat park - Replacement of Animal Research Facility & Bldg 4/27/40 refurb/reconfiguration	3,000
Capital Infrastructure Plan	North Ryde - CMIT Pollution Control	2,800
Capital Infrastructure Plan	Black Mountain - Replacement/Construction Glasshouses and associated Infrastructure	2,300
Capital Infrastructure Plan	Rockhampton - Rendell Laboratory Refurb	2,300
Capital Infrastructure Plan	Black Mountain - CLW Christian/Butler Bldg Refurb	2,200
Capital Infrastructure Plan	Black Mountain - Entomology Bioscience	2,100
Capital Infrastructure Plan	Clayton - (CMIT 3) Relocation of CMIT from Hightett to Clayton - Phase 2	1,600
Capital Infrastructure Plan	Floreat Park - Upgrade services	1,400
Capital Infrastructure Plan	Black Mountain - Plant Industry Biochemistry Bldg 2 Refurbishment	1,300
Capital Infrastructure Plan	Clayton - Bldg 201 East Refurbishment for CMS	1,300
Capital Infrastructure Plan	Cleveland - Bldg 1 selective refurb	1,300
Capital Infrastructure Plan	Clayton - CMIT 2 Process Bay	1,200
Capital Infrastructure Plan	Waterford - CMins construction of expanded facilities	1,200
Capital Infrastructure Plan	Clayton - Building Services and Infrastructure Upgrade	1,100
Capital Infrastructure Plan	Clayton - CFFP Refurb Bldg 201 West	1,000
Capital Infrastructure Plan	Narrabri - ATNF Replace Facility Control Bldg	1,000
Capital Infrastructure Plan	Gungahlin - Refurb and Infrastructure works	1,000
Plant & Equipment > \$500k		
Energy Tech	Syngas Generator	2,000
ATNF	Compact array broadband backend	1,900
Minerals	Electron Probe Microanalysis	1,700
CSIRO IT	Cabling	1,000
Minerals	QEMScan	800
Molecular and Health Technologies	Robotic plate handling & imaging unit	795
Exploration and Mining	Mark 1 drilling platform	600
Intangibles > \$500k		
Corporate	ERP System	16,400

7. Major Enterprise Wide Research Initiatives 2005-06

CSIRO Operational Plan 2005-06

CSIRO National Research Flagships 2005-06

	New Appropriation Revenue (BAA2)			Redirect Appropriation			External*				Total			
	Budget 04/05	Budget 05/06	change %	Budget 04/05	Budget 05/06	change %	Budget 04/05	(% External)	Budget 05/06	(% External)	change %	Budget 04/05	Budget 05/06	change %
		\$k		\$k	\$k		\$k		\$k			\$k	\$k	
Energy Transformed	5,310	5,546	4.4	15,440	17,709	14.7	5,160	19.92	8,600	27.00	66.7	25,910	31,855	22.9
Food Futures	6,582	6,450	-2.0	19,142	17,912	-6.4	2,640	9.31	5,510	18.45	108.7	28,364	29,872	5.3
Light Metals	4,781	5,033	5.3	13,904	13,539	-2.6	4,380	18.99	5,196	21.86	18.6	23,065	23,769	3.1
Preventative Health	4,644	5,032	8.3	13,507	12,763	-5.5	3,260	15.23	2,780	13.51	-14.7	21,411	20,575	-3.9
Water for Healthy Country	4,972	5,088	2.3	14,460	13,219	-8.6	6,770	25.84	8,849	32.59	30.7	26,202	27,156	3.6
Wealth from Oceans	3,711	4,032	8.7	10,795	13,884	28.6	4,880	25.17	6,468	26.53	32.5	19,386	24,384	25.8
Flagship Collaboration	3,819	-		500	3,985	696.9						500	7,804	1460.7
Total CSIRO	30,000	35,000	16.7	87,748	93,011	6.0	27,090	18.70	37,403	22.61	38.1	144,838	165,414	14.2

Note: Flagship figures include Flagship Directors and Implementation Office, but do not include allocation of other Corporate Support Costs.

*To reflect the full impact of the Flagship Program external revenue includes revenue earned by the Food Science Australia and ensis Joint Ventures. For accounting reasons these revenues are accounted for in the Joint Ventures and are not recorded as revenue by CSIRO.

Major Science Initiative Funding 2005-06

	Budget 05/06
Coasts	400
Counter Terrorism	1,800
Minerals Down Under	1,300
New Talent Fund	2,000
Sustainable Agriculture	250
Synchrotron	370
Total CSIRO	6,120

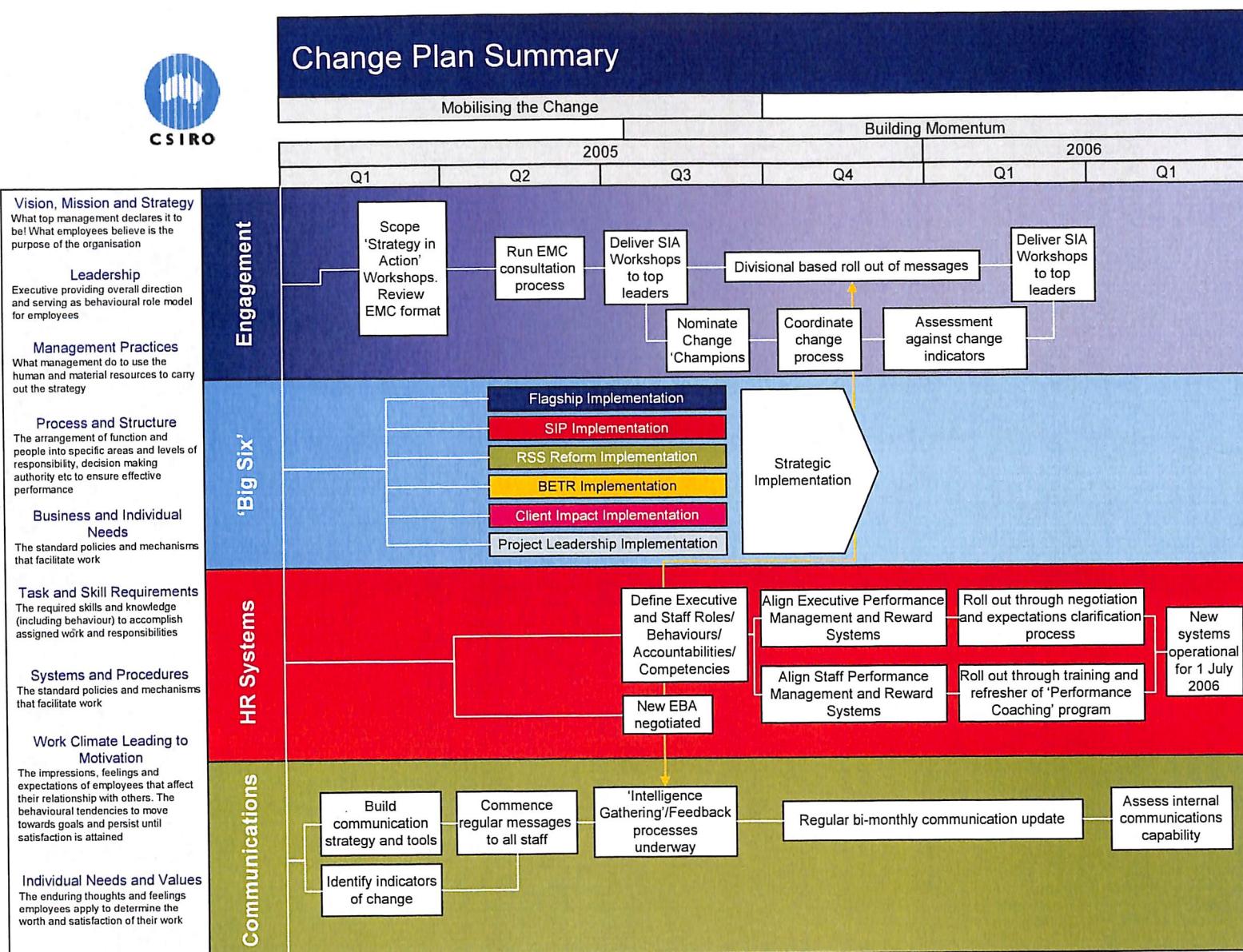
Note: additional funding was also allocated as part of the new science initiative process to the following two Flagship initiatives for 2005/06, which are already included in the above Flagship totals:

Flagship - Wealth from Oceans 1,470

Flagship - Energy Transformed 950

Section 10 Appendix

10.1 Change Plan Summary



10.2 CSIRO's Functions

CSIRO is an independent statutory authority constituted and operating under the provisions of the *Science and Industry Research Act 1949*. This Act lays out the functions, powers and structure of governance of the organisation.

In summary, CSIRO's primary functions (Section 9) are:

- To carry out scientific research for the purpose of assisting Australian industry, furthering the interests of the Australian community, contributing to the achievement of national objectives or the performance of national and international responsibilities
- To encourage or facilitate the application or utilisation of the results of scientific research
- To carry out services, and make available facilities, in relation to science

Secondary functions specified in the Act include:

- Liaison with other countries in matters connected with scientific research
- Training of research workers
- Establishing research fellowships and studentships
- Co-operation with associations of persons engaged in industry for the purpose of carrying out industrial scientific research
- Establishing, developing, maintaining and promoting standards of measurement
- Collection, interpretation and dissemination of information on scientific and technical matters
- Publication of scientific and technical reports, periodicals and papers

The Act also provides (in Section 10) that CSIRO shall, as far as possible, co-operate with other organisations and authorities in the co-ordination of scientific research, with a view to preventing unnecessary overlapping and ensuring the most effective use of available facilities and staff.

Source: Sections 9 and 10 the Science and Industry Research Act 1949

10.3 CSIRO's Organisational Chart

Minister

Education, Science and Training - The Honourable Dr Brendan Nelson MP

CSIRO Board⁽¹⁾

Ms Catherine Livingstone (Chairman)

Professor Suzanne Cory - Dr Terry Cutler - Mr Peter Duncan

Dr Geoff Garrett - Mr Brian Keane - Ms Lisa Paul - Ms Deborah O'Toole

Professor Alan Robson - Dr Ed Tweddell

Executive Team

Dr Geoff Garrett – Dr Michael Barber – Dr Michael Eyles⁽²⁾

Dr Rod Hill – Mr Peter May – Dr Steve Morton – Mr Nigel Poole

Dr Ron Sandland – Ms Donna Staunton – Mr Mike Whelan

Executive Management Council⁽³⁾

Agribusiness Group

Ensis⁽⁴⁾ -

Entomology -

Food Science Australia⁽⁵⁾ -

Livestock Industries -

Plant Industry -

Textile and Fibre Technology -

Information, Manufacturing & Minerals Group

- Australia Telescope National Facility

- Exploration and Mining

- ICT Centre

- Industrial Physics

- Manufacturing and Infrastructure Technology

- Mathematical and Information Sciences

- Minerals

- Molecular and Health Technologies

Sustainable Energy & Environment Group

Energy Technology -

Land & Water -

Marine & Atmospheric Research -

Petroleum Resources -

Sustainable Ecosystems -

Flagship Programs

- Energy Transformed

- Food Futures

- Light Metals

- Preventative Health

- Water for a Healthy Country

- Wealth from Oceans

CSIRO-wide Support

Business Development & Commercialisation -

Communications -

Corporate Operations -

Finance -

People and Culture -

Science Planning and Investment -

(1) Board membership as at 1st July 2005

(2) Dr Michael Eyles, is retiring as Group Executive Agribusiness, and will be replaced by Dr Alastair Robertson when a appointment has been made for the CEO of Food Science Australia

(3) The Executive Management Council comprises members of the Executive Team, Divisional Chiefs, Flagship Directors and some Corporate Officers - see following page.

(5) Joint venture with the New Zealand Forestry Research

(4) Joint venture with the Victorian Government

Executive Management Council (1st July 2005)**Executive Team**

Chief Executive	Dr Geoff Garrett	02 6276 6132
Deputy Chief Executive	Dr Ron Sandland	02 6276 6127
Executive Director: Science Planning	Dr Michael Barber	02 6276 6388
Group Executive: Agribusiness Group	Dr Michael Eyles ⁽¹⁾	02 9490 8341
Group Executive: Information, Manufacturing & Minerals Group	Dr Rod Hill	03 9545 8600
Executive Director, People and Culture	Mr Peter May	02 9490 8877
Group Executive: Sustainable Energy & Environment	Dr Steve Morton	02 6246 4552
Executive Director: Business Development and Commercialisation	Mr Nigel Poole	02 9490 8138
Executive Director: Communications	Ms Donna Staunton	02 6276 6182
Chief Finance Officer, and Executive Director: Corporate Operations	Mr Mike Whelan	02 6276 6598

CSIRO Divisions & Divisional Chiefs**Agribusiness Group**

Ensis ⁽²⁾	Dr Rick Ede	03 9545 2227
Entomology	Dr Joanne Daly	02 6246 4025
Food Science Australia ⁽³⁾	Dr Alastair Robertson	02 9490 8341
Livestock Industries	Mr Shaun Coffey	07 3214 2999
Plant Industry	Dr Jeremy Burdon	02 6246 5546
Textile & Fibre Technology	Dr Brett Bateup	03 5246 4777

Information, Manufacturing & Minerals Group

Australia Telescope National Facility	Dr Brian Boyle	02 9372 4300
Exploration & Mining	Dr Cliff Mallet (Acting)	03 9545 8202
ICT Centre	Dr Alex Zelinsky	02 9372 4201
Industrial Physics	Dr Gerry Haddad	02 9413 7800
Manufacturing & Infrastructure Technology	Mr Larry Little	03 9252 6114
Mathematical & Information Sciences	Dr Murray Cameron	02 9325 3203
Minerals	Dr Bart Follink	03 9545 8605
Molecular and Health Technologies	Dr Graeme Woodrow	03 9662 7135

Sustainable Energy & Environment Group

Energy Technology	Dr David Brockway	02 4960 6046
Land & Water	Dr Rob Vertessy	02 6246 5940
Marine and Atmospheric Research	Dr Tony Haymet	03 6232 5212
Petroleum Resources	Dr Bev Ronalds	08 6436 8650
Sustainable Ecosystems	Dr Andrew Johnson	07 3214 2383

CSIRO Flagship Program Directors

Energy Transformed	Dr John Wright	02 4960 6080
Food Futures	Dr Bruce Lee	02 6246 5154
Light Metals	Dr Tony Filmer	07 3327 4684
Preventative Health	Dr Richard Head	08 8303 8865
Water for a Healthy Country	Mr Colin Creighton	02 6263 6038
Wealth from Oceans	Mr Craig Roy	02 9490 8561
General Manager: Flagship Implementation	Mr Graham Thompson	02 6276 6638

Other EMC Members

General Manager: CSIRO IT	Ms Roze Frost	02 6276 6601
General Manager: Corporate Finance and Operational Performance	Mr Bob Garrett	02 6276 6423
General Manager: Science Investment Process	Dr Attila Brungs	02 9490 8572
Director: Business Development	Ms Mara Bun	02 9490 8203

(1) Dr Michael Eyles, is retiring as Group Executive Agribusiness, and will be replaced by Dr Alastair Robertson when an appointment has been made for the CEO of Food Science Australia

(2) Joint venture with the New Zealand Forestry Research

(3) Joint venture with the Victorian Government

10.4 Organisational Health Measures

CSIRO Organisational Health Indicators

As noted in section 2.2, Organisational Health Indicators form but one component of CSIRO's overall framework for monitoring, measuring and managing organisational performance. The Executive Team regularly monitors performance on these indicators, and they form part of a regular Organisational Performance Report presented to the CSIRO Board. The results for the majority of these indicators also are included in CSIRO's Annual Report. Some Organisational Health Indicators have specific targets associated with them. Others, which currently have 'monitor only' status, may be assigned targets if performance trends warrant this at some future time. Similarly, new indicators may be included and others deleted from time to time according to need.

FINANCIAL HEALTH

CSIRO Financial Performance

Relevant Strategic Objective: 6.4

Financial Parameter	Units	Target 2005-06*
Operating Result	\$m	0.0
Total External Revenue	\$m	351.4
Cash	\$m	146.0
Capex	\$m	120.8
Overhead Ratio	%	30.0

* Targets as per budgeted financial statements as at 17 June 2005.

Total External Revenue does not include CSIRO's share of revenue from the Food Science Australia and Ensis Joint Ventures.

Flagships Financial Performance

Relevant Strategic Objective: 1.3

Financial Parameter	Units	Target 2005-06*
Appropriation Revenue	\$m	128.0
External Revenue	\$m	37.4
Total Revenue	\$m	165.4
Total Expenditure	\$m	165.4

* Targets as per budgeted financial statements as at 17 June 2005.

Figures include Flagship Directors and Implementation Office, but do not include allocation of other Corporate Support Costs.

Coinvestment, Consulting and Services Revenue by Industry Category

Relevant Strategic Objectives: 4.1, 4.2, 4.3

Industry Category	Units	Target 2005-06*
Australian Private (Large)	\$m	
Australian Private (SME)	\$m	
Commonwealth, State & Local Govt	\$m	
R&D Corporations	\$m	
Overseas Entities	\$m	
Total Coinvestment, Consulting and Services	\$m	289.4

* Targets as per budgeted financial statements as at 17 June 2005.

NB There are no specific Budgets/Targets set by Industry Category. (Monitor only)

Research and Services Revenue by Investment Domain

Relevant Strategic Objectives: 6.2, 6.3

Investment Domain	Units	Target 2005-06*
Coinvestment	\$m	217.4
Services & Consulting	\$m	72.1
IP Revenue	\$m	46.0
Total R&S Revenue	\$m	331.6

* Targets as per budgeted financial statements as at 17 June 2005.

Total R&S Revenue includes work-in-progress and deferred revenue adjustments.

Revenue from Top Customers

Relevant Strategic Objective: 5.3

Private Sector: Top Ten Customers	Units	Public Sector: Top Ten Customers	Units
List Customers 1-10	\$'000	List Customers 1-10	\$'000
Total	\$'000	Total	\$'000
Contribution to Total Invoiced Revenue	%	Contribution to Total Invoiced Revenue	%

NB There are no specific Budgets/Targets set for revenue from the top ten customers. (Monitor only)

SCIENTIFIC OUTPUT AND QUALITY**Publications**

Relevant Strategic Objective: 2.3

Number of Publications by Type	Units
Journal Articles	no.
Books/ Chapters	no.
Conference Papers	no.
Technical Reports	no.
Client Reports	no.
Total (excl client reports) per RS/E*	no.

* RS/E = Research Scientist/Engineer

NB There are no specific Targets set for publication numbers. (Monitor only)

Comparative Citation Rate	Units	Target 2005-06
CSIRO cpp / World Average cpp *	%	118

cpp = citations per paper. Data appropriately weighted by research field.

Intellectual Property

Relevant Strategic Objective 2.3

IP Production	Units
New Inventions	no.
Total Inventions	no.
Granted Patents	no.
Live Patent Cases	no.
Patents per RS/E	no.

NB There are no specific targets set for IP production. (Monitor only)

IP Impact	Units	Target 2005-06*
IP Revenue per Patent	\$'000	
Patent Impact Index	no.	approaches 1.0

* The target for the Patent Impact Index - from the Strategic Plan - is to trend upwards to the world average (1.0).

NB There is no specific target for IP revenue per patent. (Monitor only)

CSIRO STAFF**People and Training**

Relevant Strategic Objective 2.1

Staff Numbers and Composition	Units	Target 2005-06
Total Staff	no.	
Proportion of Research Staff	%	
CSIRO PostDocs	no.	325
Federation Fellows	no.	
Contribution to Research Training	Units	
Sponsored PostGrads	no.	
Supervised PostGrads	no.	

NB A specific numeric target is set only for the number of CSIRO Post-Docs. Other indicators are monitored.

Staff Insight Survey (annual indicators)

Relevant Strategic Objective: (a,b) 2.1, (c) 5.4, (d,e,f,g) 5.2

Category	Units	Target 2006
(a) Engagement	score/100	exceed global norm
(b) Satisfaction	score/100	exceed global norm
(c) Working Relations, Organis'n, Efficiency	score/200	exceed global norm
(d) Performance Management	score/100	>55
(e) Safety Culture: Safety Procedures	score/100	>80
(f) Safety Culture: Corrective Action	score/100	>87
(g) APA (Performance Review) completion	score/100	>90

EXTERNAL STAKEHOLDER ASSESSMENTS

Customer Value Survey: Rating of Key Attributes for CSIRO

Relevant Strategic Objectives: (a) 6.3, (b) 1.2, (c) 2.2, (d) 3.3

Performance Attribute	CSIRO Score		Comparative *	Target 2005-06
	Units	Units		
(a) Rating of CSIRO on Overall Value	n/10	%		
(b) Rating of CSIRO on Product/Service	n/10	%		
(c) Rating of CSIRO on People/Process	n/10	%		
(d) Importance of CSIRO Name in Choosing an R&D Provider	n/10	%		

* (CSIRO score / Competitor Score) expressed as a percentage

NB Specific numeric targets are set only for the 'overall value' rating. These are the 'World-Class' benchmark scores.

For the other ratings, the general target is to maintain or increase the CSIRO and comparative scores.

Customer Value Survey: Overall Value Rating by Market Segment / Industry Category

Relevant Strategic Objectives: (a) 4.1, (b) 4.3, (c) 4.3, (d) 4.2

Industry Category	CSIRO Score		Comparative *
	Units	Units	
(a) RDCs	n/10	%	
(b) Small enterprises	n/10	%	
(c) Medium enterprises	n/10	%	
(d) Large enterprises	n/10	%	

NB For these ratings, the general target is to maintain or increase the CSIRO and comparative scores.

National Brand Positioning and Performance Survey *

Relevant Strategic Objective: (a,b) Goals 3 & 4, (c) 3.2, (d) 3.3, (e) 4.2, 4.3 (f) 3.1, (g) 3.3

Overall Ratings of CSIRO's Brand and Communications	
(a) CSIRO's Brand	
(b) CSIRO's Communication	

Overall Ratings of CSIRO Performance by Stakeholder Group	
(c) Government	
(d) Australian community	
(e) Business	
(f) Research community	
(g) Media	
(h) Staff	

* Survey currently under construction. Final data elements and format to be determined.

OPERATIONAL PERFORMANCE**Program Performance Summary Statistics**

Relevant Strategic Objective 1.2, 1.3, 5.2

Annual Performance Goals	Units
Red	no.
Amber	no.
Green	no.
% Green	%
Themes	Units
Red	no.
Amber	no.
Green	no.
% Green	%

NB there is no specific target for 'Green' APGs or Themes. (Monitor only)

The traffic light system is used as an alert-response mechanism, not a measure of success/failure.

Subsidy Elimination

Relevant Strategic Objective 6.3

Services and Consulting Domain	Units	Target 2006
Amount of Subsidy	\$m	zero
% of S&C Expenditure	%	zero

Project Management

Relevant Strategic Objective 2.2

Active Output Projects	Units	Target 2006*
Number	no.	
% with Effort	%	
Average Value	\$'000	
Project Management Index	no.	<60

* The Project Management Index aggregates five separate measures of budget management, financial performance and effort logging .

'Traffic Light' results are awarded as follows: < 60 = green; 60-100 = amber; >100 = red

Occupational Health, Safety and the Environment

Relevant Strategic Objective: 5.2

Occupational Health and Safety	Units	Target 2005-06*
ATLR (Average Time Lost Rate)	no.	3.9
LTIFR (Lost Time Injury Frequency Rate)	no.	6.0
MTFR (Medical Treatment Frequency Rate)	no.	20
OHS Positive Performance Index	%	90%
Environment	Units	
GHG emissions	000 tonnes	
Emergency Response	no.	
Improvement Programs	no.	
Waste Management	no.	

* Targets for the three OHS injury indicators are as specified in the Strategic Plan - to improve on these June 2003 baseline results.

The OHS positive performance index is based on eight indicators, each of which is separately monitored on a regular basis.

The component indicators are: Safety induction, Incident investigation, Supervisor training, Risk assessment, Rehabilitation, Induction Outcome, Incident outcome and Risk assessment outcome.

NB There are no specific targets for the Environment measures in 2005-06. (Monitor only)

10.5 Organisational Risk Profile June 2005

Risk Assessment Methodology

The risk assessment methodology, adapted from the Australian Risk Management Standard AS/NZS 4360:2004, involves identifying the risk and analysing each risk in terms of how likely it is to happen (Likelihood) and the possible impacts (Consequence). The risk score for each risk is calculated by combining Consequence score with the Likelihood score. This will give a risk score of between 2 and 10, which can then be referred to the Risk Scoring Matrix (refer below) to give a risk rating of HIGH (8-10), SIGNIFICANT (7), MEDIUM (6) or LOW (2-5). Where there is more than one risk measurement area for scoring consequence, the highest combination of scores is taken as the final risk score.

The initial risk score before consideration of existing risk treatment strategies and mitigating controls is called the ***inherent risk*** grading. The controls in place reduce the inherent risk grading to ***assessed risk***. The assessed risk grading takes into account management's perception of the effectiveness of current controls and reduces the level of risk.

Scoring Example:

Risk Scoring Matrix

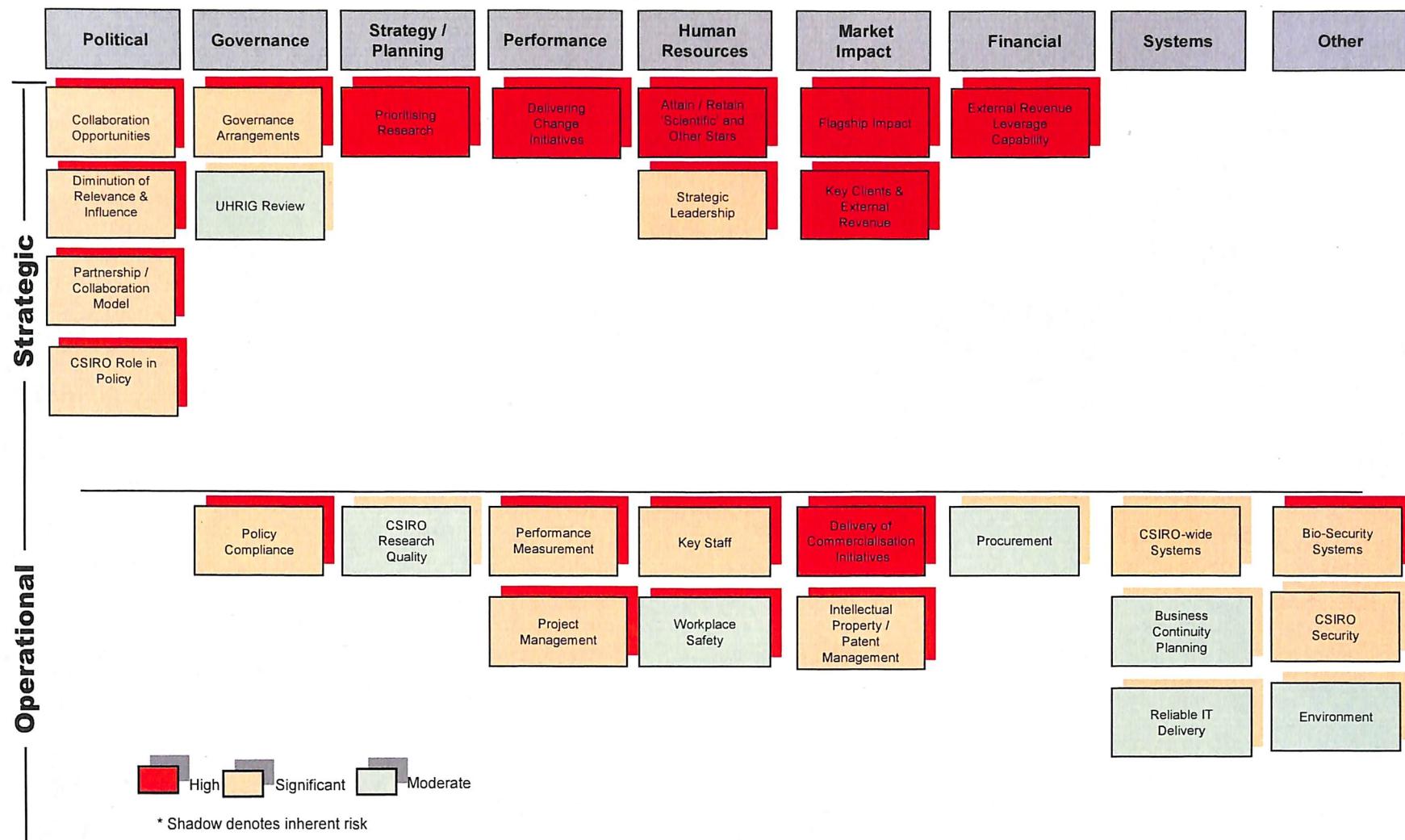
Consequence risk score of 4 (major)

Likelihood risk score of 2 (unlikely)

Grading: Significant risk 6

LIKELIHOOD		CONSEQUENCE				
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Almost Certain	5	S	S	H	H	H
Likely	4	M	S	S	H	H
Possible	3	L	M	S	H	H
Unlikely	2	L	L	M	S	H
Rare	1	L	L	M	S	S

CSIRO Organisational Risk Profile



10.6 CSIRO Research Themes and Budgets (\$m) 2004-05 and 2005-06

The Flagships *

Energy Transformed 05/06

Energy Futures	\$2.3
Low Emission Electricity	\$18.2
Low Emission Transport	\$7.4
Low Emission Distributed Energy	\$4.0

Food Futures 05/06

Advanced Genetics	\$10.1
Breed Engineering	\$6.4
Innovative Processing	\$8.4
Quality Biosensors	\$4.3
Consumer Engagement	\$0.7

Leading the Light Metals Age 05/06

Alumina	\$5.6
Aluminium Metal Production	\$6.5
Magnesium Metal Production	\$2.5
Aluminium and Magnesium Manufacturing	\$2.2
Titanium	\$7.1

Preventative Health 05/06

Colorectal Cancer	\$12.6
Neurodegenerative Diseases	\$1.5
Cardiovascular Disease/Inflammatory Diseases	\$2.8
Environment and human health	\$0.5
Health Data Integration	\$3.2

Water for a Healthy Country 05/06

Great Barrier Reef Catchments	\$5.5
River Murray Region	\$8.1
Urban Waterscapes	\$4.4
Southwestern WA	\$6.3
Water Knowledge	\$2.9

Wealth from Oceans 05/06

Ocean System Prediction and Responses – "the Springboard"	\$11.9
Ocean Based Forecasts of Australian Climate – "Oceans to Rain"	\$4.0
Ocean Based Industry Development and Growth – "Blue GDP"	\$4.9
Ocean based regional development and growth – the "Marine Nation"	\$3.7

Energy Transformed 04/05

Energy Futures	\$3.0
Low Emissions Electricity	\$12.4
Low Emissions Transport	\$6.5
Low Emissions Distributed Energy	\$4.2

Food Futures 04/05

Advanced Genetics	\$10.2
Breed Engineering	\$8.0
Bioactive Separation	\$2.7
High Pressure Processing (HPP)	\$2.4
Quality Biosensors	\$4.1
Consumer Acceptance	\$0.7

Leading the Light Metals Age 04/05

Alumina	\$5.2
Aluminium Metal Production	\$5.9
Magnesium Metal Production	\$3.1
Magnesium/Aluminium Fabrication	\$1.7
Titanium	\$7.3

Preventative Health 04/05

Colorectal Cancer	\$14.0
Cardiovascular/Inflammatory Disease	\$3.1
Neurodegenerative Disease	\$1.4
Environment and Human Health	\$0.4
Health Data Integration	\$2.6

Water for a Healthy Country 04/05

Great Barrier Reef Catchments	\$3.6
Urban Waterscapes	\$4.9
River Murray System	\$6.9
Southwest Western Australia	\$6.2
Integrating and Supporting Research Theme	\$4.7

Wealth from Oceans 04/05

Ocean System Prediction and Responses – 'the Springboard'	\$11.6
Ocean Based Forecasts of Australian Climate – 'Oceans to Rain'	\$5.3
Ocean Based Industry Development and Growth – 'Blue GDP'	\$1.1
Ocean Based Regional Development and Growth – 'Marine Nation'	\$1.5

*2005-06 Flagship budgets as published in the 2005-06 CSIRO Operational Plan, 2004-05 Flagship budgets as allocated by FOC 28 April 2004.

Agribusiness Group***Forestry and Forest Products / ensis 05/06**

Wood Quality Solutions	\$4.3
Precision Plantation Solutions	\$4.9
Development of Improved Germplasm and Breeding Decision Support Tools	\$7.8
FirePAK - National Bushfire Behaviour Prediction System	\$2.7
Smart Wood Products	\$7.0
Forests and the Environment	\$5.9

Entomology 05/06

Securing agriculture against biological threats	\$14.6
Protecting ecosystem function, biodiversity and water quality	\$14.8
Developing innovative bio-industries	\$4.9

Food Science Australia 05/06

Processing Innovation and Food Quality	\$20.3
Healthy Foods	\$11.2
Integrated Food Safety	\$11.6
Obesity and Health	\$11.4

Livestock Industries 05/06

Enabling Technology Innovation	\$8.4
Ensuring Product Integrity and Market Access	\$31.5
Understanding and transforming the Animal and its Products	\$19.5
Achieving Environmental Sustainability and Social Acceptance	\$11.8
Other Initiatives - Diagnostic, Surveillance & Response Group	\$7.5

Plant Industry 05/06

Advanced Gene Technologies for Plant Science and New Agricultural Products	\$18.7
Quality, Differentiated Food for Health and Market Access	\$34.9
Plant Fibre and Biofactories for New Agricultural & Industrial Products	\$9.5
Restructured Agriculture and Biodiversity Sustainability	\$21.2
Australian National Herbarium Collection and Services	\$2.2

Textile and Fibre Technology 05/06

Develop market led consumer products made from Australia's natural fibres	\$12.1
Increase efficiency of processing and trading Australia's natural fibres	\$10.9
Other Initiative - Investigate the potential for flexible electronics as a platform in textiles	\$1.8
Other Initiative - Assisting Australian Small to Medium Sized Enterprises	\$1.7

Forestry and Forest Products 04/05

Wood Quality Solutions	\$2.8
Improved Germplasm	\$5.5
Smart Products	\$5.3
CFFP Business Units	\$2.0
Precision Plantation Solutions	\$3.5
Commercial Environmental Forestry	\$3.1
FirePAK	\$2.7
CFFP Business Units	\$1.0
Other CFFP Initiatives	\$10.1

Entomology 04/05

Securing agriculture against biological threats	\$14.7
Protecting ecosystem function, biodiversity and water quality	\$13.6
Developing innovative bio-industries	\$7.8

Food Science Australia 04/05

Processing Innovation and Food Quality	\$17.9
Healthy Foods	\$8.6
Integrated Food Safety	\$8.4
Other Initiatives - Capability Building	\$4.5

Livestock Industries 04/05

Achieving Environmental Sustainability and Social Acceptance	\$11.1
Enabling Technology Innovation	\$9.9
Ensuring Product Integrity and Market Access	\$30.8
Understanding and Transforming the Animal and its Products	\$21.5
Other Initiatives - Diagnosis, Surveillance and Response Group	\$5.0

Plant Industry 04/05

Advanced Gene Technologies for New Agricultural & Industrial Products	\$17.8
Quality, Differentiated Food & Fibre for Health and Market Access	\$36.3
Restructured Agriculture and Biodiversity Sustainability	\$24.4
Partnerships for Global Agribusiness Development	\$7.1

Textile and Fibre Technology 04/05

Develop Market Led Consumer Products Made from Australia's Natural Fibres	\$12.2
Increase Efficiency of Processing and Trading Australia's Natural Fibres	\$8.8
Other Initiative - Investigate the potential for flexible electronics as a platform in textiles	\$1.6
Other Initiatives - Assisting Australian Small to Medium Sized Enterprises	\$2.0

*Divisional budgets as published in the 2005-06 CSIRO Operational Plan and the 2004-05 CSIRO Operational Plan respectively

Information, Manufacturing and Minerals Group***Australia Telescope National Facility 05/06**

National Facility Operation	\$12.4
Technologies for radio astronomy	\$6.9
Astrophysics	\$3.2
Other Initiatives	\$4.7

Exploration and Mining 05/06

Computational Geoscience for Predictive Discovery	\$6.9
Exploration Through Cover	\$3.3
Discovery Technologies	\$6.6
Rock Mass Characterisation	\$4.1
Mining ICT and Automation	\$4.3
Mining Systems	\$7.6
Mining & Sustainable Development	\$2.3
Other Initiatives – Minerals Down Under	\$0.5
Other Initiatives – QCAT 3	-

ICT Centre 05/06

Autonomous Systems	\$7.0
Information Engineering	\$8.5
Networking Technologies	\$8.2
Wireless Technologies	\$12.5
Other Initiative – e-Health Research Centre	\$5.8

Industrial Physics 05/06

Nanoscale manufacturing	\$7.3
Physical Security & Public Safety	\$4.9
Enabling Physics for Flagships & the National Innovation System	\$5.3
Other Initiative – Facility Management	\$11.2

Manufacturing and Infrastructure Technology 05/06

Manufacturing in a Carbon Constrained Future	\$4.4
Adaptive Extreme Process Technologies 'AdEPT'	\$11.6
Manufacturing Technologies for Transport	\$17.2
Innovative Material, Polymer and Composite Technologies (IMPACT)	\$12.2
Safeguarding Technologies	\$13.9
Future Cities	\$17.5
Other Initiatives - Industrial Research Consultancy Services (IRCS)	\$4.6

Australia Telescope National Facility 04/05

Technologies for Radio Astronomy	\$6.5
Astrophysics	\$3.1
National Facility Operations	\$16.2
Other Initiative - Gemini Subscription	\$3.1

Exploration and Mining 04/05

New Deep Mineral Resources	\$14.4
Commercial Products for Mineral Resource Characterisation	\$8.5
Sustainable Mining of Mineral Resources	\$12.3
Other Initiatives - Minerals and Energy in Society	\$1.1

ICT Centre 04/05

Networked Information Systems	\$3.9
Wireless and Antenna Futures	\$11.8
Networking for the Information Economy	\$8.0
Information Agility	\$4.6
Autonomous Systems	\$4.9
e-Health	\$4.5
Other Initiatives - QeHRC	\$4.0

Industrial Physics 04/05

Clean Energy	\$3.5
Physical Security	\$2.7
Frontier Industrial Technologies	\$6.4
Aerospace Systems	\$11.4
Other Initiatives - Light Metals Flagship Program	\$1.3
Other Initiatives - Instrumentation Program	\$1.7

Manufacturing and Infrastructure Technology 04/05

Manufacturing in a Carbon-Constrained Future	\$4.2
Efficiency and Intensification in the Process Industries	\$9.4
Manufacturing New Generation Transport Vehicles	\$12.9
Revitalising Product Manufacturing	\$10.2
Safe and Secure Australia	\$10.0
Smart Infrastructure	\$10.5
Sustainable and Competitive Cities	\$6.4
Other Initiatives - Industrial Research and Consulting Services - IRCS	\$3.1

*Divisional budgets as published in the 2005-06 CSIRO Operational Plan and the 2004-05 CSIRO Operational Plan respectively

Information, Manufacturing and Minerals Group* - continued**Mathematical and Information Sciences 05/06**

Biotechnology & Health Informatics	\$8.6
Environmental Informatics	\$5.4
Decision Technologies	\$9.2

Minerals 05/06

Value Adding to Australia's Minerals	\$6.8
Sustainable Processing of Minerals	\$12.9
Advanced Technology Platforms for the Minerals Industry	\$12.9
Australia Leading the Light Metals Age	\$16.8

Molecular and Health Technologies 05/06s**Part A – Molecular Science**

Bioactive Molecules	\$8.4
Biomaterials	\$7.9
Diagnostic Markers	\$5.8
Product Security	\$2.6
Industrial Biotechnology	\$4.2
High Performance Polymers	\$6.0
Nano-structured Materials	\$2.3

Part B – Health Sciences & Nutrition (Parkville)

Protein-based Diagnostic Technologies	\$7.6
Rational Drug Design	\$8.7

Mathematical and Information Sciences 04/05

Biotechnology and Health Informatics	\$9.8
Environmental Monitoring for Management	\$5.5
Decision Making for Industrial Processes & Business Services	\$7.9
Other Initiatives - Software consulting and support	\$0.7

Minerals 04/05

Value Adding to Australia's Minerals	\$6.8
Sustainable Processing of Minerals	\$13.8
Advanced Technologies for Mineral Process Design and Control	\$9.4
Australia Leading the Light Metals Age	\$15.8

Molecular Science // Health Sciences and Nutrition 04/05

Molecular Science 04/05	
Health Through Medical Devices	\$10.4
Parasite Control	\$3.8
Security	\$1.4
Elaborately Transformed Manufactures	\$16.7
Other Initiatives - Future Capabilities	\$2.9

Health Sciences & Nutrition 04/05

Dietary & Lifestyle Strategies for the Control of Obesity & Obesity-related Conditions	\$7.9
Protein-based Diagnostic Technologies	\$6.7
Rational Drug Design	\$9.0
Flagship/ESA Initiatives outside Divisional Themes	\$3.9

* Divisional budgets as published in the 2005-06 CSIRO Operational Plan and the 2004-05 CSIRO Operational Plan respectively

Sustainable Energy & Environment Group***Energy Technology 05/06**

Renewables and Hydrogen	\$5.7
Distributed Energy and Storage	\$7.1
Energy and Environment	\$6.6

Land and Water 05/06

Agriculture, Water and Environment	\$18.0
Environmental Biogeochemistry	\$7.7
Water Resources	\$8.9
Rivers and Coasts	\$10.7
Society, Economy and Policy	\$4.7
Environmental Sensing, Prediction and Reporting	\$10.2
Urban and Industrial Water	\$5.3

Marine and Atmospheric Research 05/06

Part A – Marine Research	
Managing Multiple Uses (of the marine environment)	\$14.8
Sustainable Fisheries	\$16.2
Sustainable Aquaculture Production	\$4.8
Climate Processes and Prediction	\$7.0
Marine Environment Prediction	\$8.6
Part B – Atmospheric Research	
Climate and Weather Prediction	\$11.8
Environmental Monitoring & Prediction	\$10.3
Other Activity – Earth Observation Centre/COSSA	\$4.5
Other Activity – Complex systems Science	\$1.7

Petroleum Resources 05/06

Maximising Australia's Oil Self Sufficiency	\$17.8
Growing Australia's Methane Economy	\$6.8

Sustainable Ecosystems 05/06

Resilient Regions and Communities	\$11.8
Sustainable Rural Livelihoods	\$17.4
Healthy Ecosystems	\$11.1
Investing in sustainability	\$3.9

Energy Technology 04/05

Low Emissions Electricity and Competitive Coal	\$10.3
Renewables and Hydrogen	\$2.1
Distributed Energy and Storage	\$7.5
Energy and Environment	\$8.8

Land and Water 04/05

Water Allocation and Quality	\$16.0
Urban Water Re-use	\$1.5
Land Use Options	\$25.8
Environmental Contamination	\$9.4
Triple Bottom Line Land and Water Management Options	\$9.5

Marine Research // Atmospheric Research 04/05

Marine Research 04/05	
Managing Multiple Uses	\$13.4
Sustainable Fisheries	\$17.8
Sustainable Aquaculture Production	\$5.2
Climate Processes and Prediction	\$4.9
Marine Environment Prediction	\$7.0
Other Initiatives - National Collections	\$0.6
Other Initiatives - National Facility Southern Surveyor	\$9.6

Atmospheric Research 04/05

Climate and Weather	\$9.4
Air Quality and Health	\$4.2
Atmosphere and Earth Observation	\$10.5
Other Initiatives - Complex Systems Science Directorate	\$1.6

Petroleum Resources 04/05

Maximising Australia's Oil Self Sufficiency	\$14.6
Supporting Australia's Gas Future	\$7.9

Sustainable Ecosystems 04/05

Healthy Regions and Communities	\$10.2
Prosperous Rural Enterprises	\$14.5
Sustaining Biodiversity and Ecosystem Services	\$10.6
National Options for Long-term Sustainability	\$3.8
International Partnerships for Sustainability	\$2.6
Healthy Urban Ecosystems	\$1.2
Other Initiatives - Social and Economic Integration Directorate	\$0.9
Other Initiatives - Realising Impact Through Innovation – RITI	\$1.0
Other Initiatives - The Australian National Wildlife Collection – ANWC	\$0.5

*Divisional budgets as published in the 2005-06 CSIRO Operational Plan and the 2004-05 CSIRO Operational Plan respectively

10.7 National Research Priority Areas and Priority Goals

A. An Environmentally Sustainable Australia

Transforming the way we utilise our land, water, mineral and energy resources through a better understanding of human and environmental systems and the use of new technologies

A1. Water – a critical resource

Sustainable ways of improving water productivity, using less water in agriculture and other industries, providing increased protection of rivers and groundwater and the re-use of urban and industrial waste waters.

A2. Transforming existing industries

New technologies for resource-based industries to deliver substantial increases in national wealth while minimising environmental impacts on land and sea.

A3. Overcoming soil loss, salinity and acidity

Identifying causes and solutions to land degradation using a multidisciplinary approach to restore land surfaces.

A4. Reducing and capturing emissions in transport and energy generation

Alternative transport technologies and clean combustion and efficient new power generation systems and capture and sequestration of carbon dioxide.

A5. Sustainable use of Australia's biodiversity

Managing and protecting Australia's terrestrial and marine biodiversity both for its own value and to develop long term use of ecosystem goods and services ranging from fisheries to ecotourism.

A6. Developing deep earth resources

Smart high-technology exploration methodologies, including imaging and mapping the deep earth and ocean floors, and novel efficient ways of commodity extraction and processing (examples include minerals, oil and gas) while minimising negative ecological and social impacts.

A7. Responding to climate change and variability

Increasing our understanding of the impact of climate change and variability at the regional level across Australia and addressing the consequences of these factors on the environment and on communities.

B. Promoting and Maintaining Good Health

Promoting good health and well being for all Australians

B1. A healthy start to life

Counteracting the impact of genetic, social and environmental factors which predispose infants and children to ill health and reduce their well being and life potential.

B2. Ageing well, ageing productively

Developing better social, medical and population health strategies to improve the mental and physical capacities of ageing people.

B3. Preventive healthcare

New ethical, evidence-based strategies to promote health and prevent disease through the adoption of healthier lifestyles and diet, and the development of health-promoting products.

B4. Strengthening Australia's social and economic fabric

Understanding and strengthening key elements of Australia's social and economic fabric to help families and individuals live healthy, productive, and fulfilling lives.

C. Frontier Technologies for Building and Transforming Australian Industries

Stimulating the growth of world-class Australian industries using innovative technologies developed from cutting-edge research

C1. Breakthrough science

Better understanding of the fundamental processes that will advance knowledge and facilitate the development of technological innovations.

C2. Frontier technologies

Enhanced capacity in frontier technologies to power world-class industries of the future and build on Australia's strengths in research and innovation (examples include nanotechnology, biotechnology, ICT, photonics, genomics/phenomics, and complex systems).

C3. Advanced materials

Advanced materials for applications in construction, communications, transport, agriculture and medicine (examples include ceramics, organics, biomaterials, smart material and fabrics, composites, polymers and light metals).

C4. Smart information use

Improved data management for existing and new business applications and creative applications for digital technologies (examples include e-finance, interactive systems, multi-platform media, creative industries, digital media creative design, content generation and imaging).

C5. Promoting an innovation culture and economy

Maximising Australia's creative and technological capability by understanding the factors conducive to innovation and its acceptance.

D. Safeguarding Australia

Safeguarding Australia from terrorism, crime, invasive diseases and pests, strengthening our understanding of Australia's place in the region and the world, and securing our infrastructure, particularly with respect to our digital systems

D1. Critical infrastructure

Protecting Australia's critical infrastructure including our financial, energy, communications, and transport systems.

D2. Understanding our region and the world

Enhancing Australia's capacity to interpret and engage with its regional and global environment through a greater understanding of languages, societies, politics and cultures.

D3. Protecting Australia from invasive diseases and pests

Counteract the impact of invasive species through the application of new technologies and by integrating approaches across agencies and jurisdictions.

D4. Protecting Australia from terrorism and crime

By promoting a healthy and diverse research and development system that anticipates threats and supports core competencies in modern and rapid identification techniques.

D5. Transformational defence technologies

Transform military operations for the defence of Australia by providing superior technologies, better information and improved ways of operation.

Find more info on National Research Priorities at: <http://www.dest.gov.au/priorities/default.htm>.

10.8 List of Acronyms

ANWC	Australian National Wildlife Collection
ATNF	Australia Telescope National Facility (CSIRO Division)
BCC	Board Commercial Committee
BD&C	Business Development & Commercialisation (CSIRO Group)
BETR	Business Processes & Enabling Technology Review
CeNTIE	Centre for Networking Technologies for the Information Economy
cLET	Centre for Low Emission Technologies
COG	Corporate Operations Group (CSIRO Group)
CRC	Cooperative Research Centre
CST	Customer Service Team
CVS	Customer Value Survey
DCITA	Department of Communications, Information Technology & the Arts
DEST	Department of Education, Science & Training
DoFA	Department of Finance & Administration
E&M / EM	Exploration & Mining (CSIRO Division)
EMC	Executive Management Council
ET	Executive Team
ET	Energy Technology (CSIRO Division)
FFP	Forestry & Forest Products (CSIRO Division)
FOC	Flagship Oversight Committee
FSA	Food Science Australia (CSIRO Division)
GHG	Greenhouse Gas
HSN	Health Sciences & Nutrition (CSIRO Division)
HSPC	High Performance Scientific Computing
ICTC	Information & Communication Technology Centre (CSIRO Division)
IMM	Information, Manufacturing and Minerals (CSIRO Group)
IP	Intellectual Property
IP	Industrial Physics (CSIRO Division)
L&W / LW	Land and Water (CSIRO Division)
LI	Livestock Industries (CSIRO Division)
MDU	Minerals Down Under
MIS	Mathematical & Information Sciences (CSIRO Division)
MIT	Manufacturing & Infrastructure Technology (CSIRO Division)
MXDP	Major Cross Divisional Program
NIS	National Innovation System
NTD	New Technology Demonstrator
P&C	People & Culture (CSIRO Group)
PI	Plant Industry (CSIRO Division)
PMF	Performance Measurement Framework
PPF	Program Performance Framework
PR	Petroleum Resources (CSIRO Division)
QCAT	Queensland Centre of Advanced Technology
RSS	Research Support Services
SBU	Strategic Business Unit
SE	Sustainable Ecosystems (CSIRO Division)
SEE	Sustainable Energy and Environment (CSIRO Group)
SIP	Science Investment Process
SKA	Square Kilometre Array
TFT	Textile and Fibre Technology (CSIRO Division)
WLAN	Wireless Local Area Network
WRON	Water Resources Observation Network

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Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.



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