



CSIRO Operational Plan – 2004-05

July 2004

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About the CSIRO Operational Plan...

This Operational Plan, as required by the *Science and Industry Research Act 1949 (Section 35)*, sets out details of the Organisation's strategies and activities, and of the resources allocated to those activities.

CSIRO's research is organized into a hierarchy of:

- **Themes** - which have high level strategic goals,
- **Streams** – which represent collections of related projects that address a particular aspect of the Theme goal. Each Stream has an explicit medium-term objective supported by specific annual performance goals, and
- **Projects** – which are the core unit of research activity and budgetary control.

The Operational Plan describes CSIRO's research portfolio to the level of Theme Goals and should be read in conjunction with the CSIRO Strategic Plan 2003-2007 and also the CSIRO Performance Report 2003-04. Details of Stream objectives and 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.

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Executive Summary

This Operational Plan, developed within the framework of, and the context provided by, the CSIRO Strategic Plan 2003–07, sets out our approach for the delivery and execution of our strategic goals for 2004–05.

At the strategic level the areas of highest intensity for 2004–05 are:

- Continue to build critical mass and ensure quality in our core research programs - in particular commencing a new Science Quality Review process
- Continuing to focus on implementing the Flagships Program to improve the lives of Australians and advance Australian industries
- Increasing the impact of major cross-Divisional activities, and our other core research activities through a (new) focused strategic investment process
- Focusing on processes to develop, retain, attract and excite talent, throughout the organisation
- Further improvement of our project management processes
- Building stronger relationships with large corporations, with tangible outputs in place
- Further improving cross – organisational collaboration and working together efficiencies through adoption of standard processes and IT systems
- Proactive management of CSIRO's patent and equity portfolios, and deliver on our IP revenue objectives (for reinvestment into our science)
- Delivering value-for-money to our customers while eliminating subsidisation in our consulting and services business
- Continuing efforts to reduce overhead and purchasing costs, meeting out targets in this regard.

The bulk of CSIRO's science is organised around priority-driven core research grouped into Divisional research portfolios, however, an increasing proportion of research is being integrated into 'One-CSIRO' portfolios. The Emerging Science Initiative, Flagships Program and Major Cross-Divisional Programs and are all examples of this change. Approximately 83 percent of CSIRO's total science investment for 2004–05 is targeted at research outcomes relevant to the National Research Priorities.

Emerging Science

In 2004–05 the Emerging Science Initiative will seek to enhance the focus of Divisions on emerging and frontier science and to facilitate the development of CSIRO's capabilities in key areas of scientific activity likely to be important to CSIRO's future impact and relevance. Specific objectives are to:

- finalise the restructure of the Emerging Science Initiative,
- finalise Divisional Emerging Science Plans and ensuing budget allocations to Divisions,
- implement a new corporate component of the Initiative designed to foster new areas of emerging science,
- continue to support the identified areas of complex systems science, socio-economic integration and nanotechnology.

Flagships

During 2004–05 the Flagships initiative, with its emphasis on partnerships with other leading Australian scientists, research institutions, Government agencies, commercial companies and selected international partners, and closely aligned with the National Research Priorities, will centre on consolidating and expanding the six existing Flagships: Energy Transformed; Food Futures; Light Metals; Preventative Health; Water for a Healthy Country; and Wealth from Oceans. Total expenditure across the six Flagships for 2004–05 will be approximately \$145 million, of which close to 20 percent will be generated externally.

Major Cross-Divisional Programs

In 2004–05 there are two continuing Major Cross-Divisional Programs designed to increase CSIRO's impact in selected areas. The CSIRO Climate Program is a network of CSIRO Divisions and over 100 scientists that links core climate science across the organisation with applications in adapting to climate change and variability, and in mitigating emissions. The Secure Australia Program is currently under development and seeks to coordinate CSIRO activities and explore opportunities in the areas of: plant, animal and human biosecurity; security devices; critical infrastructure protection; detection and sensing; and information management and planning.

During the year we will establish a further program aimed at providing a focus for CSIRO's involvement in the Australian Synchrotron Project.

Priority Driven Core Research

Our priority-driven core research delivers world-class science outcomes across our core science capability and is closely aligned with National Research Priorities.

Agribusiness and Health

The Agribusiness and Health Group comprises the Divisions of: Food Science Australia; Forestry and Forest Products; Health Sciences and Nutrition; Livestock Industries; and Plant Industry, and the Food Futures and Preventative Health Flagships. The Group has 1,685 full-time staff as of July 2004 and a total budget for 2004–05 of \$241.2 million, including external revenue of \$80.7 million.

The Group's prime objectives are to:

- Enhance the global competitiveness and sustainability of agribusiness industries by seeking:
 - profitable production systems for agriculture and forestry that are best practice in terms of productivity and minimising adverse environmental impacts
 - high quality, differentiated and market-driven agrifood and fibre products
- Improving human well-being and community health by developing:
 - high-impact technologies, delivery systems and products for preventative health, therapeutics and diagnostics, with an emphasis on diseases associated with ageing

Environment and Natural Resources

The Environment and Natural Resources Group comprises the Divisions of: Atmospheric Research; Entomology; Land and Water; Marine Research; and Sustainable Ecosystems, and the Water for a Healthy Country and Wealth from Oceans Flagships. The Group has 1,452 full-time staff as of July 2004 and a total budget for 2004–05 of \$225.5 million, including external revenue of \$83 million.

The Group's prime objectives are to:

- Develop and apply leading-edge environmental and natural resources research which meets Australian needs through:
 - developing methods for optimising water use and sustainable land management
 - managing and protecting our biodiversity
 - focused research into climate and weather, air quality and health
 - research into invertebrates and weeds and their management
 - promoting the ecologically sustainable development of Australia's oceans

IT, Manufacturing & Services

The IT, Manufacturing and Services Group comprises the Divisions of: the Australia National Telescope Facility; the ICT Centre; Industrial Physics; Manufacturing and Infrastructure Technology; Mathematical and Information Sciences; Molecular Science; and Textile and Fibre Technology. The Group has 1,573 full-time staff as of July 2004 and a total budget for 2004–05 of \$269.5 million, including external revenue of \$85.8 million.

The Group's prime objectives are to:

- Improve the competitiveness of Australian industry, especially in the service sector, manufacturing, ICT, textiles, pharmaceuticals, human health, chemicals and plastics, and infrastructure by:
 - developing novel metals and biomaterials
 - developing new, improved and more efficient manufacturing processes
- Build a world-class ICT R&D Centre, complementing other major providers, to help to take Australia to the global forefront of ICT research, especially for:
 - delivering tailored information and services (eg remote and personal health and education across Australia)
 - enabling major scientific endeavours, drawing on CSIRO's wide range of challenging applications, in which ICT provides a differentiating advantage
 - assisting the growth of vibrant Australian ICT and knowledge-based service industries
- Operate a world-class radio telescope facility supported by leading-edge technology and astrophysics research

Sustainable Minerals & Energy

The Sustainable Minerals and Energy Group comprises the Divisions of: Energy Technology; Exploration and Mining; Minerals; and Petroleum Resources, and the Energy Transformed and Light Metals Flagships. The Group has 748 full-time staff as of July 2004 and a total budget for 2004–05 of \$134.2 million, including external revenue of \$49.2 million.

The Group's prime objectives are to:

- Create sustainable value from Australia's mineral and energy resource base by:
 - optimising use of mineral and energy resources such as titanium, coal and petroleum
 - developing new and improved tools and systems for more productive, efficient and cost-effective mineral and resource exploration, extraction and processing
- Deliver clean and competitive ores, minerals, metals, energy and energy systems to the Australian and global markets by:
 - developing efficient processing systems for minerals and energy production, including reducing wastes, recycling and mitigation of emissions
 - continuing to pursue alternative, ultra-efficient, renewable energy sources and technologies

Financial Information

The 2004–05 Federal Budget provides the financial basis for CSIRO to meet its strategic goals. A new Triennium Funding Agreement for the 2004–05 to 2006–07 period was agreed, providing indexed base funding totalling \$1,665 million, including an additional \$105 million support for the Flagships. In 2004–05 CSIRO will receive total appropriation of \$576.5 million, of which \$30 million is new appropriation for Flagships.

CSIRO's budgeted external revenues in 2004–05 are \$329.1 million. Including CSIRO's share of external revenues through its joint ventures (\$28.3 million), total external revenue for the CSIRO 'Group' is estimated to be \$357.4 million for 2004–05, an increase of approximately 11 percent over 2003–04, consistent with our Strategic Plan target of \$356 million.

Performance Framework and Targets

To support our emphasis on delivering outputs that contribute to desired outcomes CSIRO has developed a rigorous Performance Measurement Framework, which includes four primary groups of measures:

- Strategy Implementation and Achievement Measures
- Program Performance Measures
- Organisational Health Measures
- Effectiveness and Outcome Measures

Details of the individual headline measures and targets for 2004–05 are provided on page 21.

Section 1: Introduction and Context

The Operational Plan for 2004-05 has been developed within the context of the organisational strategic planning framework:

CSIRO strategic planning framework

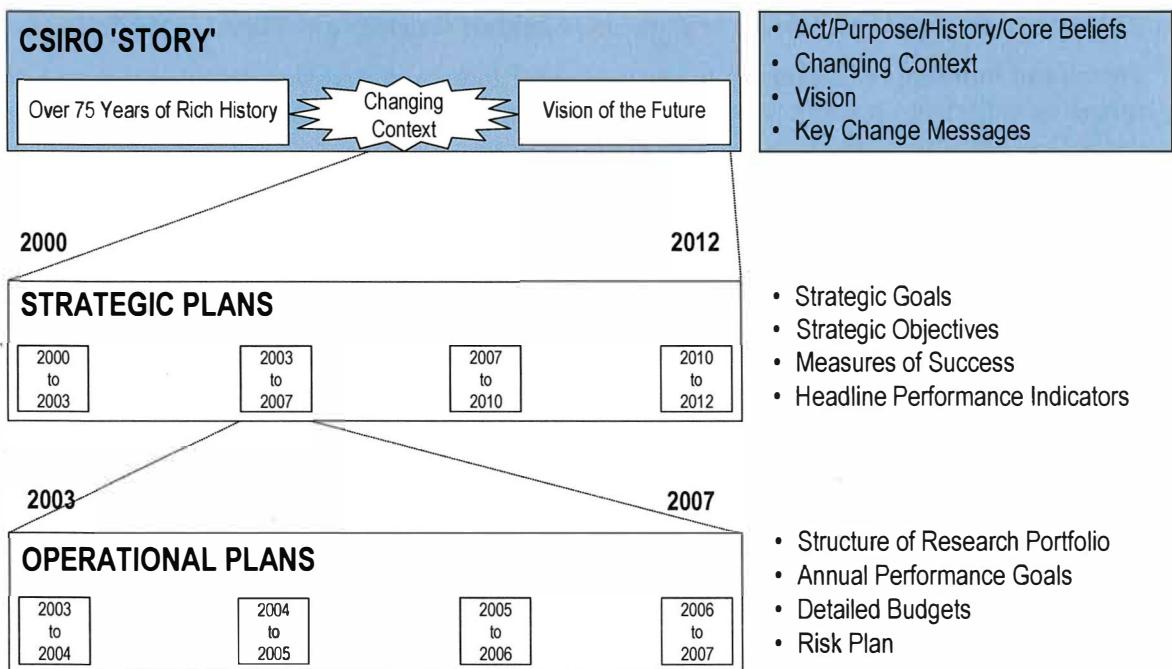


Figure 1: Inter-relationships, and prime outputs, in CSIRO planning process

Source: CSIRO Strategic Plan 2003-2007, page 3.

CSIRO has a proud tradition of close to eighty years of distinguished achievement. It is often accorded 'icon' status. Rightly so. We are in transition, in complex and ambiguous times, but we are meeting the challenges, and continuing to deliver on our core purpose – **'by igniting the creative spirit of our people we deliver great science and innovative solutions for industry, society and the environment'**. This Operational Plan sets out our approach and these challenges for 2004-05.

1.1 In Summary: Our Year in Review – 2003-04

CSIRO's 2003–07 Strategic Plan was finalised in August 2003 and is centred on six strategic goals, building on the six key messages we identified in 2001. This past year focused on **delivery** and **execution** against these six strategic goals. We continued to **focus** on the major scientific challenges and opportunities for Australia, both through the Flagships Initiative and our core research program, with a strong **outward-looking** emphasis. We further strengthened our **partnerships** with universities, other science agencies and industry and continued to build a '**service from science**' culture. Considerable gains were made in making full use of our collective strengths through a unified '**One-CSIRO**' approach, and above all we continued to **grow** our impact and relevance to the nation.

This past year focused on delivery and execution against the goals articulated in the Strategic Plan.

Focus, and building critical mass: In developing our future strategy, we recognised that we had been spreading our science investment too thinly and needed to better focus our efforts. Further implementation of the National Research Flagships has been our primary activity in re-prioritising our investment over the last 12 months. Flagships are closely aligned with the Government's National Research Priorities and build on CSIRO's core science capability and, in partnership, concentrate on major challenges and opportunities in the areas of energy, water, health, growing new industries based on our rich mineral and agricultural resources, and developing sustainable wealth from our oceans. Although the Flagships are relatively new, they are already delivering real outcomes e.g., the discovery of unique plant genes which control the synthesis of protective oils for use in health foods, the development of a novel super-capacitor with a significant increase in power delivery and energy storage, and a revolutionary new titanium powder manufacturing process that significantly cuts the production costs of this valuable light metal.

We have also developed critical mass in a number of other areas. One of these has been in ICT. In September 2003 we established our ICT Centre with over 180 staff and an annual budget of approximately \$40 million and we expect to continue to produce exciting innovations such as our recently awarded Virtual Critical Care Unit. Another focus has been in energy with the opening, in October 2003, of the CSIRO Energy Centre in Newcastle, NSW. This \$36 million investment represents the largest consolidated base of energy R&D in the southern hemisphere.

Growing our financial foundation: A stable, and growing, financial platform is key to ensuring CSIRO's ongoing capacity and impact. The 2004 Federal Budget confirmed CSIRO's three-year base funding with a record \$1.7 billion appropriation for 2004-07. Moreover, CSIRO's progress with the Flagships Initiative attracted an additional high level of commitment in the Budget with \$305 million of new money provided over the next seven years to enable us to accelerate this Initiative. This investment confirmed the appropriateness of, and the Government's commitment to, CSIRO's decision to refocus its own scientific investments and, over time, to devote up to 40 per cent of total resources to the Flagships.

Our overall financial performance during 2003–04 was very gratifying with total external revenue growth of 7.6% to \$320 million (very close to our budget of \$322 million), a 60% increase in intellectual property revenue (spot on our target of \$22 million) and a \$25 million 'bottom line' improvement over a budgeted \$30 million deficit. During 2003-04 we also reviewed procurement, asset management and associated business processes aiming to reduce overall costs and release funds for additional investment in science. Highlights included realisation of significant savings gained across a number of '**One-CSIRO**' initiatives, including the successful pilot of an e-procurement project and the revision of procurement policies and practices for the engagement of consultants.

Looking out for our science, and our people: CSIRO's core business is the delivery of impact from our world-class science. This requires us to attract and retain world-class people. Over the past year there has been a particular emphasis on talent management, enhancing performance and strengthening support arrangements for our staff (e.g. we have continued to make very good progress in OHS, with improved performance figures and a positive change in our safety culture; there has also been strong take-up of our enhanced recognition and rewards processes). The quality and relevance of the science base in CSIRO and its scientific outputs is critical. Based on the Institute for Scientific Information's (ISI) Essential Science Indicators for 2003–04, (monitored across over 3,400 institutions), CSIRO continued to be ranked in the top one per cent of institutions worldwide in 12 of ISI's 22 research fields. During 2003–04, CSIRO scientists received a range of

international awards with the highlight being Dr Keith Sainsbury (Marine Research) receiving the prestigious 2004 Japan Prize for his work on sustainable marine ecosystems.

Partnerships: Our rejuvenated collaboration initiatives allow CSIRO to have impact where our own efforts alone are insufficient. We are committed to a 'Team Australia' approach. For example, CSIRO remains the largest single participant in the Cooperative Research Centre (CRC) Program. In addition, within the Flagship Program, we developed collaborations with partners from industry, in 50 of the current 71 active CRCs and academia, with some 34 collaborative partnerships currently in place. CSIRO is committed to further strengthening ties with universities and we see co-location as a strong facilitator of collaboration. At present over 2,600 of our 6,500 staff are on or adjacent to university campuses and this is set to soon increase significantly under our property consolidation plans.

'One-CSIRO': CSIRO's scope and scale mean that when we act as a single unified organisation the possibilities are limitless. Progress has been achieved on migrating the culture of the Organisation to one more epitomised by the statement 'One-CSIRO' – one in which cooperation between different parts of CSIRO is actively sought out in order to bring to bear the full breadth of available skills and experience, to help identify exciting new 'cross-boundary' science and innovation possibilities, and to maximise the effectiveness of assessment, reporting and administrative systems.

This requires both a cultural change and the introduction of standard processes and IT systems across CSIRO to enhance efficiency. During 2003–04, the CSIRO IT Services strategy was developed and Phase I of its implementation has begun through restructuring of IT delivery in the Sydney basin. This will provide both improved IT security and significant cost savings and represents the first of a series of similar changes to ensure an enterprise approach to the support services.

Service Delivery from our Science: We have established a number of dedicated cross-Divisional Client Service Teams to provide a single window into all of CSIRO to enable customers to draw on the full breadth of our available skills. This has facilitated the development of some significant ventures with major corporations. In one notable example of larger coinvestment, CSIRO Petroleum Resources , Curtin University of Technology and the University of WA, have established a strategic research partnership with Woodside Energy Ltd, with Woodside committing \$30 million to fund oil, gas and other energy R&D projects. Another exciting venture is with Australian Customs. This crystallised in March 2004, following the commitment of \$8.4 m by the Federal Government, with the signing of the contract for construction of a commercial-scale version of CSIRO's contraband scanner which has the ability to detect materials such as drugs and other prohibited imports.

We recognise that SMEs play a major part in jobs growth in Australia and we are currently involved in around 2000 contracts with SMEs each year. We have developed a new approach to support the growth of existing SMEs and have also developed and implemented a new system for the execution of contracts across CSIRO (*FastTrack*) which is of particular benefit to SMEs; *FastTrack* simplifies CSIRO contracts from up to 20 pages to 1-1½ pages of plain English and reduces the time involved in negotiations from up to 70 days to as little as 24 hours.

In 2001 we commenced a systematic assessment of our customers' views using an internationally-benchmarked Customer Value Survey. Quarterly returns from an average of 150 of our customers (large and small, public and private) allow us to continually track our progress and identify ways to improve our customer relationships. For the year ending June 2004, CSIRO was ranked above average on overall value and achieved world class ratings on customers' willingness to recommend and reuse and on our brand name.

1.2 Context for Strategy Implementation in 2004-05

Global, national and internal factors provide an important context for the implementation of our strategy. CSIRO operates in a rapidly changing environment.

Global Factors: CSIRO faces a continuing 'war for talent' with increasing globalisation of research and global competition. Many OECD countries recently announced strong ongoing support of public sector R&D. The global economy is beginning to trend upwards and China is emerging as an economic juggernaut. At the same time, continuing conflict in the middle-east and increasing worldwide security issues continue to be of concern.

Implications for CSIRO of these global factors are; CSIRO's (and Australia's) capacity for impact and reputation for science excellence depends upon attracting, exciting and retaining talent in a mobile and competitive global resource pool. Talent management is fundamental in implementing any strategy; Against a background of OECD support for public sector R&D and the move by Nations towards more deliberate National innovation systems, ensuring a strong healthy unified CSIRO is important for the execution of an Australian NIS. Deliberate clarification of CSIRO roles and areas of distinctiveness will contribute to the formulation of an integrated national strategy; The trend of current terrorism and global security concerns driving national science agenda's towards defence and security related topics must be considered in our science investment strategy

Australian Factors: The Department of Education, Science and Training's recent *Research Collaboration Review* outlines Government's recognition that ongoing collaboration and partnerships are vital in pulling together the best possible scientific expertise. There is an increasing belief that greater co-location can facilitate people interactions, synergies and infrastructure sharing and also that outcome-oriented performance management is a critical component to delivering world class science outcomes. Government is also actively experimenting with how contestable funds could be a useful tool to encourage a healthy level of competition within the National Innovation System (NIS) and ensure that Government dollars are invested wisely. These policies sit on top of the recent Government exercise of *Mapping Australian Science and Innovation* which points out Australia's strengths and opportunities for improvement in a global context. Post these Government reviews, and through recommendations stated in the *Evaluation of the Knowledge and Innovation Reforms*, we are seeing a strong shift in funding trends towards greater contestability, transparency, collaboration, demonstrable impact and with increasingly detailed reporting requirements.

CSIRO's strategy is in strong alignment with the outcomes of the recent Government reviews. The Federal Government's recent decision to maintain three-year base-line funding for CSIRO affirms CSIRO's strategic objectives which are all about producing the best possible research outcomes for the benefit of all Australians. This three-year, \$1.7 billion agreement helps provide the platform, certainty and continuity of funding needed to enable long-term, large-scale strategic research in line with National Research Priorities, ensure Australia's responsiveness to changing research agendas, support the national Research Facilities and Reference Collections, and provide a base for stable strategic partnering and co-investment. The Government's seven year, \$305 million funding commitment to the National Research Flagships, one of the largest targeted scientific research programs in Australia's history, highlights Government's ongoing support for the organisation and its relevance to Australia. This funding commitment, out of *Backing Australia's Ability: Building our Future Through Science and Innovation* program, is in addition to the \$20 million provided to CSIRO in 2003-04 to support the Flagship initiative.

Internal Factors: The past year has seen an increased focus and central coordination of several key activities. Examples have included accelerated implementation of one-CSIRO IT systems, intensive re-engineering of CSIRO's procurement processes, the formation of a small BD&C team to assist the Flagship Directors in research delivery and commercialisation, and others that have lead to clarified line management responsibilities.

Recent Insight staff survey results show that overall staff satisfaction remains 3% points above the norm for global R&D organisations. CSIRO staff's pride in our organisation continues to be near the very top for R&D organisations globally, and some 11 points higher than the global norm. Significant improvements have been made in how staff feel about; remuneration levels; how performance is being managed; safety of the work environment; working relationships (especially teamwork); interactions with immediate managers, and our

customer focus. The only decline of significance this year was in how staff are feeling about job security/organisational sustainability. While this result is of real concern, it is not unexpected in organisations undergoing substantial change, especially with the substantial redeployment of staff into Flagship projects and other initiatives. Although these results overall are very pleasing, there are still some areas of staff concern that need to be addressed viz; we need to continue to work hard to communicate our strategic direction and performance to all staff, as quite a few people are still not sure as to where we are headed, and how we are performing as an organisation; there is still the feeling that there is too much bureaucracy and paperwork associated with doing our work; some staff still feel unsure as to whether it's always safe to speak up; we are still seen as not acting on poor performance; and we need to further enhance collaboration between workgroups within Divisions.

1.3 In Summary: The Year Ahead – 2004-05

The year ahead will again be '**delivery** and **execution**' oriented. We have created expectations, and are delivering well against these – as the Year in Review has summarised and highlighted; but we must continue to do so. At the same time, responding to the challenging forces provided from our local, regional and global environment, require us to embed the changes upon which we have embarked but, in concert, reflect systematically and thoughtfully upon our future, ten to fifteen years out. The metaphor of "changing the tyres while our car is travelling at 100kph" comes to mind! However being able to do this, effectively, is a hallmark of successful organisations in both the private and public sectors, worldwide.

Our 2003–07 Strategic Plan, and the six goals and corresponding 24 objectives articulated therein, will continue to provide our framework for action. Thus:

We must prevail with our passion for **focus**. As such, for example, Flagship Programs' delivery is critical, with streamlining the corresponding business processes required here a priority. Enhancing, correspondingly, our various partnerships with our University and other research agency colleagues, in delivering on Flagship objectives, will also be central to success.

Looking out, into the future – the very nature of the science business – demands from us science leadership and the maintenance of CSIRO's strong tradition of science excellence. The science we choose to do, and how well we do at it – with our benchmark being global best practices – are top priorities for our science leaders, our management, and our Board. Falling short of the standards we set ourselves will bring us into 'look out!' (i.e., watch out, danger) territory. For this reason, our objective (2.1) to 'concentrate people processes on developing, attracting, exciting and retaining talent', at all levels in the organisation and in our collaborative arrangements, assumes predominant importance. Correspondingly, understanding – and appropriately migrating – our organisation culture in responding to the pace and scale of change required of us, as a nation, to compete in the world, is key and a medium- to long-term initiative.

'Partner or Perish' is not an understatement. CSIRO, as a publicly-funded research organisation, is relatively big, in world terms, and as such provides competitive advantage for Australia. However, the magnitude and complexity of challenges ahead necessitate porosity of our boundaries – as much for our co-researchers as well as for our industrial and community partners, who carried the main responsibility for the effective take-up and appropriate diffusion of technologies we develop.

CSIRO is in the service business. **Service from science**. We exist only because of our stakeholders, our customers, and the community at large, and our job is to meet, and anticipate, their needs. Australia's future will continue to be fuelled by economic growth and, as such, we must continually build our effectiveness in serving as a catalyst for industrial innovation, whether this be through providing the scientific underpinning for growing regional agri-business, in a very competitive world, establishing more comprehensive and strategic relationships with larger corporations, or stimulating the development of technology-oriented SMEs – a prime engine of growth and job creation into the future.

Harnessing the power of '**One CSIRO**' is our key differentiating advantage, for the nation. Pulling together – and as one – the 'muscle' of our six and a half thousand staff, close to two thousand PhDs across sixty sites in Australia, and a wide diversity of expertise (being noted as among the top 1% of the world's R&D organisations in 12 out of 22 disciplinary areas). This is no easy task, but requires us *inter alia*, to: harmonise and unify our processes and systems as 'hygiene factors' supporting our great science; make it much easier for clients to access and work with us; and continually seeking those new breakthroughs which will emerge from

cross-disciplinary cooperation and mutual understanding. Of our ‘six key messages’ this is the one that has most resonated with CSIRO staff, and we will continue to push very hard to make our aspirations a reality.

A stable financial foundation provides a springboard for unleashing creative thought. We have achieved strong and tangible support from the Federal Government for the next three years. We are on track in our plans to increase revenues from our vast intellectual property assets by a factor of ten over a six year period, to be reinvested into our research activities. We have real opportunities for improving efficiencies, around the way we work with our clients, but also in savings possibilities in the way we do our business. We will continue to vigilantly seek and meet targeted gains in these areas.

Finally, while our Strategic Plan has provided guidance into our future, it is just that: a guide, not a road map. We are already engaged with deep and thoughtful analysis around CSIRO’s roles, and responsibilities, into the future, with the goal of defining, more specifically, what exactly it is to be a ‘research enterprise with global reach’. Correspondingly, as stewards for the wise investment of close to \$600 million of taxpayers’ monies each year, we are reviewing our strategic investment portfolio – both process and content.

Section 2: Performance Framework and Targets

2.1 Background

The CSIRO 2003-2007 Strategic Plan links CSIRO's broad vision for the future with specific annual operational plans that specify current priority initiatives. The strategic goals and objectives outlined in the strategic plan have provided the primary direction for the development of the 2004-05 operational plan.

As illustrated in Figure 2, the Operational Plan provides a one-year whole-of-CSIRO view of implementation of the Strategic Plan, and reflects the more detailed planning that takes place to flesh out activities and performance objectives across the Organisation.

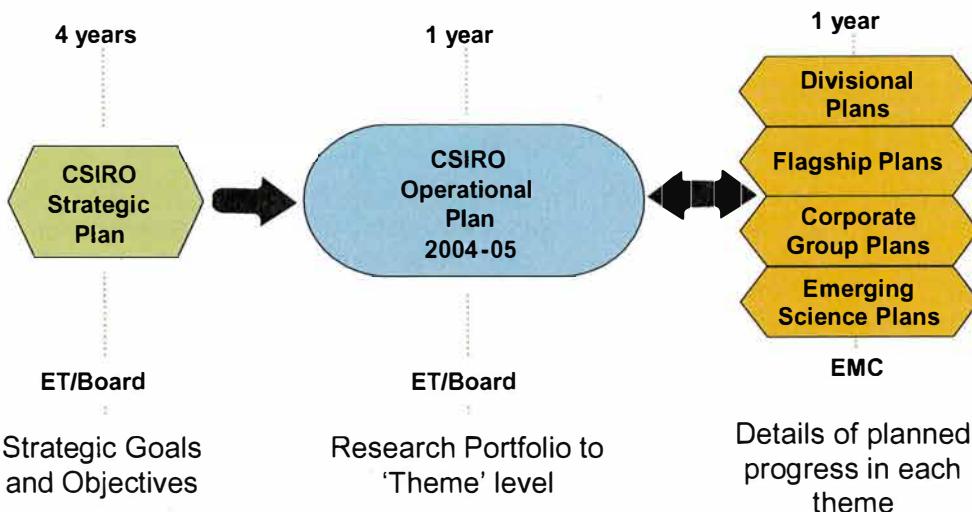


Figure 2: Relationship between CSIRO Plans

This Operational Plan outlines specific initiatives and activities for the coming year as well as providing details of the organisation's budget, annual performance targets and reporting groups that focus our activities for the year. All of these activities are designed to push forward the strategic goals and objectives that appear in our Strategic Plan.

2.2 CSIRO's Performance Measurement Framework

CSIRO operates within the Commonwealth Government's formal "outcome-outputs" resourcing framework. CSIRO's implementation of the framework is illustrated in Figure 3 and summarised below.

Outcome	Outputs			
Outputs				
<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 <p>(Total price of Outputs: \$908.728m. Departmental Appropriation \$576.528m)</p>				
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	

Figure 3: CSIRO's Outcome-Outputs Framework (as amended November 2003)

Outcome: CSIRO's outcome statement emphasises the Organisation's critical role in contributing to economic, social and environmental benefits for Australia through the application of research and innovation. The outcome statement directly reflects the Organisation's functions as defined in the Science and Industry Research Act.

Outputs: CSIRO's outputs are the research products and services delivered to four broad sectors of economic/social significance. Internally, CSIRO's research Divisions (the business units responsible for the conduct of research) are organised into four corresponding sectoral Groups (see Organisation Chart, Appendix 2).

Activities: Contributing to CSIRO's outputs are 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.

To underpin performance and accountability in relation to our strategic objectives and our outputs and outcomes, CSIRO has developed a Performance Measurement Framework (PMF) with four primary groups of measures (Figure 4). Organisational performance against each group of measures is considered in a regular cycle of reporting to the Executive Team (ET) and CSIRO Board.

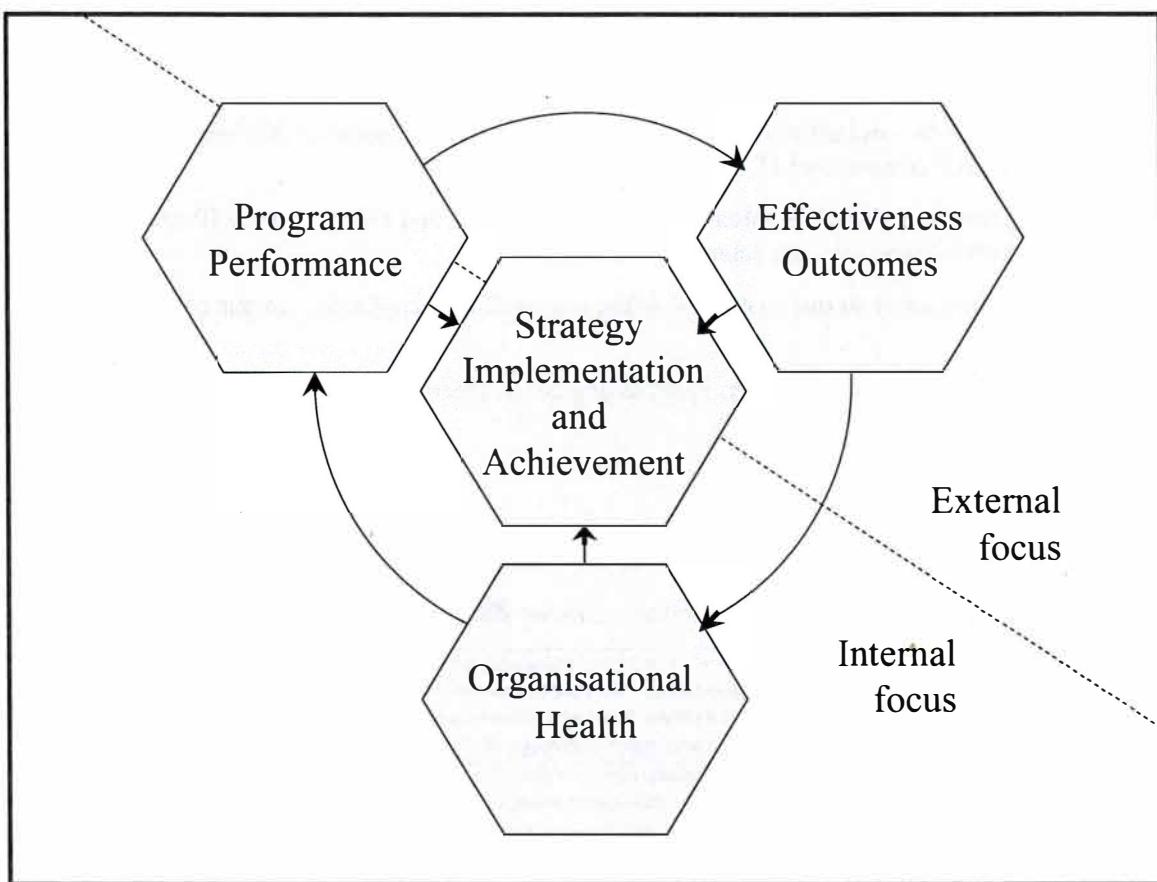
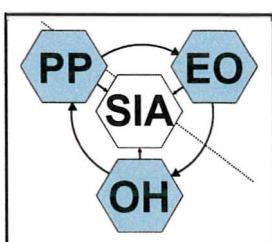


Figure 4: CSIRO's Performance Measurement Framework

2.2.1 Strategy implementation and achievement



These measures are directly associated with CSIRO's Strategic Goals and Objectives, as articulated in the CSIRO Strategic Plan 2003 - 07. A 'headline measure' (Section 2.4.1) summarises progress toward Strategic Plan targets for each of the six major strategic goals. Two further headline measures address the critical issues of employee satisfaction and customer satisfaction. In addition, specific success measures and targets are identified each year for each of the 24 strategic objectives. Further details are provided in Appendix 4.

Each of the six goals are underpinned by four strategic objectives. As indicated in Figure 5 the intensity of activity around any particular strategic objective will vary from year to year and will be shaped by annual priorities. Also, not every functional Group or Division will be focused on every objective. Divisional plans and Corporate Group Plans describe in more detail their contribution to the specific objectives for 2004-05, and are summarised in Sections 4 through 10.

The areas of highest intensity activity for 2004-05, as identified in the Strategic Plan and reaffirmed by ET's Strategic Plan review are:

- Continue to build: critical mass and ensure quality in our core research programs - in particular commencing a new Science Quality Review process

- Continuing to focus on implementing the Flagships Program to improve the lives of Australians and advance Australian industries
- Increasing the impact of major cross-Divisional activities, and our other core research activities through a (new) focused strategic investment process
- Focusing on processes to develop, retain, attract and excite talent, throughout the organisation
- Further improvement of our project management processes
- Building stronger relationships with large corporations, with tangible outputs in place
- Further improving cross – organisational collaboration and working together efficiencies through adoption of standard processes and IT systems
- Proactive management of CSIRO's patent and equity portfolios, and deliver on our IP revenue objectives (for reinvestment into our science)
- Delivering value-for-money to our customers while eliminating subsidisation in our consulting and services business
- Continuing efforts to reduce overhead and purchasing costs, meeting our targets in this regard.

Strategic Goals, Objectives and Intensity of Activity

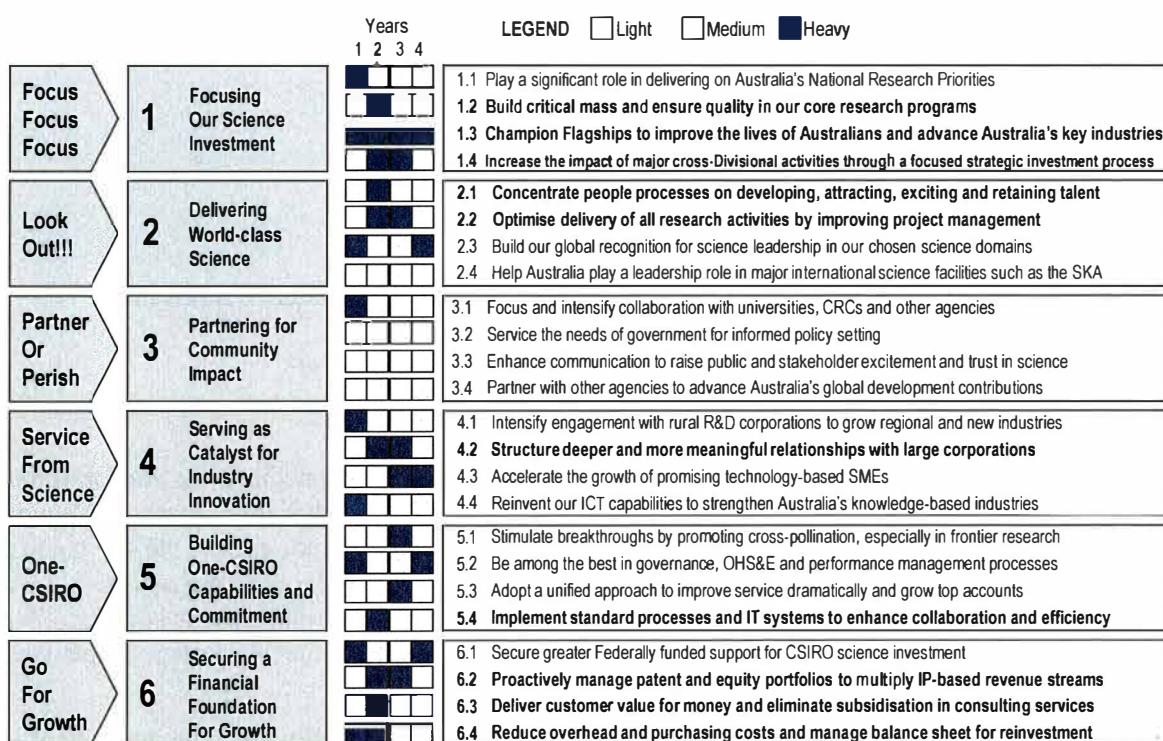
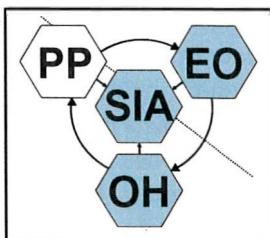


Figure 5: Intensity of Activity Toward Strategic Goals and Objectives

2.2.2 Program performance



To promote robust business planning, good target setting and strong accountability, CSIRO has developed a new Program Performance Framework (PPF). This provides a set of tools and measures which are progressively being applied at appropriate levels across all of CSIRO's research and supporting activities. The major components of the PPF are illustrated in Figure 6.

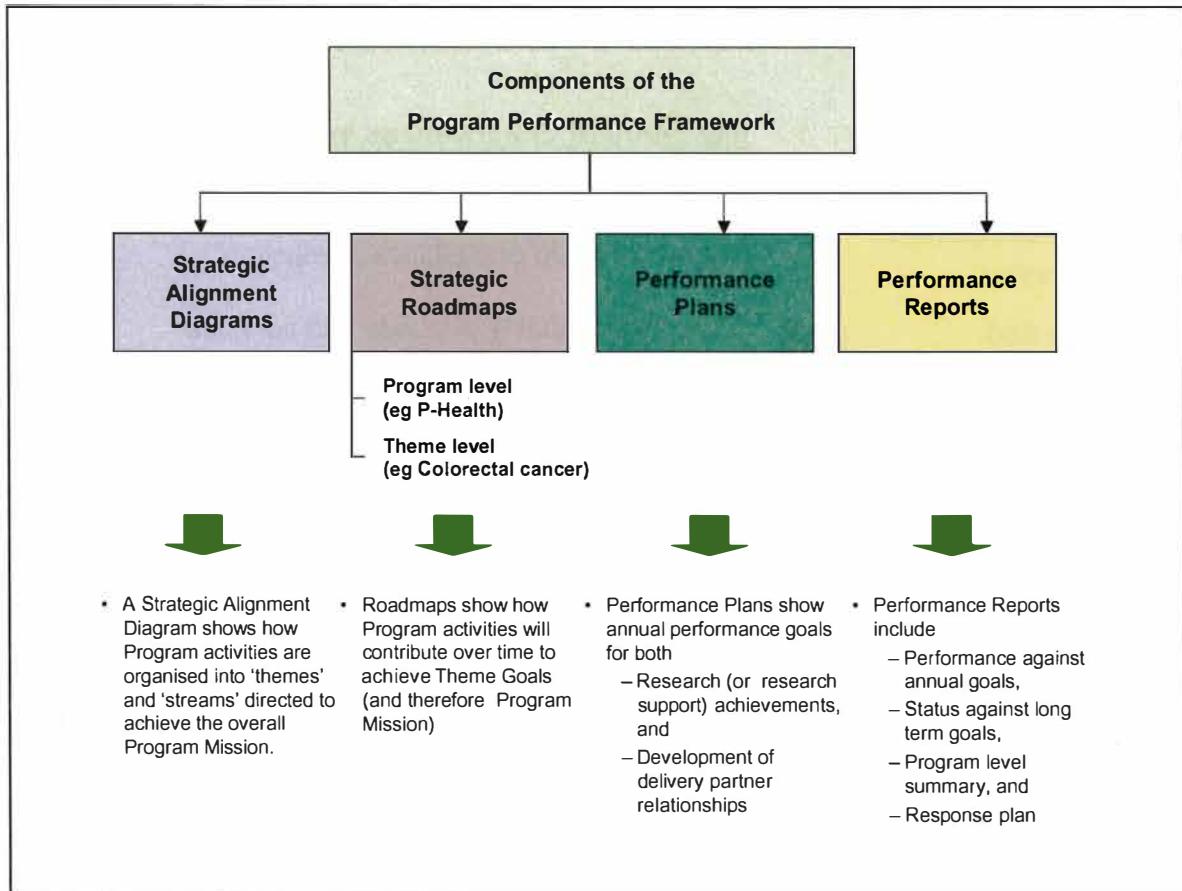
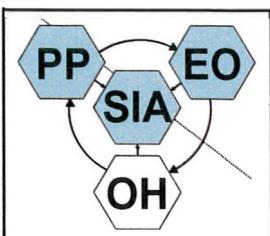


Figure 6: Program Performance Framework

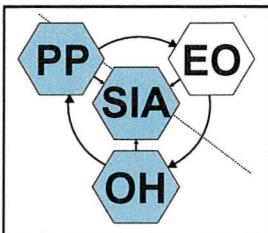
2.2.3 Organisational Health



Organisational health indicators refer to performance information captured at different levels of the organisation to monitor the 'health' of our underlying processes and in so doing help identify any areas that may require particular attention. Over time, as major process improvements or change initiatives are identified, different organisational health indicators may be 'elevated' to be indicators of 'strategy implementation and achievement'.

Our organisational health indicators encompass standard measures required to meet traditional performance monitoring and reporting requirements (eg financial, people and OH&S statistics). For a table of organizational health measures for 2003-04 see Appendix 3.

2.2.4 Effectiveness /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. Key outputs are also described in the Annual Performance Report to the Board.

<u>CSIRO's Outcome</u>	<u>Indicators of Effectiveness in Achieving this Outcome</u>
The application or utilization of the results of scientific research delivers:	
<ul style="list-style-type: none"> • Innovative and competitive industries 	<ul style="list-style-type: none"> • Lower / more competitive production costs • Improved quality of goods and services • New products, services and businesses
<ul style="list-style-type: none"> • Healthy environment and lifestyles 	<ul style="list-style-type: none"> • Improved human health, safety and wellbeing • Reduced pollution • Improved environmental health
<ul style="list-style-type: none"> • A technologically advanced society. 	<ul style="list-style-type: none"> • Reduced risk (economic, environmental or social) • Development of skills (enhanced human capital) • Informing policy (cost-effective public programs)

Figure 7: Effectiveness Indicators for CSIRO's Outcome

2.3 Leadership Responsibility

CSIRO has made significant progress during 2003-04 in establishing a number of initiatives to drive the Organisation toward fulfilment of its strategic goals and the delivery of value to stakeholders. The strong emphasis during 2004-05 will continue to be on implementation and execution, supported by ongoing work to strengthen CSIRO's corporate governance framework.

To help drive our strategic initiatives through to successful execution, two additional members have been added to the Executive Team. The appointment of Donna Staunton as Executive Director Communication (from March 2004) and Peter May as Executive Director People and Culture (from June 2004) has resulted in some re-assignment of roles and responsibilities. While the Executive Team collectively is responsible for providing organisational leadership, individual members of the team have different roles - as mapped in Figure 8 - to lead, support and execute action toward each strategic objective.

Full details of the membership of the Executive Team, and of the broader leadership team that also includes Divisional Chiefs, Flagship Directors and senior Corporate Officers - the Executive Management Council - are included in the organisational chart described in Appendix 1.

Responsibility Matrix for CSIRO Operational Plan

Strategic Goal	Strategic Objective	CE	DCE	GROUP EXECUTIVE	EDSP	ED BD&C	CFO/ EDCO	ED Comm	ED P&C
1 Focusing Our Science Investment	1.1 Play a significant role in delivering on Australia's National Research Priorities 1.2 Build critical mass and ensure quality in our core research programs 1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries 1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	S	S	E	L	S	S	S	S
2 Delivering World-class Science	2.1 Concentrate people processes on developing, attracting, exciting and retaining talent 2.2 Optimise delivery of all research activities by improving project management 2.3 Build our global recognition for science leadership in our chosen science domains 2.4 Help Australia play a leadership role in major international science facilities such as the SKA	S	S	E	E	S	L	E	L
3 Partnering For Community Impact	3.1 Focus and intensify collaboration with universities, CRCs and other agencies 3.2 Service the needs of government for informed policy setting 3.3 Enhance communication to raise public and stakeholder excitement and trust in science 3.4 Partner with other agencies to advance Australia's global development contributions	S	S	E	L	E	S	S	L/E
4 Serving as Catalyst for Industry Innovation	4.1 Intensify engagement with RDCs to grow regional and new industries 4.2 Structure deeper and more meaningful relationships with large corporations 4.3 Accelerate the growth of promising technology-based SMEs 4.4 Reinvent our ICT capabilities to strengthen Australia's knowledge-based industries	S	S	E		L	S	S	S
5 Building OneCSIRO Capabilities and Commitment	5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research 5.2 Be among the best in governance, OH&S and performance management processes 5.3 Adopt a unified approach to dramatically improve service and grow top accounts 5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	E	S	E	S	E	L	S	E
6 Securing a Financial Foundation For Growth	6.1 Secure greater Federally funded support for CSIRO science investment 6.2 Proactively manage patent portfolio to multiply IP-based revenue streams 6.3 Deliver customer value for money and eliminate subsidisation in consulting services 6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	S	S	E	S	E	L	E	E

Key

CE: Chief Executive

DCE: Deputy Chief Executive (with specific responsibility for Communications, People Development and Flagship Oversight)

EDSP: Executive Director Science Planning

GROUP EXECUTIVE: For the Four Research Groups

EDBD&C: Executive Director Business Development and Commercialisation

EDComm: Executive Director Communications

CFO/EDCO: Chief Finance Officer and Executive Director Corporate Operations

EDP&C: Executive Director People and Culture

L = LEAD:

S = SUPPORT:

E = EXECUTE:

Figure 8: Executive Responsibility Matrix

2.4 Measuring Our Performance: Targets for 2004-05

We have developed a set of measures directly associated with CSIRO's Strategic Goals and Objectives. A 'headline measure' summarises progress toward Strategic Plan targets for each of the six major strategic goals. Two further headline measures address the critical issues of employee satisfaction and customer satisfaction. In addition, specific success measures and targets are identified each year for each of the 24 strategic objectives (Appendix 4).

Headline Indicators

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as the Headline Indicators are
currently being reviewed.

Section 3: Delivering Research Outputs

3.1 How Research is organised in CSIRO

The core business of CSIRO - scientific research - is undertaken in 21 Divisions (including the ICT Centre) affiliated into four Groups. 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.

As indicated in the opening preamble to this plan, 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).

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.

CSIRO Operational Plan 2004-05

The CSIRO Operational Plan describes the research portfolio to the Theme level, while 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.

Figure 9 provides a schematic representation of the structure of CSIRO's research portfolio:

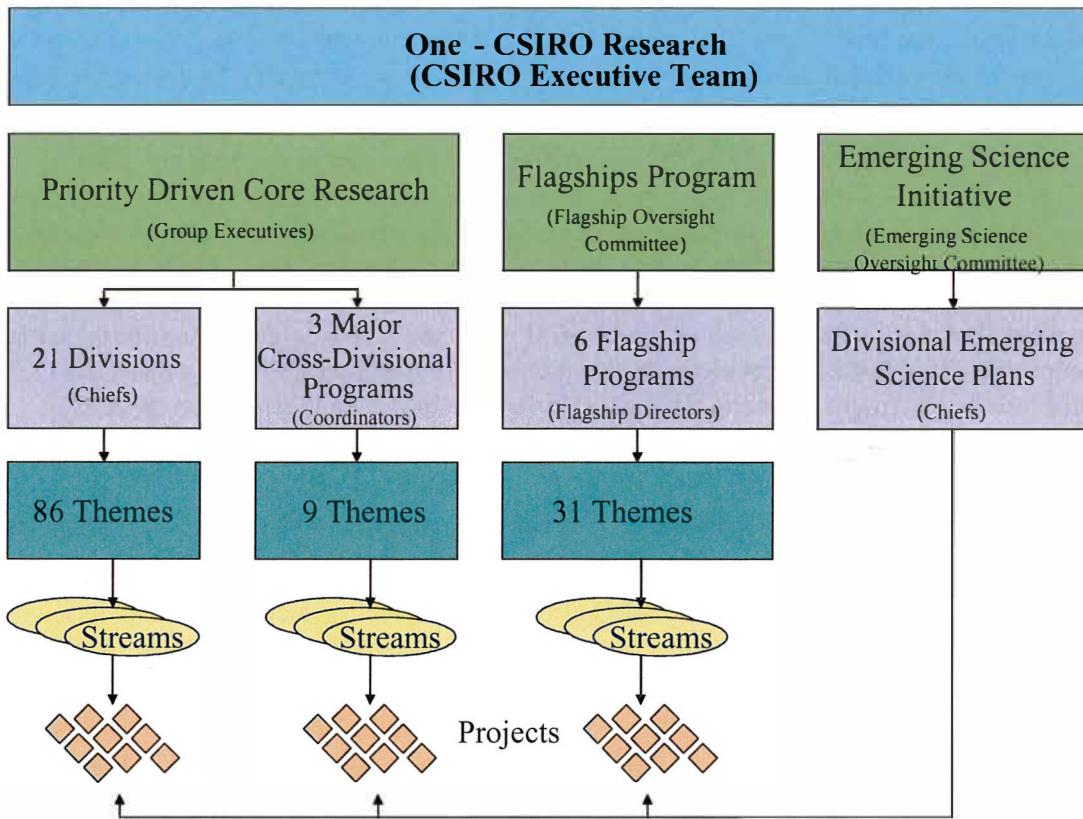


Figure 9: The Structure of CSIRO's Research Effort

3.2 Delivering Quality Science

3.2.1 Articulation of Capabilities

For organisations like CSIRO excellence is required in both science and its application. Consequently, CSIRO has to pay explicit attention to both its science base and how it is being used in outcome-oriented applications if the Organisation is to have sustained high impact. In this Operational Plan the concept of capabilities has been introduced to facilitate this objective.

Ultimately the capabilities should depict CSIRO's scientific and technical strengths while the outcome orientated themes depict how these capabilities are deployed and the resulting value proposition.

This year, the Divisional Plans (in Sections 6 through 9) aim to:

- Build on last year's work by further evolving the concept of 'themes' so that they are explicitly *outcome-oriented*, that is, a theme should be defined around a particular intended outcome. Ideally, and with time, theme goals should be defined in terms which enable impact to be measured.
- Help the positioning and differentiation of CSIRO by characterising our 'core capabilities' particularly where we have scale and distinctiveness.
- Recognise that one of the essential functions of Divisions is to sustain, build and create the capabilities that underpin the Organisation's ability to deliver a sustained high impact.

Capabilities provide a constructive framework that helps unify a number of CSIRO-wide initiatives and integrate them with Divisional planning.

At this time it is fair to say that Divisional definitions of capabilities and themes continue to show considerable variability. It is the intent that, over 2004-05, and in particular in preparation for the 2005-06 Operational Plan, the definition of both themes and capabilities will continue to positively evolve to meet the objectives summarised above.

3.2.2 Science Assessment

The delineation of each Division's capabilities, together with a mapping of these capabilities to outcome oriented themes, forms a natural framework on which to construct an effective and transparent science assessment process that should add value to our internal processes. The keystone of the process, (see also Science Planning, Section 10.2), is a periodic testing of each Division's self-assessment of its capabilities and the underpinning science-base, by an external review panel.

This review covers:

- The quality of the capabilities and their underpinning scientific skills and disciplines and the associated outputs (publications, patents, reports, technology transferred to users, etc.).
- 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 identification of future or emerging capabilities that are believed to be necessary to achieve the Division's aspirations and the feasibility of the strategies (including the emerging science plans, see below) proposed to acquire or develop these capabilities.

CSIRO has adopted a policy on, and procedures for, science assessment reviews. Development of the policy and procedures is part of CSIRO's Triennium Funding Agreement for the 2004-07 triennium. Regular assessment of each Division's research by an external panel will begin in 2004-05. All Divisions will be reviewed over the 2004-05 to 2006-07 triennium. The schedule for 2004-05 is: Entomology, Industrial Physics, Minerals, Manufacturing and Infrastructure Technology, Health Sciences and Nutrition, Molecular Science and Food Science Australia.

3.3 Emerging Science Plans

The Emerging Science Initiative has been established to sustain and enhance CSIRO's reputation for science excellence and as a source of the breakthrough science and frontier technologies that will underpin CSIRO's portfolio of "3rd Horizon" activities. Its objective is to catalyse investments in breakthrough science that will:

- initiate or accelerate growth in emerging areas of critical science capability in CSIRO;
- contribute towards the frontier technologies that will underpin CSIRO's long-term (3rd horizon) strategic portfolio;
- enhance CSIRO's reputation for scientific excellence; and,
- strengthen CSIRO's linkage with international science (the other 98%).

Emerging science involves large-step pushes on the scientific frontier of a field (not incremental advances). Consequently, significant scientific or technical questions will be tackled in any emerging science project and, if successful, the scientific or technical advances enable radical innovation.

Alignment with CSIRO's Strategic Plan

Within the context of the Strategic Plan the Initiative directly addresses two goals:

2.3 Build our global recognition for science leadership in our chosen science domains; and,

5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research.

Governance and Operation

Governance arrangements for the Initiative were agreed in April 2003 which gave oversight to the Emerging Science Oversight Committee (ESOC). ESOC is chaired by the Executive Director Science Planning and consists of 11 members, one of whom is external, and all recognised for their scientific distinction.

Roles of the ESOC include advising the Executive Director Science Planning with regard to the identification of emerging science themes and deliverables; the approval of Divisional emerging science plans and budgets; the oversight of theme performance; and the facilitation of cross Divisional activities.

Central funding for the Emerging Science initiative in 2004-05 is \$15million.

The Emerging Science Initiative in 2004-05

The Emerging Science Initiative has been restructured into two parts:

- A Division-based component, structured around Divisional Emerging Science Plans; and,
- A corporate program with a specific focus on implementation of Strategic Plan Goal 5.1.

This new structure is being implemented for the first time for 2004-05.

The restructured Initiative is not restricted to the five themes of biotechnology, ICT, nanotechnology, complex systems science and social and economic integration which applied in the previous arrangements.

The aim of the corporate program is to establish new capabilities in CSIRO by building research capacity around challenging problems. Research programs in this component will be developed in stages.

The intent of Divisional Emerging Science Plans is to encourage Divisions to understand and respond to *scientific* developments that have potential to impact significantly upon either the technical capabilities of the Division or the sector in which it operates to deliver outcomes of value to Australia. All the emerging science in a Division is required be included in its Plan.

The Divisional Emerging Science Plans are reviewed critically by the Emerging Sciences Oversight Committee and will be a key input into the regular external assessments of the quality of the science in each Division.

A Divisional Emerging Science Plan is expected to have a strong link to the building of capabilities as outlined in the Division's Operational Plan. The Plans also provide a CSIRO-wide view of emerging science, provide a mechanism to encourage connectivity across CSIRO in emerging science and allow monitoring of the total amount of emerging science against the goal of 10 – 15% of CSIRO's research.

The restructuring of the Emerging Science Initiative means that the research previously funded through the five themes of biotechnology, ICT, nanotechnology, complex systems science and social and economic integration is now included in Divisional Emerging Science Plans. The removal of the restriction of the Emerging Science Initiative to these five areas enables other broad cross-Divisional research themes to be identified. Some additional themes emerging from Plans for 2004-05 are:

- the inter-related areas of sensor networks, dealing with very large amounts of data, integrating data from different sources and predictive modelling utilising this fused data;
- sustainability science; and,
- systems-level science, the science of whole ecosystems, for example.

Significant centres have been retained in complex systems science and social and economic integration. A range of linkage and networking activities, both within CSIRO and between CSIRO and other groups, are supported through these centres.

The Centre for Complex Systems Science supports a range of linkage activities to ensure cross-fertilisation between groups working on complex system science. These linkage activities include working groups in agent-based modelling; complex spatial interactions; network theory; and, engineering, design or control of complex systems

Interaction tasks are another crucial linkage activity. These tasks convert a set of independent complex system science projects into an integrated effort. They consist of a small number of questions that are generic in the sense that they can be stated at a more general level than the questions addressed in individual projects. Current interaction task areas are emergence; human landscape interaction; memes; and, continuous/discrete interaction.

The Social and Economic Integration Centre supports a range of activities in the areas of delivery of integrated solutions; sustainability modelling and institutional analysis; human dimensions and the social context of science; and, in conjunction with the complex system science theme, decision support tools and agent based modelling.

Key Objectives for 2004-05

In 2004-05 the emerging science initiative will seek to enhance the focus of Divisions on emerging and frontier science and to facilitate the development of CSIRO's capabilities in key areas of scientific activity likely to be important to CSIRO's future impact and relevance. Specific objectives are to:

- finalise the restructure of the Emerging Science Initiative,
- finalise Divisional Emerging Science Plans and ensuing budget allocations to Divisions,
- implement the new corporate component of the Initiative to foster new areas of emerging science,
- improve the processes for the Divisional component of the Initiative and phase 1 of the new corporate component,
- develop a process for phase 2 of the corporate component,
- assess the next round of Divisional Emerging Science Plans to provide a CSIRO-wide map of emerging science activities,
- continue to support the identified areas of complex systems science, socio-economic integration and nanotechnology.

3.4 Alignment to National Research Priorities

The national and international science, technology and innovation environment is dynamic. CSIRO must influence, recognise and respond to emerging trends and policy changes to maintain its position as one of the world's pre-eminent scientific organisations. In early 2004 the Australian Government released the reports of several key reviews relating to research and research funding. These reviews contributed to the next iteration of Backing Australia's Ability and the government's innovation policy both of which will provide strategic direction to the different sectors of the innovation system, including CSIRO.

CSIRO's National Research Priority (NRP)* first implementation plan was very well received in the first half of last financial year. It was later updated during the first half of 2004 in response to additional priority goals announced by the Australian Government. The changes included:

- incorporation of new priority goals;
- update of diagrams and other data to reflect 2003-04 expenditure (and the new goals);
- revision of the Flagship Section to align with current missions and objectives and to update projected expenditure including the new funding allocated as part of the *Backing Australia's Ability* program announced in the 2004 Budget;
- a similar revision of the Sections on Emerging Science, the new CSIRO ICT Centre and key Major Cross-Divisional Programs in security and climate.

That there is already a significant alignment between the NRPs and CSIRO's current research portfolio is consistent with CSIRO's mandate and the organisation's historical focus on performing research to benefit Australia. Figure 10 summarises how the twenty one research Divisions of CSIRO currently address the priority goals of the four NRPs. Approximately 83 per cent of CSIRO's total investment for 2004-05 is targeted at research activities with potential outcomes relevant to the goals associated with National Research Priorities. The corresponding figure was 74 per cent in 2002-03 and 80 per cent in 2003-04. Most of the increase is due to the inclusion of the new priority goals, particularly goal A7 'Responding to climate change and variability', where CSIRO is actively engaged.

Figure 11 illustrates how the key CSIRO strategies embedded in Flagships will, over the coming triennium, direct resources and effort into the NRPs. Figure 11 grades the likely impact on the Priority Goals from these initiatives as:

- Central, when the Priority Goal itself is a key objective of the program and substantial investment is planned so that scale is obtained;
- Significant, when the Priority Goal is a lesser objective but still significant and consequently addressing this objective will be a feature of the program; or
- Supplementary or incidental, where there is a reasonable likelihood that the program may contribute outcomes relevant to the indicated Priority Goal but this is not a major focus of the program for which major direct investment is planned.

During 2004-05 CSIRO will remain actively engaged in discussion with all the other agencies who are required to develop NRP implementation plans to identify factors and/or practices that inhibit cooperation; and to identify opportunities for future collaboration that would further the Government's intent. Implementation of the Flagship Collaboration Fund see Flagships, Section 4, will further enhance the collaboration with the National Research Flagships and hence delivery towards the primary goals of the National Research Priorities.

* The National Research Priorities are available in Appendix 5

CSIRO Operational Plan 2004-05

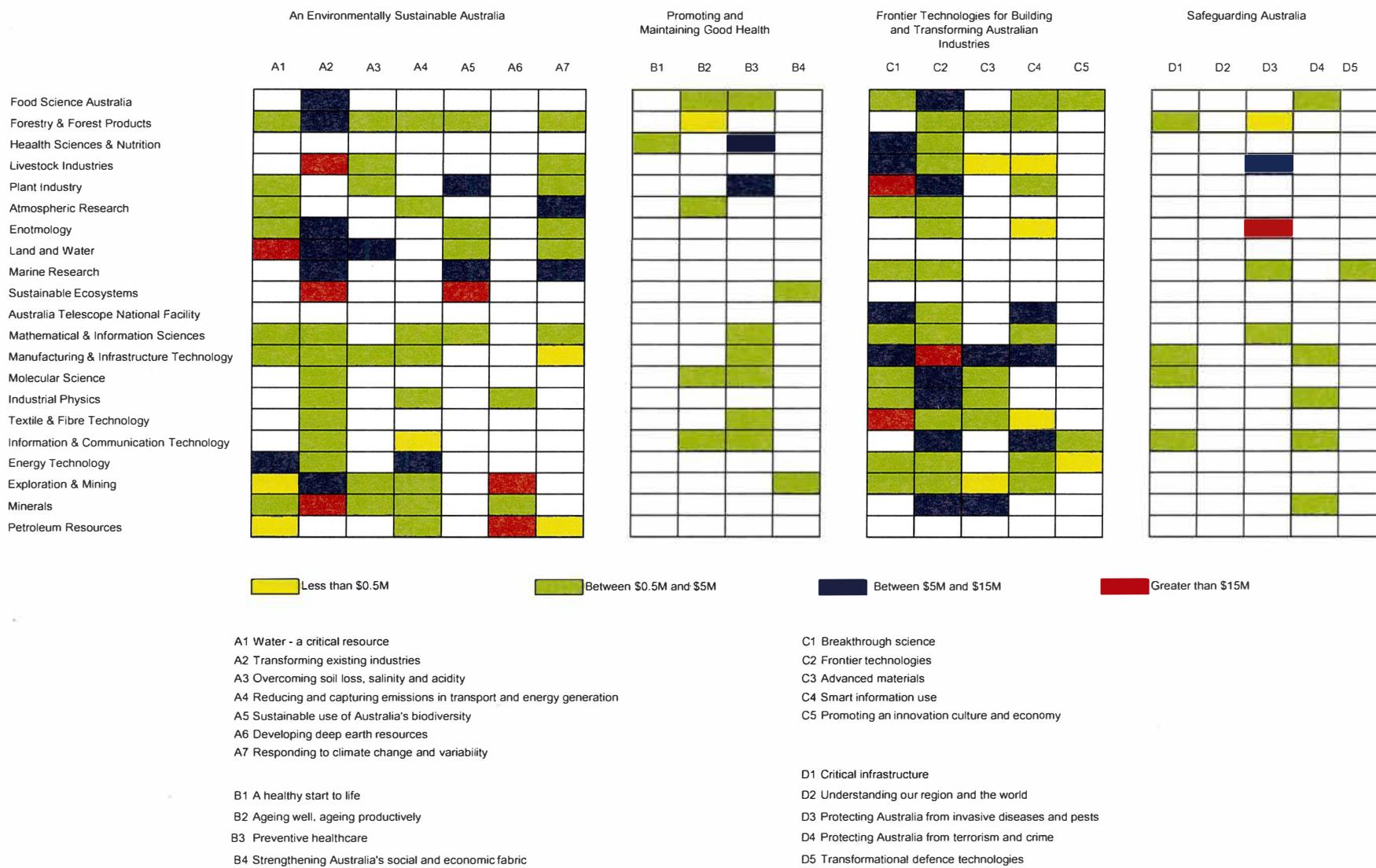


Figure 10: Alignment of Divisional Activities with the National Research Priorities

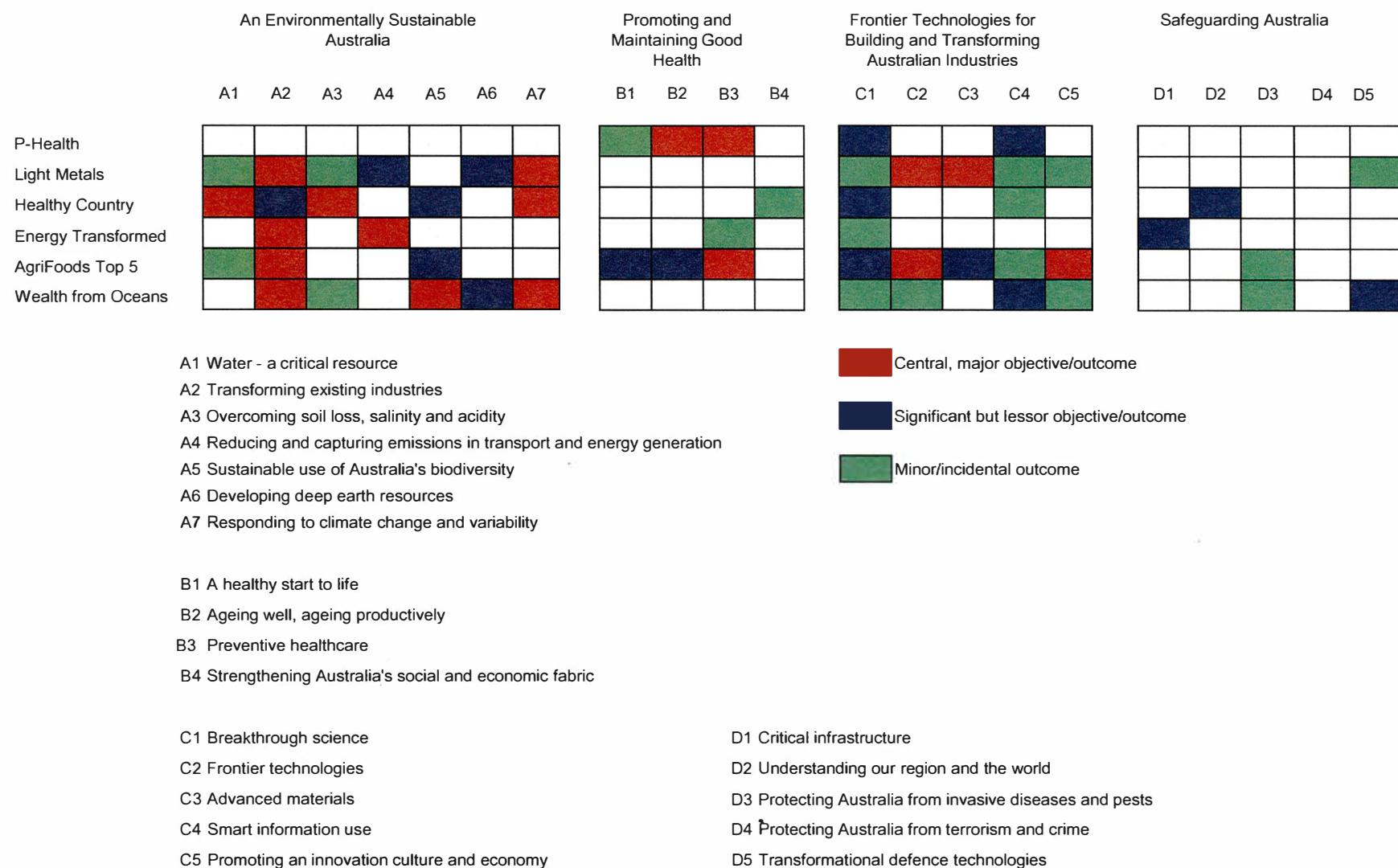


Figure 11: Alignment of Flagship Activities with the National Research Priorities

Section 4: The Flagship Programs

Deputy Chief Executive: Dr Ron Sandland

Overview

The National Research Flagships are partnerships of CSIRO, other leading Australian 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 (as illustrated in Figure 11 above).

The Flagship Oversight Committee (FOC) is responsible for governance of the Flagships initiative. Chaired by the Deputy Chief Executive, the Committee meets at least four times a year to:

- consider Flagship business plans and decide on ongoing and prospective resource allocations to the Flagships
- ensure that the Flagships research portfolio is appropriately balanced and aligned with the Organisation's strategic research priorities
- ensure that research performed in the Flagships remains of the highest quality
- review the performance of the Flagships against annual performance plans and project management criteria.

Other members of the Committee include: two Group Executives, the Executive Director Science Planning, a CSIRO Fellow, the Executive Director Business Development and Commercialisation, the Chief Financial Officer and the General Manager Flagship Implementation.

Following the successful establishment of the current six Flagships in 2003-04, the Government announced significant new funding for the Initiative (\$305M over 7 years) in the May 2004 Budget. This vote of confidence from the Government has consolidated the position of the existing Flagships and full business plans for each to 2007 have now been developed. These plans, together with the individual operational plans, contain measurable benefits and annual performance goals for the stream elements of the individual Flagships. Progress against these goals is monitored by the Flagship Oversight Committee and this will provide a strong framework within which the emerging success of each program can be assessed. All Flagships have either established or are in the process of establishing their own Advisory Committees which will predominantly comprise external appointments. This will be completed late in 2004.

Key Learnings from 03-04

Apart from the demanding research delivery goals established for the Flagships, the effective integration of this matrix responsibility into CSIRO carries its own set of management and cultural challenges. We have identified many of the emerging issues during 2003-04 and will be working during 2004-05 to ensure that any barriers to effective Flagship implementation are addressed. Consistently effective project management is still an issue across CSIRO and we need to get better at "fast-failing" activities that are not meeting expectations. We need to improve our enterprise processes and systems in support of the Flagship activities and to establish clearer understandings of respective roles and accountabilities between Flagships and Divisions. Good work has already been done in this area during 2003-04 through a series of "think-tank" exercises involving Flagship, Divisional and Corporate staff.

Relationships with our external partners and collaborators have developed strongly during 2003-04 and we have some exciting early science wins across all the Flagships. Support for the work and direction of the initiative from external stakeholders and partners has been particularly encouraging and we need to keep working hard at these relationships.

Significant Initiatives being undertaken in 04-05

As part of the Government's budget announcement, a "collaboration fund" is to be established by CSIRO from the new Flagship allocation. This will provide funding for students, Flagship fellows and a contestable pool of funds to enable universities and other publicly-funded bodies to work with CSIRO in areas where their research can add value to key Flagship deliverables. The fund will rise from \$6M in 2004-05 to approximately \$17M in 2007-08.

The key focus for the Flagships during 2004-05 will be to build on early science successes and to work hard on delivery against goals and milestones across the Flagship's streams and projects. We will need to effectively communicate this progress externally and to build on our internal communication activities. A new key appointment was made in July 2004 to co-ordinate the communication activities across the Flagships, both internally and externally, and we expect to see significant pay-offs from this during 2004-05. The last of the official Flagship launches (for Wealth from Oceans) will be at Darling Harbour, Sydney in August 2004.

Risk assessment analyses will have been completed for all the Flagships early in 2004-05 and these will provide a strategic framework for addressing and managing key exposures across the initiative.

Themes – 2004 - 05

The detailed programs for each of the Flagships are outlined in the following pages. Together, these paint a challenging and exciting picture of research outcomes and delivery pathways which address the major themes being undertaken and which will deliver scientific solutions to advance some of Australia's most vital national objectives consistent with the Government's National Research Priorities including:

- strong, sustained growth, new industries, competitive enterprises and quality jobs
- healthier, more productive lives for Australians
- clean, cost-efficient energy
- more productive and sustainable use of water
- the generation of sustainable wealth from our oceans
- growth and prosperity for regional Australia.

During 2004-05 the Flagships initiative will centre on consolidating and expanding the six existing Flagships: Preventative Health; Light Metals; Energy Transformed; Water for a Healthy Country; Wealth from Oceans; and Food Futures.

Resources (\$m)

	New Appropriation (BAA2)	Redirected CSIRO Appropriation	External Leverage	Total
2004-05	30.00	84.27	30.57	144.84
2003-04	20.00	53.80	8.67	82.47

Alignment with CSIRO's Strategic Plan - Flagships

Strategic Plan Objective	Flagship Programs Activity
1.1 Play a significant role in delivering on Australia's National Research Priorities (NRPs)	There is strong alignment between Flagships and the NRPs. In 11 of the 21 priority goal areas at least one Flagship has a major objective that is strongly aligned with the priority goal and in another 7 priority goal areas at least one Flagship has a significant objective that is strongly aligned.
1.2 Build critical mass and ensure quality in our core	The Flagships initiative has been developed and resourced in part to build critical mass and ensure quality in our core research programs. The aim is for

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research programs	between 30-40% of CSIRO's appropriation resources to be dedicated to Flagships within the next 3 or 4 years.
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	The Flagships are focused on improving Australians' quality of life and on industry support and development. For example, the Preventative Health Flagship aims to help Australians live longer, healthier lives; while the Light Metals Flagship aims to double export income from light metals while at the same time reducing the industry's environmental impact.
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	The Flagships represent one-CSIRO in action. The combination of multidisciplinary science with scale and a strategic investment process focused on the nation's major challenges and opportunities is designed specifically to ensure that the initiative has substantial impact.
2.3 Build our global recognition for science leadership in our chosen science domains	One of the imperatives of the Flagships initiative is to focus transformational science on major challenges and opportunities confronting Australia. The Flagship Oversight Committee (FOC) has an explicit role in maintaining the high quality of science performed in the Flagships.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	The Flagships are being developed as one-Australia partnerships of CSIRO, other leading Australian scientists, research institutions, Government agencies, commercial companies and selected international partners.
3.2 Service the needs of government for informed policy setting	As the Flagships are focused largely on areas of identified National Research Priority, it is inevitable that they will make a substantial contribution to informed policy setting by government. For some Flagships, eg Water for a Healthy Country and Energy Transformed, the provision of information for policy setting purposes is among their highest order objectives.
6.2 Proactively manage patent portfolio to multiply IP-based revenue streams	Parts of the Flagships initiative are focused on developing IP as a longer-term path to revenue growth.



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.

The Flagship will achieve this by:

- developing a national energy model
- developing and implementing technologies for near zero emissions from coal-fired power and renewable energy systems
- developing technologies for new generation transport vehicles and traffic management systems
- developing and integrating leading edge small-scale generation technology and energy management systems to facilitate the enhanced introduction of distributed generation into the Australian transport and stationary energy sectors.

Theme performance and response – 2003 - 04

Theme: Energy Futures

Goals:

Through a process of government, industry and community engagement, supply the tools, data and modeling capability to develop a range of techno-economic scenarios for the stationary energy and transport sectors to 2020 and beyond.

Progress

Annual Performance Goals	Achieved: 5	Delayed to 04-05: 1	Unachievable: 0
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The Energy Futures Forum, the major activity of the Theme, has taken all of 03-04, with considerable assistance of Corporate BD&C, to get to the point where we are able to take the opportunity to the market. Its development was more complicated than expected but will be high impact when successfully implemented. The Theme has become increasingly clear about how it will integrate each of its Streams and projects toward meeting the Theme goal. All Streams, and projects within those Streams, are now more strongly aligned towards developing technical and socio-economic capabilities that can be directed towards delivering advanced scenario analysis tools for the Forum. The tools differ in their emphasis on spatial and temporal scales, social science, 'hard' science, quantitative or qualitative approaches. Developing partnerships has been the key to achieving these research goals. Key external research partnerships were secured in 03-04. Industry, government and community partnerships will follow in early 04-05.

Response

Presentations on the Energy Futures Forum to over 20 of Australia's largest energy and transport companies and 5 "community" groups commenced in 03-04 and will continue in the first two months of 04-05. Interest in joining the Forum is universally high.

Theme: Low Emissions Electricity

Goals:

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.

Progress

Annual Performance Goals		Achieved: 3		Delayed to 04-05: 2		Unachievable: 0
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The Federal Government's Energy Statement (June 04) captured many of the Flagship's programs and provided the means to progress the Flagship's roadmap goals of clean coal technology demonstration and renewables technology advances. The Flagship progressed its goals of clean coal demonstration through engagement with the COAL21 initiative (industry plus government), the CO2 CRC and the creation of the Centre for Low Emissions Technology (cLET). The delays to the Theme in 2003-04, mainly due to the slower than expected start up of the cLET, have been a function of an ambitious program and the complexity of engagement with many stakeholders. The renewable stream goals in Theme 2 were advanced in 03-04 due partly to early external funding of the program. This has given a welcome boost to the program as a whole.

Response

CSIRO has recruited six new post-docs and the Director to be the nucleus of the cLET and to accelerate its research program. Once the scoping studies are completed in Sept 04 the research program will begin in earnest. The portfolio of projects in Theme 2 has been expanded in renewables, including linkage with the European Sixth Framework Program on hydrogen production. Specific linkages with US programs in clean coal (FutureGen) are planned for 04-05 to extend the technical exchange beyond Australian institutions. More Divisions have been included in the Theme for 04-05 although not all projects could be funded in 04-05.

Theme: Low Emissions Transport

Goals:

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.

Progress

Annual Performance Goals		Achieved: 3		Delayed to 04-05: 1		Unachievable: 0
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Breakthroughs in materials for super-capacitors, energy management for more fuel-efficient vehicles, and in transportation surveillance technologies were achieved in 03-04. Together with new methods for designers and policy makers to produce and select effective Intelligent Transport Systems, progress to the goal of improving vehicle technology and traffic movement efficiency in the short-term to hasten the transition to H2 vehicles over the long-term, is on track.

Response

R&D in the transport area has strong growth potential. Emphasizing this is the continuing development of research links with General Motors (US) and the initiative to set up a Victorian Centre of Excellence in Intelligent Transport Systems. At the same time, it is a complex mix of vehicle technology, road management, politics and customer preferences. Because of its importance to the Flagship's goal of increased efficiency to reduce GHG emissions from the sector, it has been decided to search for, and appoint in 04-05, a business/strategy leader to further develop the national and international potential of the Theme.

Theme: Low Emission Distributed Energy**Goals:**

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

Progress

Annual Performance Goals	Achieved: 6	Delayed to 04-05: 1	Unachievable: 0
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Major projects have been initiated with the potential for step change improvement in the economic viability and the ability to implement distributed energy.

A Rankine Cycle project is developing a generic distributed generation technology that can be used as a stand-alone generator in distributed renewable applications, or as an efficiency enhancement to existing gas fired generators. A patented breakthrough in the design of the expander component, optimisation of cycle thermodynamics and niche specific selection of the generator combine to give a unique package to achieve the Theme goal. The project is progressing to plan with a focus in 03-04 on paper studies to define the IP and commercialisation issues. Research in 04-05 will focus more on experimental results and prototype demonstrations.

Distributed Energy Management and Control addresses key technical barriers of network reliability, data management volumes and safety, which currently make distributed energy less attractive to electricity utilities. The research on self controlling distributed energy devices is overcoming these problems and facilitating the Theme goal, by breaking down these technical barriers to distributed generation implementation. Progress on partner engagement has been faster than expected and research on architecture definition is progressing to plan.

Response

Partnering in this Theme has been at lower levels compared to the other Flagship Themes. However, this is a relatively new area for CSIRO and external interest is starting to pick up satisfactorily as milestones are achieved. It is potentially a wide area, and in recognition of this, the Theme is being used as trial to develop, in conjunction with BD&C, a technology roadmap to identify the science, technology and business opportunities in this fertile area.

In recognition of the growing interest in hydrogen production and utilisation, the previously inactive Stream 1 of the Theme has been activated with a significant project on small scale hydrogen production from renewable energy using reverse fuel cell technology.

Learnings from last year and key challenges in 04-05

Flagships represent a new way of conducting R&D in CSIRO and across the broader research community. This challenge has highlighted a number of gaps that need to be addressed to provide the degree of focus, delivery and flexibility required of the Flagship Program. Key issues include the development of a higher level of professional project management with a concentration of delivery on the dual milestones of "research" and "engagement"; providing systems and processes that facilitate high quality project management and finally, instilling a culture that engenders a commitment to the Flagship initiative. In part, this will be achieved through a clearly articulated, detailed Flagship strategy.

Putting in place a process to achieve these improvements will be a key challenge in 04-05.

Communication is also a key issue. A learning from last year is that there is still a low level of understanding in CSIRO of what constitutes a Flagship Project. A key challenge in 04-05 is to develop a better understanding of the goals and objectives of the Energy Transformed Flagship across CSIRO, how to engage with the Flagship and the obligations associated with that engagement.

In the first full year of operation of the Energy Transformed Flagship, it is becoming apparent that the most successful projects are those that have clear science and technology targets that require significant "stretch" to achieve. Setting both research and business development challenges is highly motivating and brings out the best in CSIRO people. A key challenge in 04-05 will be to appropriately refine and clarify the science and technology stretch targets against which the success of individual projects will be assessed in contributing to the Flagship's overall goal.

Research Themes – 2004 - 05

There are no changes in The Energy Transformed Program Themes for 04-05. With the further development of Theme 4 (Low Emissions Distributed Energy) in 03-04 and the increasing opportunities in hydrogen generation and use, Stream 1 (Distributed Generation) has now been activated.

Energy Futures

Goal: Through a process of government, industry and community engagement, supply the tools, data and modeling capability to develop a range of techno-economic scenarios for the stationary energy and transport sectors to 2020 and beyond. This process will be guided by the formation of an Energy Futures Forum. Through representation by industry, government, environmental and community groups, it will provide a credible, all-inclusive technology roadmap to transform Australia's energy and transport future.

Low Emissions Electricity

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. Guided by the principles and outcomes of the Energy Futures Forum, these reductions will be achieved by the formation of a range of partnerships with governments and industry to develop and improve critical technologies in the fossil and renewable power generation chains.

Low Emissions Transport

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. These goals will be achieved by innovation in two distinct but related areas. Cars will evolve from today's traditional internal combustion engine powered cars through to hybrid (combustion-electric) and ultimately hydrogen powered vehicles. All these vehicles will run on roads that are managed by intelligent traffic systems optimised to reduce traffic congestion.

Low Emissions Distributed Energy

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. These systems will supplement the existing, remotely-located, base-load power stations and power delivery systems by enabling power generation in industrial, commercial and residential applications. The targets will be achieved by developing with our partners integrated leading edge, modular generation devices with supply and demand instrumentation and systems control for widespread adoption.

Resources (\$m)

	New Appropriation (BAA2)	Redirected CSIRO Appropriation	External Leverage	Total
2004-05	5.30	15.3	5.16	25.76
2003-04	3.3	6.37	1.07	10.74

4.2 Food Futures

Flagship Director: Dr Bruce Lee



Overview

Flagship Goal: To transform the international competitiveness and add \$3 billion annually to the Australian agrifood sector by the application of frontier technologies to high-potential industries.

Food Futures will develop innovative agrifoods and processing technologies to help generate a major increase in wealth and sustainability for Australia's agribusiness sector and revitalise the rural and regional economy. It will do this by:

- Developing frontier science and technologies with potential to transform the agrifood sector through broad application across its component industries
- Applying these technologies to Australia's largest and fastest growing agrifood industries
- focusing their application at key leverage points in the supply chain where success can unlock substantial value
- Demonstrating by example their transformational impact by initially concentrating on five key 'hot spot' applications.
- Partnering with key Research and Development Organisations/Companies in the Agrifood Industry
- Providing the "vehicle" to harness the diverse capabilities within CSIRO to tackle large and complex objectives.

Theme performance and response – 2003 - 04

Theme: Advanced Genetics

Goals:

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

Progress

Annual Performance Goals	Achieved: 8	Delayed to 04-05: 7	Unachievable: 0
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(1A) WHEAT: Development of non-transgenic resistant starch wheat lines is on track. If there is little yield penalty, this should be an excellent lead to commercialisation. The design concept and operational protocols for the RS/GI instrument have been delayed.

(1B) CANOLA: The 03-04 plan was to clone microalgal genes to provide the possibility to engineer ω-3 synthesis in oilseeds to create diversified high-value grain products.

Response

(1A) Resources have shifted towards surveying wheat lines with increased levels of arabinoxylan.

(1B) Project directions are unchanged. In 04-05, significant emphasis will be placed on additional experimental work to strengthening our patent position and provide further IP positions. Commercial FTO analysis will now be undertaken using an external patent attorney in early 04-05. During the course of 04-05 a targeted effort will be made to obtain coinvestment.

Theme: Breed Engineering

Goals:

To apply breed engineering to boost the product value of Australia's animal-based food industries by \$350M for beef and by \$550M for seafood by 2013

Progress

Annual Performance Goals		Achieved: 10		Delayed to 04-05: 4		Unachievable: 0
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(2A) BEEF: The majority of goals have been achieved in 2003-04 with significant progress in some individual projects, particularly in bull proximity control and testes stem cell transfer. Industry communication relating to bull proximity control and testes stem cell transfer has been progressed ahead of schedule, with positive feedback.

The full business cases and commercialisation goals will be developed in 2004-05.

(2B) AQUACULTURE: A critical step towards achieving the Theme Goal is to progress the Australian prawn, abalone and salmon farming industries from their current reliance on wild or unselected genotypes to the use of genetically improved stocks. Major progress towards this goal has been achieved in 2003-04 via successful captive breeding of black tiger prawns, establishment of an industry-based abalone genetic improvement program and attracting external investment to develop a DNA vaccine against salmon AGD infection.

Response

(2A) Now that proof of concept and patent applications have been priority filed for some Projects, full business plans and co investment targets will be developed in conjunction with Divisions and Corp BD & C.

(2B) In addition to achieving the major science and industry impact goals for 03-04, the success of proposals attracting external co-investment to Stream 2B for 04-05 strongly endorses the R & D focus of the science plan.

Theme: Separation Technologies

Goals:

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

Progress

Annual Performance Goals		Achieved: 6		Delayed to 04-05: 1		Unachievable: 0
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(3A) SEPARATION: The original plan was for the results of 3A1 to feed into 3A2 and 3A3, and that capability was built within 3B to accept candidates from stream 3A and incorporate them into model foods. A late start to the project delayed delivery of the candidates and hence had a ripple effect through the project. This delay has largely been corrected and now two molecular candidates are being enriched and prepared for incorporation into prototype foods. These lead candidates are: enriched from bovine carcass wastes and from milk waste streams. The emphasis of the work is now on isolation, separation and incorporation of molecular candidates. This has limited the role of HSN scientists. We are also optimistic about funding opportunities.

(3B) INCORPORATION IN FOOD: Literature review on selected bioactives has been completed and progress has been made towards method development and validation for substitution of bioactives in model food systems to determine its effect on structure and functional characteristics. The work that has been done indicates that there are significant technical challenges in formulating bioactive ingredients into food products since the final product will have to be accepted in the market place if the project is to be completely successful. Redirection of resources at HSN is under consideration.

Linkages to the P-Health Flagship are under development in order to see if the bioactives discovered in P-Health can be considered as separation candidates for Food Futures. Joint coinvestment with third party companies may be considered with P-Health.

Response

(3B) There are currently some delays in the separation of bioactives and to continue with the application stream the sourcing of bioactive from a commercial source or laboratory separation of smaller quantities of bioactives may need to be considered. The need for encapsulation of bioactives will be examined.

Theme: Non-thermal Processing

Goals:

To apply non-thermal processing to create a new Australian industry generating \$350M sales of 'preserved-fresh' foods for global convenience markets by 2013

Progress

Annual Performance Goals		Achieved: 2		Delayed to 04-05: 2		Unachievable: 0
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Some additional methodology optimisation was required for the C. botulinum spore inactivation work, which has been completed. Final determination of a single indicator strain for development of inactivation models can now be completed by August 2004. Data generation for Salmonella and lactic acid bacteria inactivation model development is ahead of schedule. Completion of the white paper on HPP has been delayed due to a delay in the contracting process.

Response

A strategy is being developed for moving forward with other external partners, as a contingency plan if agreement can't be reached with MF. This includes an assessment of the patent/IP landscape and should be complete in 2 months. The white paper will also be further developed in this period.

Under-staffing for the Plant Industry component of the Stream continues to be an issue and the team is addressing alternative approaches.

Theme: Quality Biosensors

Goals:

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

Progress

Annual Performance Goals		Achieved: 5		Delayed to 04-05: 4		Unachievable: 0
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(5A) BIOSENSORS: The current phase of the project is early stage research to match olfactory receptors to molecules believed to be important in consumer appeal in wine. Information obtained in Stream 5B will be utilised in our program. Our focus has been on constructing the molecular and other experimental tools necessary to routinely assign odorants to olfactory receptors. There is a slight delay (few weeks) in developing a heterologous functional expression system for olfactory receptors. Analysis of the intellectual property landscape has concluded that there is currently freedom to operate with the approach being taken. Information presented at the Eighth World Congress on Biosensors (Granada, 24-26 May 2004) also indicates that CSIRO's approach is radically different from that being taken by others.

(5B) GRAPE AND WINE FLAVOUR: Strong support of industry partners resulted in 6 sites producing fruit of different "quality" being selected for grape and wine analysis. Little is known about

grape flavour molecules and their relationship to quality. Grape slurries were made from the selected vineyards for sensory and chemical analyses. Large and small scale wine making was undertaken and completed with the involvement of major wine companies and Provisor. Amber APGs are due to new staff commencing later than expected and sensory analyses being carried over to 04-05.

Response

(5A) Forty-eight olfactory receptors are known to be expressed in *Drosophila melanogaster*. However, only six full length cDNAs for olfactory receptors have been previously isolated. All the indications are that isolating the remaining receptors will be straightforward. However, verification and insertion of the cDNAs into expression vectors with the ensuing verification of their integrity is a significant logistical task. Under staffing at the Divisional level is being addressed and the delayed milestone should be reached by the end of the calendar year 2004.

(5B) Strong support of industry partners resulted in 6 sites with a history of producing wine of different "quality" being selected for integrated grape and wine analysis. Grape slurries were made from the selected vineyards for sensory and chemical analyses. Large and small scale wine making was undertaken and completed with the involvement of major wine companies and Provisor. Amber APGs are due partly to new staff commencing later than expected. The final staff appointment will start in late July 2004. An unavoidable delay in analyses of samples was caused by the late 2004 harvest (vintage) period due to unusual seasonal conditions. This caused a flow on delay effect for sample collection and in sensory and chemical analyses of grape slurries and wine. The sensory analyses for grape slurries will be completed in July 2004 and chemical analysis of the grape samples is underway. Following a rest period after bottling, the wine sensory analysis will be completed September 2004.

Theme: Consumer Acceptance of Novel Agrifood Technologies

Goals:

Consumer acceptance of technologies associated with other Food Futures Flagship stream goals.

Progress

Annual Performance Goals		Achieved: 2		Delayed to 04-05: 2		Unachievable: 0
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Our goals were to create suitable tools and these have been identified and are currently being tested and/or used to collect consumer data. There was delay due to staff not being appointed until January 04. Data collection is progressing well.

Response

No redirection planned at this stage

Learnings from last year and key challenges in 04-05

Each of the research themes outlined below represents an area of opportunity to make a significant impact on adding value to existing agribusiness, such as cattle breeding and aquaculture, or to develop emerging industries, such as high pressure processing for food preservation. By developing each of these themes independently but in concert, some significant early progress should build into substantial impact across the industry in later years.

Progress during 03-04 has exceeded expectations in a number of projects, interestingly in many cases in areas completely new to CSIRO and developed specifically for the Flagship. Other new areas have required more lead time but staffing is now close to 100%. Remote locations have proved to be difficult to staff in some instances. As the Flagship moves into 04-05 more funding has been directed to strengthening themes which have demonstrated good progress however there have been no major changes in direction at this point. The FF flagship program is under constant watch for opportunities to progress its vision, and some changes are anticipated in 05-06.

Key challenges in 04-05:

- To stop those programmes that will not deliver a commercially viable outcome.
- Replace those terminated with new projects or initiate new streams
- Commercialise the outcomes
- Contribute to, and encourage cultural change in the organisation by placing emphasis and urgency on ensuring the success of Flagship programs.

Research Themes – 2004 - 05

The Flagship has been running for just over one year and the Director of the Flagship started in the role at the end of January 2004. The 2004-05 year will see a redirection of resources into projects whose strong progress indicates that extra funding would enhance an early result, and a concurrent ramping down or closure of those projects assessed not to be able to deliver in the time frame required. The Flagship Advisory Committee will also assist in 2004-05 in redirecting and focusing resources on existing and/or new Agrifood targets. There are currently 10 divisions participating in the Flagship (CPI, CLI, ENT, CMR, FSA, HSN, CLW, CMS, CMIS, & ICT Centre). The Flagship will be proactive in the coming financial year to ensure that all divisions have the opportunity to provide their capabilities to the delivery of Flagship goals, thus more divisions may be involved in 2005-06.

2004-05 will also be a year in which work will be undertaken to ensure that key partnerships (both co-investment and key company partnerships / licenses) are established. The communication of key messages around each of the stream outcomes, both internally and externally, will form an integral part of the activities in 2004-05.

Advanced Genetics

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. Wheat varieties (both bread and durum) with high levels of resistant starch (around 80%) are being created. Two approaches have been undertaken (1) Genetically Modified (GM) and (2) non-GM. Trials of health attributes of these wheats will also be undertaken when the wheats are incorporated into different foods processed by thermal, extrusion and other processing techniques.

Wheats of high quality at low protein content are also under investigation.

This stream will also deliver seed-oil grains (eg transgenic canola) enriched in omega 3 polyunsaturated fatty acids (PUFAs). The pathway and production of key intermediates is being assessed in the model plant *Arabidopsis*. In 2004-05 demonstration of the production of the key PUFA (DHA) in this model plant is expected.

Breed Engineering

Goal: To apply breed engineering to boost the product value of Australia's animal-based food industries by \$350M for beef and by \$550M for seafood by 2013.

This technology is aimed at improving the productivity (principally via improved meat quality) of the North Australian beef herd. Further work on predicting ovulation aims to boost productivity in both beef and dairy herds. Validation of controlled mating techniques utilizing bull separation techniques will also be undertaken.

In abalone, faster growth and analyses of selected family lines will continue. In prawns, prevalence of growth related genes and screening for virus resistance will be continued. In salmon, efforts will concentrate on reducing the levels of amoebic gill disease (AGD) using a vaccine approach and breeding for natural resistance.

Bioactive Separation

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

The two bioactives selected will be further studied for their characteristics, cost effective separation and functional and sensory properties in a variety of model food systems. Additional bioactives will be selected in the 2004-05 period.

High Pressure Processing (HPP)

Goal: To apply non-thermal processing to create a new Australian industry generating \$350M sales of 'preserved-fresh' foods for global convenience markets by 2013

Assessment of the parameters involved in HPP and the effects on nutritional properties of selected fruit and vegetables will be undertaken. Predictive modelling in fruit and vegetables and the effects of HPP on *Salmonella* and *Lactobacillus* will be completed. Commercial adoption of one phase-change material designed for transporting perishable products and optimisation of a mathematical modelling system will also be advanced.

Quality Biosensors

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

Flavour components will be analysed in samples collected and vinified from two grape varieties and vineyard variation will also be investigated. Genetic analyses of selected pathways contributing to berry flavour will also be undertaken. In the biosensor component of the program, odorant sensitivity for compounds in previously uncharacterised odorant receptors and cellular expression of an odorant receptor will be completed.

Consumer Acceptance

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

Further work on qualifying consumer attitudes both domestically and in export markets to new approaches to food production will be addressed and new techniques for measurement of subconscious reactions validated.

Resources (\$m)

	New Appropriation (BAA2)	Redirected CSIRO Appropriation	External Leverage	Total
2004-05	6.15	16.88	5.15	28.18
2003-04	4.1	12.35	2.35	18.80



4.3 Leading the Light Metals Age

Flagship Director: Dr Tony Filmer

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

The Light Metals Flagship will help:

- double the economic value of Australian light metal production to \$10 billion by 2010
- cut by one third the energy needed to make light metals
- develop novel manufacturing systems for light metals and alloy products
- develop technology to create a new titanium metal industry
- cut the life-cycle environmental impact of light metal products by half

The Flagship will also help catalyse a specialist export cluster in light metals processing, products, technology and related services.

Theme performance and response – 2003-04

Theme: Alumina

Goals:

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

Progress

Annual Performance Goals		Achieved: 5		Delayed to 04-05: 1		Unachievable: 0
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Progress in portfolio selection has been satisfying, with acknowledgement and support of the new direction from the customer base. Technical progress has been limited due to the small budget allocation available, whilst projects are at the proof of concept stage.

Response

Projects in the environmental footprint theme are now sufficiently well formulated in conjunction with the customers, to initiate work independent of the specific funding arrangements.

Theme: Aluminium Metal Protection

Goals:

Reduce the global greenhouse impact (CO2 equivalent) by 10% whilst improving cost effectiveness by 2012

Progress

Annual Performance Goals		Achieved: 6		Delayed to 04-05: 1		Unachievable: 0
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Portfolio is now well structured and employment of people from the industry sector has provided both project management expertise and greater industry context.

Response

Having integrated into the world leading energy efficiency project, excellent project management will be required to mobilise the requisite skills and achieve the scientific breakthroughs necessary for delivery.

Theme: Magnesium Metal Protection

Goals:

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

Progress

Annual Performance Goals	Achieved: 3	Delayed to 04-05: 1	Unachievable: 0
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The new direction of the Flagship was established prior to the demise of AMC, driven by a cost analysis which illustrated Australia's un-competitiveness in the absence of breakthrough technology (which AM technology is not)

The demise of AMC over the past year made the rapid delivery of Flagship outcomes critical, before the expertise currently available in Australia is lost. However ongoing external funding by AMC, difficulty in recruiting, and less than ideal project leadership, has lead to a slow ramp up of the theme.

Response

The critical issues have now been addressed and acceleration is anticipated over the next three months.

Theme: Magnesium / Aluminium Fabrication

Goals:

Robust and growing Australian semi-fabricated and component industry as evidenced by 20% of magnesium production consumed locally by 2012

Progress

Annual Performance Goals	Achieved: 2	Delayed to 04-05: 0	Unachievable: 4
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Finding breakthrough projects in an area where Australia does not have a strong industry base nor a natural competitive advantage has proved slow. One excellent example is underway and efforts have been directed to supporting the renewal of the CAST CRC to ensure ongoing incremental R&D.

Response

Magnesium manufacturing will be ramped up when a realistic pathway exists to metal production in Australia. Until then resources will be reallocated to promote these ends.

Theme: Titanium

Goals:

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

Progress

Annual Performance Goals	Achieved: 6	Delayed to 04-05: 0	Unachievable: 0
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Substantive progress towards focussing resources on the technologies that provide opportunities for Australian production. Now integrated in the teams of the two credible companies that have strategic projects in this area.

Response

Having created the right partnerships, delivery of the integrated project outputs will require excellence in project management, this will form the crux for a new titanium industry in Australia.

Learnings from last year and key challenges in 04-05

The Light Metals Flagship has evolved significantly during the past year from a conceptual construct to an operational entity. As with any major change that cuts across historical skills, systems, structures, and strategies, and demands new ways of doing business; Flagships have uncovered some great opportunities and some barriers to progress.

Overall progress has been encouraging, with both companies and CSIRO exhibiting willingness to engage, and becoming increasingly aligned with the need for change.

The essential areas for Flagship success which have proved most foreign to CSIRO staff are:

Planning – Spending the time constructing a value proposition and the essential elements of science that are required to deliver the requisite output. This is distinct from seeking to build on the pre-existing science base, in areas that may have relevance to customers.

Teamwork – Fitting in with a project team environment that is required to integrate all the necessary skills to deliver an output. This is particularly relevant where the project team cuts across pre-existing team structures, and requires changes to day to day priority setting from the traditional line structure.

Urgency – Appropriation expenditure has traditionally taken a back seat to small projects earning external income, has been largely discretionary in timing, and the individual scientist has generally had control of the direction of the R&D. The requisite responsiveness to the project demands of an internal customer is proving fundamentally different from the status quo.

Work on the systems, symbols and behaviors, needed to change the pre-existing culture, has been piecemeal during the formation phase of the Flagships, but has been undertaken in an environment of goodwill.

Despite these impediments, the project portfolio for the LMF has made great strides into the areas that can make a real difference to the current Australian light metals industry base.

Customers with global reach are increasingly integrating CSIRO into their strategic business initiatives, rather than passing across small pieces of support or consultancy work.

The principle challenge for the Flagship in 2004-05 will be to bridge the gap between the expectations that have been set, and our ability to find innovative and attractive pathways to the long established and thorny constraints facing the Australian light metals industry. This will require a step change in the quality of CSIRO's project leadership.

Research Themes – 2004-05

The themes for the Flagship have remained unchanged. Within each of these themes however, the refinement of projects to deliver the theme outcomes has been significant. Cumulatively they now provide the technical potential and in some cases the partnership arrangements to meet the Flagship Goals.

Alumina efforts have been focused on addressing two substantive costs issues and one environmental issue specific to Australian bauxites. The aluminium theme has been increasingly integrated with groundbreaking, energy related aspects outlined in the industry's technology roadmap. Magnesium has been re-arranged to shift the emphasis from AM technology to development of more cost effective carbothermic technologies. Titanium efforts have been progressively focused on the most prospective technology developments. The manufacturing theme remains the least developed. This is due to a good pre-existing support base through the CAST CRC, and a need to establish credible pathways for magnesium and titanium metal production in Australia before providing additional breakthrough efforts in support of a domestic manufacturing sector.

Research Themes – 2004-05

Alumina

Goal: Building on Australia's bauxite resources to grow the share of global alumina production to 50% by 2012. This will be achieved through addressing the fundamental constraints to growth – high silica, high organics and red mud disposal.

Aluminium Metal Production

Goal: Reduce the global greenhouse impact (CO₂ equivalent) by 10% whilst improving cost effectiveness by 2012. This will be achieved by understanding cell performance together with step changes in anode and cathode materials.

Magnesium Metal Production

Goal: Growth of first cost quartile Australian magnesium industry to 200kt pa by 2012. This will be achieved by development of a continuous carbothermic process.

Magnesium/Aluminium Fabrication

Goal: Robust and growing Australian semi-fabricated and component industry as evidenced by 20% of magnesium production consumed locally by 2012. This will be built on the base of Australian magnesium metal production.

Titanium

Goal: Creation of a world scale (20kt pa) titanium industry based on continuous processing and integrated with downstream manufacturing in Australia by 2012. This requires the development of totally new, integrated metal production and semi-fabrication processes.

Resources (\$m)

	New Appropriation (BAA2)	Redirected CSIRO Appropriation	External Leverage	Total
2004-05	4.80	13.75	4.38	22.93
2003-04	3.10	5.83	0.33	9.26



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.

The Flagship's objective is to work in partnership to realise the enormous potential for reducing the incidence and severity of chronic diseases.

The partnership will:

- develop new foods and diets which combat disease and promote well-being
- develop new ways to identify disease before it becomes serious
- use genes and proteins to predict and prevent ill-health
- develop powerful new tools to analyse the causes of disease and ill-health
- develop better ways to measure and monitor the nation's health and key health issues.

Theme performance and response – 2003-04

Theme: Colorectal Cancer

Goals:

Reduce colorectal cancer incidence by 10% and increase 5-year survival from around 63% to 70% by 2020.

Progress

Annual Performance Goals		Achieved: 9		Delayed to 04-05: 5		Unachievable: 0
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- Significant accomplishments in diagnostics with enthusiastic scientific engagement and very large goals being addressed successfully at this stage.
- Good staff buy-in from within the projects however there were initial tensions at the interface of the Divisions and the Flagship which needed to be managed and this included some difficulty in accessing focused legal and other research support.
- Delays in achieving APGS were related to the following:
 - variable project management skills
 - some ongoing problems with identifying the right skills mix to deliver on APGs
 - dependence on interactions and negotiations with external companies and R&D collaborators (eg. delayed access to clinical samples)
 - managing in a complex environment across geographical, disciplinary and cultural barriers.

Response

- Initiated discussions within the Organisation around functional project management and accessing appropriate scientific skills & support for Flagships to assist in delivery of outputs.

- We are now working actively with Divisions to ensure appropriate staffing and support and with both Corporate and Divisional BDC to ensure delivery on engagement APGs
- Proactively managing external relationships with clear delineation of roles and responsibilities, actions etc
- Continuing to seek outstanding clinical collaboration and advice to ensure delivery and relevance of research milestones

Theme: Cardiovascular & Inflammatory Diseases

Goals:

Reduce the prevalence of individuals with elevated cardiovascular risk factors by 2020.

Reduce the prevalence of specific inflammatory diseases in the Australian population.

Progress

Annual Performance Goals	Achieved: 5	Delayed to 04-05: 4	Unachievable: 0
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- The Protective Foods project is working well and is an excellent example of cross-Divisional collaboration.
- The research in this area has a lot of commercial potential yet to be realised and which may deliver in the next FY.
- Although this theme has outstanding scientists, delays in some APGS have been due to problems with project management.
- An additional project in this theme was unable to commence due to limited resources available to drive the expansion.

Response

- Continue to support the identification of bioactives in the Protective Foods area
- Implement functional project management with the support of Corporate and Divisions
- Further expansion of the cardiovascular area requires experts in the cardiovascular field and we propose that expansion in P-Health will occur as part of the BAA2s Collaboration Funding pool.

Theme: Neurodegenerative Disease

Goals:

With Neurosciences Australia provide technology platforms to identify new preventative approaches to neurodegenerative disorders.

Progress

Annual Performance Goals	Achieved: 3	Delayed to 04-05: 1	Unachievable: 0
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- Neurodegenerative disease continues to be a disease of significance in Australia as well as globally and warrants continued research investment in prevention. Recognising the need for clinical inputs we have formed a powerful partnership with Neurosciences Australia (NSA) and within that, Australia's leading scientists in this field.
- The key research APGs have been achieved but maintaining satisfactory collaboration has been put under some strain due to delays in part due to the complex nature of the project's science that needed to be reflected in the contractual terminology.

Response

We have now outsourced legal support to drive the completion of the contractual arrangements in a more responsive manner.

Theme: Health Data Integration

Goals:

Integrate existing isolated health and social databases into accessible databases from which to generate information to guide policies &/or preventative research.

Progress

Annual Performance Goals		Achieved: 0		Delayed to 04-05: 2		Unachievable: 0
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This enabling technology activity is a large project developing a technology platform with a wide range of applications. It has been performing well scientifically but was unable to access data sets to implement the technology in a practical application until recently. Without a real practical application it has not yet successfully attracted external investment although it may well deliver earnings next FY.

Response

- We have engaged an additional expertise to ensure alignment, focus and direction of the activity and to ensure conversion of the platform technology to a practical functional system.
- Interaction with eHRC in Qld (under negotiation) will assist in the uptake and final development of this technology for a government health application and ongoing discussions with other key data-set custodians throughout Australia should facilitate practical application in a research setting over the coming year.

Theme: Environment and Health

Goals:

- To identify the key health related environmentally mediated issues in Australia by 2004
- To identify new preventative strategies

Progress

Annual Performance Goals		Achieved: 2		Delayed to 04-05: 0		Unachievable: 0
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The challenge was to identify the key external group with expertise and capability that complements CSIRO's environmental skills in this area. An additional prevailing challenge for P-Health is to improve coordination of environment and health across CSIRO.

Response

We have been working through a series of workshops with CSIRO and external groups to define the precise issues associated with health and the environment. We have developed an initial research plan which will be tabled for discussion at the FOC meeting in August 04.

Learnings from last year and key challenges in 04-05

P-Health was one of the first Flagships to be operational in 03-04 and, as such, was the pilot for the performance framework process and the move to an Organisational matrix. While the learnings are many, the key experiences are as follows:

- The outstanding scientific achievements that are possible when we horizontally integrate our discipline bases around goals and partnerships
- The "One CSIRO" culture is growing across the Flagship

- Strong support from external R&D institutions and buy in to the Flagship
- The value that Corporate BD&C has added particularly in the area of due diligence and the support of Chiefs, Group Executives and others
- The ongoing need for enhancing project management and change management
- Pressures on the resources of the Flagship office increasing as the activity builds.

The challenges that have emerged from these learnings include:

- The need to maintain the Horizon #2 characteristics of the Flagship; its fast moving nature, its cutting edge science, the enthusiasm and internal and external profile
- The need to provide sufficient skill and resource around the translation of IP positions to the market on the larger ticket areas, eg encapsulation, biodiscovery
- The need to ensure external earnings
- The need to clearly identify pathways to most effectively realise the opportunities arising out of the BAA2 Collaboration Fund
- The need to increase from the existing 9 the number of key external parties in the areas identified in the Business Plan particularly around other aspects of prevention, CNS diseases and cardiovascular disease.

Research Themes – 2004-05

The key Themes identified below and derived from the original business plan are unchanged in domains for they form the key areas of exploitation in prevention in human health. Noteworthy movements within or between themes include the following. In the Environment and Health area the first step in understanding the introductory areas identifying negative impact of environment on national health issues will be presented to the Flagship Oversight Committee in August 2004 with a view to initiating that activity in a partnership between CSIRO and the Australian National University. Health Data Integration will undergo significant translation with strong partnerships around key datasets in the coming year. The Colorectal Cancer Theme remains unchanged and is adhering very much to the key APGs and milestones within those APGs established in 03-04. Likewise Neurodegenerative Disease, with the initiation of a partnership with Neurosciences Australia will flow into the remainder of the first year of that partnership in 04-05. Two of the under-developed Themes (Cardiovascular Disease and Inflammatory Disease) are grouped as one principally because the single project around an interleukin has outcomes and implications for both disease states. In the coming year these Themes will be addressed by way of ongoing partnerships with external R&D institutions and stakeholders

Colorectal Cancer

Goal: Reduce colorectal cancer incidence by 10% and increase 5-year survival from around 63% to 70% by 2020 through prevention and early diagnosis. Colorectal cancer is a disease of significance in Australia. Our combined approach of developing technologies for early detection in parallel with food-based interventions, with external collaborators and partners will help in reducing the negative impacts of this disease. In 04-05 we expect to see a transition from technology development to preclinical and clinical evaluation with an increasing emphasis on establishing commercial alliances.

Cardiovascular/Inflammatory Disease

Goal: Reduce the prevalence of individuals (by 10%) with elevated risk factors for cardiovascular disease by 2020 and reduce the prevalence of specific inflammatory diseases in the Australian population. Cardiovascular disease is still a key cause of death in Australia and inflammatory diseases are a significant cause of ill-health throughout the nation. In cardiovascular disease, our dual approach of understanding different mechanisms of the disease (eg role of an interleukin) and identification of cardiovascular-friendly and protective foods, in collaboration with external partners, provides us with

a novel basis for reducing the long term impact of this disease. In 04-05, while our work to discover small molecule or biological inhibitors of the pro-inflammatory system will remain our central technical focus, our key activity will be the development of a strategy for broadening our clinical associations and project portfolio in this area

Neurodegenerative Disease

Goal: In the short-term, to provide technology platforms which complement and facilitate Neurosciences Australia's goals of identifying new approaches to the prevention of neurodegenerative diseases. Alzheimer's disease is a devastating disease that, in the absence of prevention and treatment, will become a highly significant social and economic burden to Australia in the future. Our research activities in 04-05 are primarily in the discovery phase with Australia's leaders in the field, by way of partnership. The key focus will be to unravel the mechanisms through which precursors of the brain amyloid plaque material characteristic of Alzheimer's disease brings about neurotoxic effects.

Environment and Human Health

Goal: Preventing or reducing negative environmental impact on national health issues. It is vital to better understand the relationship between the environment (natural and built) and the health of their populations from infancy to the aged. In collaboration with one of Australia's leading epidemiology groups we are defining the impact of urban air quality on human health outcomes. We hope that this approach will form a model for future investigation into the impact of the environment and health in the Australian population. In 04-05, Project proposals in this area will be developed and, if approved by the Flagship Oversight Committee, initiated.

Health Data Integration

Goal: Integrate existing isolated health and social data-sets into a national data-base from which to generate information to guide policies and/or preventative research. The ability for a country like Australia to maximize the resources in its data-bases by data linkage is a formidable challenge. The developed technology permits approaches to achieving this national goal in partnership with health partners. In 04-05 this technology will be tailored for institutional applications in collaboration with partners and for research applications in conjunction with key data custodians

Resources (\$m)

	New Appropriation (BAA2)	Redirected CSIRO Appropriation	External Leverage	Total
2004-05	4.78	13.24	3.26	21.28
2003-04	3.60	9.76	0.83	14.19



4.5 Water for a Healthy Country

Flagship Director: Mr Colin Creighton

Overview

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

The Water for a Healthy Country National Research Flagship will enhance its existing public and private partnerships and continue to form new partnerships to demonstrate how water can be used to return its highest environmental, economic and societal benefits to Australia. The Flagship will achieve this by demonstrating to the community, government and industry the changes required to existing landscape and cityscape systems to achieve these benefits.

The Flagship provides Australia with a vehicle to meet private and public demands for sustainable systems solutions – and to prosper from doing so. It aims to demonstrate:

- urban and rural water use systems that cope with population growth, increased demand, climate variability and climate change (underpinning continued progress in water management reforms and providing the science to support wise industry, community and government investments).
- participation in adaptive management of our landscapes, so that our unique Australian environment delivers increased profit and better environmental outcomes including resilience to flood and drought, healthy rivers and estuaries, and maintenance of biodiversity.
- industrial, urban and agricultural recycling systems that profit from innovative conversion of wastes to useable resources.

Theme performance and response – 2003-04

Theme: South-West Western Australia

Goals:

To provide the research support for implementing the State Water Strategy titled ‘Securing Our Water Future – A State Water Strategy for Western Australia’.

Progress

Annual Performance Goals		Achieved: 6		Delayed to 04-05: 2		Unachievable: 0
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Overall, the research outputs for the 2003-04 financial year have contributed to the longer term delivery of the Theme goals. Delays in achieving the APGs have been due to a number of factors including lack of research capacity and the changing research priorities of partner agencies.

Response

There has been a shift of resources to the new priority area of the Swan Estuary. Of the two APGs still to be achieved, one is now being led by the Department of Environment as core business so it will still be achieved. The delay in achieving the second APG relates to lengthy negotiations with Local Government and Water Authorities as CSIRO and its partners move to innovative water supply options.

Theme: Urban Waterscapes

Goals:

To create Australia's water-smart cities of tomorrow.

Progress

Annual Performance Goals	Achieved: 13	Delayed to 04-05: 3	Unachievable: 0
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Progress has been substantial with most APGs achieved and significant expansion of the Theme from Melbourne to other major capital cities (Sydney, Brisbane, Perth), based on stakeholder demand. Delays relate principally to research capacity as CSIRO teams shift to the Flagship concept and its needs.

Response

There has been some changes to the level of resourcing and research direction related principally to meeting various urban demands across Perth, Melbourne, Sydney and Brisbane. A strategic analysis is also underway so that resources can be continually re-allocated to the priority areas for science intervention.

Theme: Great Barrier Reef Catchments

Goals:

To provide the research support for the Great Barrier Reef Water Quality Protection Plan. This Plan aims to safeguard the marine and estuarine ecosystems of the Great Barrier Reef Lagoon by halving the water quality problems while supporting community development and enhancing productivity from all industries.

Progress

Annual Performance Goals	Achieved: 9	Delayed to 04-05: 0	Unachievable: 0
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Outcomes from 03-04 will provide the knowledge platform for targeted solution science to underpin the actions in the Reef Water Quality Protection Plan. The work to date provides a base line that compels further focused activity in 'high risk' regions identified in the Reef Plan and that also display a willingness for adoption of solutions developed through the research initiative.

Response

The APGs were achieved for 03-04. Refined APGs have been set for 04-05 commensurate with opportunities for science intervention to make a difference. This reallocation of funds has been to research actions that more sharply reflect the requirements of the Reef Plan and the Regional NRM Bodies have been undertaken. The areas where research investment has failed to deliver Reef Plan adoption targets have been reviewed and redirected eg Lower Burdekin investments.

Theme: River Murray Region

Goals:

To provide the research support for the *Living Murray*, and related Murray Darling Basin component of the *National Water Initiative*, which aims to achieve a healthy working river.

Progress

Annual Performance Goals	Achieved: 7	Delayed to 04-05: 0	Unachievable: 0
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Much of the first year's effort in the River Murray Theme has been devoted to developing a systems approach to the research being undertaken. This has involved extensive stakeholder interaction to define the scope of the research and its application at regional to whole of basin scales. This early

effort has paid dividends through stakeholder ‘buy in’ to the Flagship and their strong endorsement of the science program for the Murray Region. The strong engagement with the Murray Darling Basin Commission is testament to the effectiveness of the partnership approach.

There has been good progress across the Theme, but in particular in the research areas of climate prediction, rainfall-surface water-groundwater interactions, and the development of a water benefits accounting framework.

Response

There will be a consolidation of projects undertaking research for the irrigation industries. As a result of the strong performance in 03-04, the level of resourcing for 04-05 will remain the same with a minor incremental increase. Any financial growth in this theme will be achieved by either closer alignment of research being undertaken by Divisions or increased income from external sources.

Learnings from last year and key challenges in 04-05

Key lessons learnt from last year include:

- The challenges and potential rewards that are inherent in the development of an integrated program that is endeavouring to address social, economic and environmental components of the national and regional water research agenda.
- The multi-component approach needed to nurture strong and effective relationships with multiple partners. The Flagship will continue to work with senior management in its partnering CSIRO Divisions (12 in total), CRCs and universities to review and refine the Flagships research portfolio and to deliver in a multi-tiered framework to multiple and varied client needs.
- The conduct of research within the context of the state, federal and international water policy agenda as an information provider to policy development. To facilitate this, the Water for a Healthy Country Flagship Advisory Council has been established and is providing advice on the strategic directions and management of the Flagship’s research agenda; the policy and management environment into which the research is directed; and the appropriate arrangements to build and maintain effective partnerships. The Advisory Council includes representatives from water industry associations, the rural community and key state and commonwealth agencies.
- The need for improved, effective and efficient project and program management practices, including rigor in data management and systems for integration of research findings between component projects. The Flagship will continue to work with the CSIRO Operational Performance Unit to facilitate the adoption and implementation of corporate project management policies and tools within the Flagship’s projects and is initiating work with CSIRO IT to develop and pilot for CSIRO data management and access systems.
- The need for a highly focussed and well designed communications and knowledge exchange program that second guesses many of the community needs for information and ensures the Flagship’s research portfolio is relevant and research outputs are deliverable in an appropriate and timely manner to community information needs.

Key challenges to the Flagship in 2004-05 include:

- Defining the Water Benefits Framework that will focus the various components of the research portfolio and will assist the community, industries and governments to make better informed decisions on the management of the nation’s water resources.
- Continual fine tuning and growth of the research portfolio based on assessment of the relative needs of policy, management or science. This will ensure our resources in science are allocated to key pressure points where improved scientific knowledge will make a difference.

- Improve the level of integration within the research portfolio to further enhance the systems approach to research and to the delivery of science outputs as a portfolio across component projects.
- Further engaging and partnering with external research funders and research providers to align research activities that will deliver more benefits to the nation within a ‘Team Australia’ context.
- Specify data, information and knowledge management activities to meet community and mostly public good needs.

Research Themes – 2004-05

There will be no changes to the *Water for a Healthy Country* Research Themes in 2004-2005. It has been decided to discontinue the *Knowledge Management* cross-cutting research project. At this stage in the development of the Flagship it has been agreed that the development of data and information management support functionality is a higher priority than undertaking research *per se* in this field.

Water for a Healthy Country and *Wealth from Oceans* are together exploring opportunities to develop an Estuaries-Near Coastal Theme across both Flagships. CSIRO’s Environment and Natural Resources Divisions, as well as other external partners, will be key contributors to such a Theme.

Great Barrier Reef Catchments

Goal: To provide the research to support the implementation of the *Great Barrier Reef Water Quality Protection Plan* – in particular to improve water quality, wetland integrity and fisheries while enhancing agricultural productivity. This will be achieved by working closely with local, regional and national bodies to determine their research needs and deliver the science to inform different scenarios for the future management of the Great Barrier Reef Catchments.

Urban Waterscapes

Goal: To provide the research that will create Australia’s water-smart cities of tomorrow. New systems understanding and technologies will improve water use efficiency at various scales (household, suburban, city and catchment); enable increased reuse of waste water, and improve understanding of societal attitudes to differing water allocation and water use scenarios.

River Murray System

Goal: To help governments, industries and communities increase the social, economic and environmental benefits from water use in the River Murray Region. A whole of systems understanding of quantity, quality and restrictions on use of water resources in the catchment will facilitate more intelligent decision making in relation to the allocation of water to communities, industries and the environment.

Southwest Western Australia

Goal: To provide the science to increase triple bottom line water benefits from farm, town and catchment scale to the complex dam and groundwater systems surrounding Perth that supplies more than 90% of Western Australia’s water needs. By improving the knowledge and understanding of the quality and availability of Southwest WA’s water resources, water users will be able to determine the highest social, economic and environmental returns from the use of this limited resource.

Integrating and Supporting Research Theme

Water Benefits Accounting & Assessment

Goal: Develop a Water Benefits framework that is operational and applied at local, regional and national scales to measure progress against the triple bottom line objectives of the Flagship.

Climate

Goal: To provide observational analyses, model simulations, climate scenarios, and global circulation model downscaling and interpretive tools to integrate climate risk into the Water for a Healthy Country regional research Themes.

Terrestrial Biodiversity

Goal: To provide the knowledge base underpinning the management of terrestrial biodiversity and ecosystem function for maximal water benefits and sustainability at regional and national scales.

Resources (\$m)

	New Appropriation (BAA2)	Redirected CSIRO Appropriation	External Leverage	Total
2004-05	4.80	14.49	6.77	26.06
2003-04	3.60	9.76	0.83	14.19

4.6 Wealth from Oceans

Flagship Director: Mr 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.

The Wealth from Oceans Flagship will continue to build on the momentum of 2003-04 through managing, consolidating and building partnerships, delivering cutting edge science and, developing and applying innovative technologies to create national wealth from our vast ocean territories. The research investment is carefully targeted towards delivering high impact, environmentally responsible, ocean based solutions and innovations. Investment will be directed towards developing:

- Improved national capacity to understand and predict the future state of the ocean environment in terms of its physical and biogeochemical (health) characteristics – ocean weather prediction;
- Improved long range seasonal weather predictions for climate sensitive land and maritime industries – better regional and seasonal forecasts leading to enhanced farm gate profit;
- Improved understanding of the impacts of climate change on the marine environment allowing for smart adaptation;
- Growth opportunities for Australia's most promising ocean based industries and exploring opportunities for new industries; and
- Multiple use marine management tools, scenarios and options for selected coastal and ocean spaces within the Australian region – allowing multiple sectors and stakeholders to prosper together.

Theme performance and response – 2003-04

The Wealth from Oceans Flagship commercial operations in 2003-04 with all initial funding, invested in establishing this 'springboard' Theme. This Theme will deliver critical outcomes in its own right, and importantly will establish a secure foundation upon which higher order Flagship outcomes will be realised.

Theme: Ocean System Prediction and Responses

Stream: Operational Ocean Modelling

Goals:

To deliver national capacity to forecast the future state of the physical ocean environment by 2007.

Progress

Annual Performance Goals	Achieved: 5	Delayed to 04-05: 1	Unachievable: 0
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Stream 1 is substantially on track to deliver the Stream Goal. Major progress was achieved in developing components of the operational ocean model particularly with regard to accessing in-situ and satellite observing systems, and developing data assimilation and modelling components. The key partners (CBoM and Navy) are well engaged, and have provided positive feedback on progress and performance to date.

Response

Due to personnel shortages one pilot-activity (implementation of SWAN wave model in ROAM) is behind schedule by two months – this matter has been resolved. Delays in ARGO deployments caused by manufacturer recall of faulty floats will be overcome by deploying additional floats in 2004-05 – CSIRO detected the fault with the floats which initiated the recall.

Stream: Biogeochemistry Modelling and Responses

Goals:

To deliver national capacity to forecast changes in marine biogeochemical cycles and properties by 2008.

Progress

Annual Performance Goals	Achieved: 4	Delayed to 04-05: 0	Unachievable: 0
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Stream 2 is on track to deliver the Stream Goal. Early outputs have been made available (in situ and satellite observations and coupled models) to partners in WA Government through the established SRFME projects. Progress in developing eddy-resolving biogeochemical models has met expectations.

Response

04-05 will be a key year for progress in developing and testing eddy-resolving biogeochemical models, and for decisions about design and resourcing of new biogeochemical observing strategies.

Stream: Marine Climate Change Modelling and Simulation

Goals:

To deliver national capacity to forecast the impact of climate change on the marine environment by 2008.

Progress

Annual Performance Goals	Achieved: 3	Delayed to 04-05: 1	Unachievable: 0
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Stream 3 is on track to deliver against the Stream Goal despite some unexpected delays due to compiler problems and staffing issues. Early results have indicated climate scale warming rates in the South-eastern Tasman Sea to be greater than normal – this potentially important finding will be further investigated throughout 2004-05. Climate modelling activities have been generally pleasing with progress made in enhancing bathymetry in the Indonesian region and improvements in Southern Ocean simulation. In preparation for Theme 2 (Climate) OZCLIM has been enhanced to include marine climate projections by introducing sea level and sea surface temperature change.

Response

WfO will review its positioning in the national climate initiatives to ensure that it continues to complement and add value to the national effort. This will be particularly important as cross-agency efforts become more aligned and the result of the Round 9 CRC Climate Technology bid becomes apparent. Changes within WfO will be made as appropriate. Initiatives will be considered collectively by the Flagship and the Division to ensure that staff are only removed from Flagship projects in the most exceptional circumstances and, where necessary, alternative arrangements are implemented.

Stream: Seabed Modelling and Responses

Goals:

To deliver national capacity to forecast the future state of the oceans seabed based on climate change and human influence by 2008.

Progress

Annual Performance Goals		Achieved: 2		Delayed to 04-05: 3		Unachievable: 0
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The Stream commenced in November 2003 and suffered some early setbacks due to difficulties in accessing appropriate seabed data. The seabed sediment modelling in the SE Marine Area is now predominately back on track with initial data being sourced from the 'dbSeabed' project and INSTAAR (Boulder, USA).. There have been good results from the clathrate and organic sediment project, and they continue to develop further engagement with industry and government agencies.

Response

Efforts to gain access to appropriate seabed data through Geoscience Australia will be enhanced. The seabed clathrate and risk modelling project will be closed if suitable research/industry partners are not identified.

Learnings from last year and key challenges in 04-05

The Flagship will learn from its early experiences and implement strategies to enhance even further its impact and reach during 2004-05. The following activities will be core to the Flagship's development throughout this year:

- The commencement of Theme 2 (Oceans to Rain), Theme 3 (Blue GDP) and Theme 4 (Marine Nation);
- Continuing engagement with national, and possibly international, marine science agencies and institutions with the objective of forming partnerships that add value to the Flagship's research endeavours;
- Continuing engagement with industry, government and other stakeholder groups with the objective of partnering (as appropriate), raising external awareness of the Flagship and ensuring adoption of Flagship outcomes;
- Strong engagement with the Flagship Advisory Council;
- Building upon the support arrangements already established with Divisions and Corporate to ensure the Flagship has access to expert teams advising and acting on functional support outcomes, and thereby allowing the Flagship to focus externally;
- Official launch of the Flagship.

Research Themes – 2004-05

The Flagship enters an exciting growth phase at the commencement of 2004-05, with three new Themes activated to build upon the initial 'Springboard' Theme. In terms of CSIRO Divisions/Groups directly partnering with the Flagship the numbers are anticipated to grow from 3 in 2003-04 (CMR, CAR & CPR) to approximately 10 during 2004-05 with early opportunities identified with CLW, CSE, CMS, Ento, CIP, CEM, CSIRO Climate and the ICT Centre.

In concert with the Environmental and Natural Resources Group, and as a result of feedback from the Sector Advisory Committee, an assessment of CSIRO's future investment in the Coastal Zone is expected to be completed during 2004 – 05. A possible outcome is the establishment of a joint Coastal Theme across the Wealth from Oceans and Water for a Healthy Country Flagships – ENR Divisions would be key contributors to such a Theme.

Ocean System Prediction and Responses – the ‘Springboard’

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. This will deliver Australia access to timely, accurate and detailed information on the past, present and future state of the ocean system including its temperature, currents, salinity, primary productivity, ocean colour and seabed structure.

Ocean Based Forecasts of Australian Climate – ‘Oceans to Rain’

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 by 2013. The research will go *beyond El-Nino* to discover the key ocean processes that drive Australian climate change and variability, and then apply this knowledge to deliver enhanced regional and seasonal rainfall and temperature predictions – Australia’s agriculture sector will be prime beneficiaries of this work. The impact of climate change and variability on the maritime environment and options for adoption will also be assessed.

Ocean Based Industry Development and Growth – ‘Blue GDP’

Goal: To deliver transformational benefits to Australia’s most promising ocean based industries by 2013, through a combination of science driven efficiency dividends of 20%, and the identification and unlocking of new industrial development opportunities. The Flagship will conduct due diligence on a number of exciting industry applications as a means of selecting, and investing further in, the highest value propositions – early considerations include microbes in the Oil and Gas Sector, offshore aquaculture, ocean based proteins and oils, smart underwater sensors and adhesives.

Ocean Based Regional Development and Growth – ‘Marine Nation’

Goal: To unlock responsibly the value of Australia’s most sensitive and valuable marine regions by 2013, through delivery of both regionally specific industry efficiency dividends of 20%, and through policy options and management advice based on world class scientific research. This work will build and deliver practical scientific capacity to measure, predict and evaluate strategies, based on risk assessments and incorporating uncertainties, for multiple-use management of marine resources – proposed management strategies will be developed for selected marine regions.

Resources (\$m)

	New Appropriation (BAA2)	Redirected CSIRO Appropriation	External Leverage	Total
2004-05	3.50	10.9	4.88	19.28
2003-04	1.30	5.47	2.59	9.36

Section 5: Major Cross Divisional Programs

5.1 Introduction

Major Cross Divisional Programs (MXDPs) represent an important strategic initiative designed to increase CSIRO's impact in selected areas. By focusing investment and promoting strong coordination of multi-disciplinary effort across the Organisation, these programs will promote stronger alignment of effort, improved development of capability and more efficient application of resources to common goals.

In 2004-05 there are two continuing MXDPs – CSIRO CLIMATE and SECURE AUSTRALIA. During the year we will establish a further program aimed at providing a focus for CSIRO's involvement in the Australian Synchrotron Project.

An overview of each of these programs is provided in the following pages. It is also intended that a case will be prepared during 2004-05 for the potential establishment of a new MXDP on "Instrumentation". Further leveraging, and communicating, CSIRO wide spread activities in sensing technologies is also under consideration. Finally CSIRO's engagement, current and future, in technology in space is also receiving early, albeit low-level at this stage, attention, following a recent PMSEIC submission and presentation.



5.2 CSIRO Climate

Coordinator: Dr Bryson Bates

Overview

Formed in 1988 as one of the first multi-Divisional programs, the Climate Change Research Program has evolved into CSIRO CLIMATE, a network of CSIRO's Divisions and well over 100 scientists. The Program links core climate science with applications in adapting to climate change and variability, and in mitigating emissions. It links closely to other work across CSIRO including several Flagships and relies on major partnerships beyond CSIRO in both science and applications. The Program has been successful in developing fundamental knowledge, meeting policy needs and creating public and corporate awareness of climate change as a major issue for the 21st century.

In 2003, the Program was reviewed to fully reflect science advances, changing policy demands and changing priorities with CSIRO such as the Flagship Programs. Its objectives are twofold. Firstly, the Program aims to maximise CSIRO's capacity to create impact from its climate science across breadth of capability and disciplinary expertise by forming a tight network of well-connected staff throughout the Divisions. Secondly, the Program aims to lead targeted business development, on behalf of the Divisions, in new applications of CSIRO's climate expertise.

In business development, the Program will assist the Wealth from Oceans Flagship in its Theme 2 "Oceans based forecasts of Australian climate – Oceans to Rain" and, in particular, will be seeking opportunity in the field of climate variability in agriculture. It also stands ready to assist with commercial prospects in carbon management.

Themes

These themes will be carefully refined and connected to initiatives stemming from the Flagship Programs, particularly Water for a Healthy Country, Wealth from Oceans and Energy Transformed.

Impacts of, and Adaptation to, Climate Variability and Change

Goal: By identifying the impact of natural and human-induced variations in weather and climate on all sectors of the community, seek to develop adaptive responses and management practices that minimise risk and maximise economic and social value so that Australian society can adapt effectively to climate variability and change.

Mitigation and Abatement of Greenhouse Gas Emissions

Goal: By developing a portfolio of approaches to identify options to reduce net greenhouse gas emissions in ways that are socially, economically and environmentally acceptable contribute to national and international efforts to use less primary energy (improved efficiency at end use) and more alternative energy sources (renewables, new combustion technologies and conversion processes).

Forecasting Climate Variability and Change

Goal: Enhancing social, environmental, and economic benefits for Australia and the surrounding region through improved knowledge and predictions of the climate-biosphere-human system. This theme also supplies information and capacity to Themes 1 and 2.



5.3 Secure Australia

Coordinator: Dr Greg Simpson

Overview

The security domain, which encompasses all measures to protect Australia, including its people, livestock, plants, environment, food, water and infrastructure, from harm, has always been an important aspect of CSIRO's work. The majority of past and current investment is in the area of protection from pests, weeds, and diseases – closely aligned with the relevant National Research Priority. Defence, anti-crime and counter-terrorism related technologies are not a focus of CSIRO research per se although some of our research areas (e.g. imaging systems, sub-surface radar) have application to these fields.

We are seeking to enhance our capability in the Safe Australia NRP area via greater coordination and facilitation of our existing research capacity and investment, and looking at new opportunities and ways of collaborating with other agencies working in this area via this cross Divisional program.

Through better coordination, facilitation and focusing of capabilities in CSIRO and in partnership with other agencies, we will endeavour to provide scientific and technological solutions, conceptual frameworks and policy advice to enhance Australia's security. Key capabilities include biosecurity science (diagnostics, control technologies, biotechnology, risk analysis), design of detection, sensing and security devices, information management and security, material science and engineering, and remote sensing.

The main markets to be targeted are government agencies with responsibility for national security policy and operation, importers requiring more efficient and effective screening of cargo, agricultural industries, public and private organisations responsible for critical infrastructure, defence and security technology companies, and major US initiatives delivering science, engineering and technology for national security.

Themes

In its current form, the program seeks to develop (and communicate) a register of CSIRO's potential capabilities and technology platforms in the security domain, investigate mechanisms whereby the organisation can leverage its existing research expertise into security-related applications, and position the organisation as a significant player in security science in this country. The Secure Australia Program is currently under development and it is expected that the following themes will evolve rapidly as the program matures.

Mapping of CSIRO's Security Capabilities

Goal: To develop a register of CSIRO's potential capabilities and technology platforms in the security domain and to identify synergies across the organization. Areas of interest will include, but may not be limited to:

- Animal and human biosecurity – rapid diagnosis and treatment/isolation of disease.
- Plant biosecurity – detection, control, or eradication of exotic organisms, plant pests and diseases.
- Security devices – technologies to protect against identity and document fraud and counterfeiting.
- Critical infrastructure protection – development of threat detection technologies, materials and design, and risk-analysis modeling systems which facilitate the protection and damage minimization of dangers to critical infrastructure.

- Detection and sensing – improvement of first-line of defence detection technologies to better determine concealed items on people, in luggage or shipping containers, or behind walls; sensors for detection of toxic gases, bioreagents, drugs and explosives.
- Information management and analysis – development of new technologies to ensure Australia can build and manage secure, adaptable and integrated information systems to enable improved planning, intelligence gathering and analysis, resource deployment and communication.

Development of a one-CSIRO Security Business Plan

Goal: To identify areas of critical or near-critical mass in research capability and develop a plan or plans to leverage this expertise into the security domain, via cross-Divisional and external collaboration. At this stage, it is expected that the areas most likely to take this step in the near term are biosecurity, security devices and detection and sensing (with technologies that have possible counterterrorism, anti-crime or defence applications).

Establish CSIRO's Presence in the Security Domain

Goal: To increase CSIRO's visibility in security science with representation on appropriate policy and advisory bodies, submissions to Government reviews, and by ascertaining and meeting the needs of relevant Government Departments.



5.4 Australian Synchrotron

Coordinator: Dr Rod Hill (Acting)

Overview

The overarching goal is to strongly position CSIRO to support and benefit from the commissioning of Australia's first synchrotron in Melbourne in 2007. To this end CSIRO: has committed \$5 million to the foundation set of beamlines; is playing a major role in the design of five of the beamlines; and is developing a bid to be the operator / manager of the facility.

Of prime importance is the need to prepare CSIRO's researchers for "first light" at the synchrotron in 2007. To grow the necessary skills base, researchers need support to build their internal and external networks, and to work at overseas facilities.

Themes

Becoming the Operator / Manager of the Australian Synchrotron

Goal: To successfully bid to become the operator / manager of the Australian Synchrotron, adding to the suite of major national science facilities currently managed by CSIRO.

Staking a Claim at the Frontier of Synchrotron Science

Goal: To successfully bid for Synchrotron Science to be recognised and funded by CSIRO Corporate as an Emerging Science Area.

Maximum Access to the Beamlines

Goal: To capture the benefits of the Australian Synchrotron by achieving high rates of access to the beamlines.

Section 6: Agribusiness and Health Group

Group Executive: Dr Michael Eyles

Overview

The Agribusiness and Health Group serves two large and vital parts of the Australian economy, the agri-food and fibre industries and the human health sector. The Group's prime objectives are to enhance the global competitiveness and sustainability of agribusiness industries and to improve human well-being and community health by performing and applying world-class strategic research and providing high quality services. The Group is committed to pursuing these objectives through partnerships in the private and public sectors, both within Australia and internationally.

The Agribusiness and Health Group includes the following Divisions:

- Food Science Australia : A Joint Venture between CSIRO and the Government of Victoria
- Forestry and Forest Products (Including Ensis, our new Trans-Tasman Joint Venture)
- Health Sciences and Nutrition
- Livestock Industries
- Plant Industry

The Agribusiness and Health Group also includes two National Research Flagships:

- Food Futures
- P-Health

The Group is uniquely placed to provide outcomes for the target industries through initiatives that are integrated across the value chain, from farm or forest to consumer. The broad outcomes that we seek include:

- profitable production systems for agriculture and forestry that are best practice in terms of productivity and minimising adverse environmental and social impacts;
- high quality, differentiated and market-driven agri-food and fibre products;
- maintenance of access to export markets for Australian products; and
- high-impact technologies and products for preventative health, therapeutics and diagnostics, with emphasis on diseases associated with aging and lifestyle.

Key Lessons Learnt in 2003-2004

The establishment of the Food Futures and P-Health Flagships has revealed a variety of cultural, systems, and organisational issues that must be resolved if Flagships are to have the maximum impact. We have accordingly learned a variety of lessons about matrix management in our environment that are now being incorporated into our operations. These include the need for clear definition of roles and responsibilities, various changes in project management and the need for more effective organisational support for Flagship Directors, particularly in business development.

We examined CSIRO's portfolio in health-related research with the Health Sector Advisory Council and began a strategic dialogue with this SAC. Some health research is conducted in most Divisions. With two exceptions, health research has generally been driven from within Divisions that have seen opportunities to apply their capabilities or intellectual property to health. The exceptions are the Division of Health Sciences and Nutrition and the P-Health Flagship Program, which were specifically established to address health issues. Hence, CSIRO's health-related activities have not been driven

holistically by a strategy developed for the Health Sector; many initiatives have been opportunistic. It appears likely that we would have a greater impact if we adopted a more integrated approach. We will work with the Sector Council on priorities, and more effective integration, during the coming year.

The Agribusiness Sector Advisory Council requires some realignment. The Council has made useful contributions, but the diversity of industries that are represented has made strategic conversations that engage the whole Council difficult. The effectiveness of the Council can be improved by reassessment of the scope of the Council and its interfaces with other external groups, particularly other Sector Advisory Councils and joint venture Boards. Appropriate adjustments will be made in the coming year.

A new Food Science Australia joint venture agreement was signed late in the year. The transfer of the approximately 70 Victorian Government staff in the joint venture to the CSIRO payroll is a key feature of the agreement. The transfer was completed late in the year without any significant staff issues arising. The transfer proceeded very smoothly because of the effort that was put into open dialogue with the staff during development of the agreement, good collaboration between corporate and divisional managers on legal, industrial and other issues, and a flexible approach to the transition of terms and conditions.

Significant Initiatives Planned for 2004-05

The further development of the Food Futures and P-Health Flagship Programs will be the highest priority, with particular attention to the development of partnerships with external organisations, refinement of the science focus of both Flagships, and a reduction in the transaction costs for Divisions associated with participation in Flagships.

Implementation of the two joint venture agreements signed in the last days of 2003-2004 will be an important focus. The new joint venture involving the Division of Forestry and Forest Products and Forest Research in New Zealand, now named Ensis, will be established. A complementary strategic direction will be implemented for the significant portion of the Division that will remain outside the joint venture. The new Food Science Australia joint venture agreement will also be put into action and the associated improvements in effectiveness and efficiency will be captured.

CSIRO's ability to operate across the agribusiness value chain, from farm to consumer, is one of the organisation's key differentiating features. This capability is particularly important in responding to the health, convenience and lifestyle drivers in the food industry. We will more effectively integrate research across the agrifood value chain, with particular attention this year to the interface between Food Science Australia and the Division of Health Science and Nutrition. Science assessment reviews of these two business units and the Division of Molecular Science will be conducted this year in a coordinated fashion to ensure that the science strategies are complementary and have appropriate connections.

All Divisions in the Group will have a strong emphasis on business development and commercialisation to continue the previous year's good growth in external income. The focus for one-CSIRO initiatives will be on selected rural research and development corporations and the ddRNAi RIPPER. We will consolidate and build upon last year's good progress in developing a new relationship with GRDC.

CSIRO has substantial expertise and investment in agricultural biotechnology. The public debate on biotechnology is continuing and most State governments have imposed moratoria on the commercial use of genetically modified crops. CSIRO has responded effectively to several individual issues in the public domain, such as the recent release of the results of farm-scale trials in the UK; however, we have not had an effective and integrated communication strategy on biotechnology issues for some time. The Biotechnology Strategy Group will work with the relevant Divisions and corporate Communications Group to develop and implement a strategy for a more appropriate public profile for CSIRO on biotechnology.

We will also work to reinvigorate relationships with the Commonwealth and State Government departments that are relevant to agribusiness. State departments concerned with primary industries perform a considerable amount of research and are very active in technology transfer. Several of these departments are undergoing major changes in structure and strategic direction. We have links of various kinds with the State departments; however we will seek more effective strategic engagement, with a particular focus on opportunities for joint planning of research and infrastructure. We will also implement more effective liaison with the Commonwealth Department of Agriculture, Fisheries and Forestry.

Alignment with CSIRO's Strategic Plan – A&H Group

Strategic Objective	Activity
1.1 Play a significant role in delivering on Australia's National Research Priorities	Maintain the present proportion of investment in research aimed at the goals of the National Research Priorities.
1.2 Build critical mass and ensure quality in our core research programs	Develop more effective cross-Divisional approaches to research across the agrifood value chain in areas including foods with specific health benefits. In consultation with the Health Sector Advisory Council, develop a strategic framework for health-related research across CSIRO. Focus investment in priority-driven research themes and eliminate areas with inadequate scale in all Divisions.
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Lead further progress of the P-Health and Food Futures flagships, with a focus on the development of external partnerships and investment in collaboration with Corporate BD&C. Explore opportunities for additional Group contributions to other Flagships.
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	Liaise with People Development group to pursue an organisation-wide approach to developing the "leadership bench" and the identification of staff with leadership potential.
2.3 Build our global recognition for science leadership in our chosen science domains	Maintain CSIRO's international position in agricultural, plant and animal sciences as measured by the ISI index.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Implement the new trans-Tasman joint venture in forestry and the new Food Science Australia joint venture agreement. Support the development of CRC bids in the 2004 round. Engage with change processes under way in State government departments relevant to primary industries with a view to enhancing relationships.
3.2 Service the needs of government for informed policy setting	Map government interactions across the Group and identify opportunities for improved interaction. Implement DAFF/CSIRO liaison group. Provide effective science input to policy development through vehicles including the Primary Industries Standing Committee, the National Food Industry Council, NHMRC committees, etc.
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. Establish a Biotechnology Policy Committee to take responsibility for biotechnology policy issues across CSIRO.
3.4 Partner with other agencies to advance Australia's global development contributions	Pursue a major grant from an international foundation in collaboration with Corporate BD&C.
4.1 Intensify engagement with RDCs to grow regional and new industries	Work with the Business Development and Commercialisation Group to grow engagement with priority RDCs (GRDC, AWI, one other) and increase revenues.
4.2 Structure deeper and more meaningful relationships with large	Grow engagement with CSIRO client service teams for large corporations.

CSIRO Operational Plan 2004-05

corporations	
5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research	In collaboration with the Environment and Natural Resources Group, develop greater integration of our agricultural and environmental research and achieve a more holistic approach to major sustainability issues.
5.2 Be among the best in governance, OHS&E and performance management processes	Achieve 100% rating on Positive Performance Indicators and continue building a positive OHSE culture across the group.
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Actively support the roll-out of the One-IT and libraries plans.
6.2 Proactively manage patent and equity portfolios to multiply IP-based revenue streams	Pursue licensing returns from ddRNAi RIPPER and reorient commercialisation of BarleyMax in collaboration with Corporate BD&C.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Reduce research support expenditure ratio through sharing of best practice between Divisions and engagement with Corporate efficiency initiatives.



6.1 Food Science Australia

Divisional Chief: Dr Alastair Robertson

Food Science Australia's researchers use specialized facilities to develop innovative food processes and safe, value-added products. A multi-disciplinary team of skilled people are committed to help make Australian food companies among the most competitive in the world.

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

Our core capabilities are:

- *Ingredients functionality {51.4 EFT}*
- *Integrated Food Safety {31.5 EFT}*
- *Food storage, distribution and packaging {23.2 EFT}*
- *Food processing, automation and sensing {34.8 EFT}*
- *Emerging technologies (high pressure, ultrasonics) {24.9 EFT}*

Theme performance and response – 2003-04

Theme: Integrated Food Safety

Goals:

To provide the scientific basis for the ‘Clean and Green’ image of Australian food products through the identification and proactive management of new and emerging food safety hazards and the development of technologies and tools for improving food safety risk management.

Progress

Annual Performance Goals	Achieved: 17	Delayed to 04-05: 1	Unachievable: 0
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Stream projects completed on time and within budget. Technology transfer projects were especially effective with good industry attendance at workshops and a good first year review to the Australian Food Safety Centre of Excellence, a joint initiative with the University of Tasmania that is funded by the National Food Industry Strategy.

Response

One project area was delayed because of breakdowns with the High Pressure Processing (HPP) kinetics unit. See action below in the Emerging Food Processing Technologies Theme

Theme: Emerging Food Processing Technologies

Goals:

To support the development and commercialization of at least two emerging non-thermal food processes within Australia by 2008 leading to a range of differentiated products and processes for export

Progress

Annual Performance Goals	Achieved: 32	Delayed to 04-05: 1	Unachievable: 3
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Pulsed Electric Field and High Power Ultrasonics (HPU) Streams largely completed on time and within budget. HPU commercial projects have been successful. HPU Stream has been refocussed to a

narrower range of application areas. The High Pressure Processing (HPP) Stream has identified good opportunities for exploration of IP arising from a link between packaging and HPP.

Response

Negotiations undertaken with equipment supplier to ensure that technical manuals and training received by Food science Australia staff on repair techniques for the HPP kinetics unit. Sale of the company supplying one specific ultrasonics device which subsequently terminated technical support for the unit effectively removed access to the technology for our program.

Theme: Food Processing and Sensing Innovation

Goals:

To develop new food processes leading to the commercialization of industrial separation processes for the manufacture of at least three classes of ingredients as well as scale up and commercialization of two new robotic food processing technologies by 2008.

Progress

Annual Performance Goals		Achieved: 18		Delayed to 04-05: 1		Unachievable: 1
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Theme completed on time and generally within budget. The Process Automation and Efficiency Stream experienced some budget overruns. The Theme has been very successful with strong involvement in the Food Futures and pHealth Flagships through the New Processing Systems and Support Stream. This Stream has also been very successful in capturing Food Innovation Grant funding from the National Food Industry Strategy.

Response

Focus on evaluation and Go/No Go decision on the commercialisation of the lactose technology within the New Processing Systems and Support Stream.

Theme: Food Storage, Distribution and Packaging

Goals:

To maximise the quality and safety of perishable foods to distant markets through an understanding of production and supply chain handling systems leading to adoption and improvement in efficiencies and the reduction of wastage and product rejection by up to 20% nationally and the commercialisation of at least one new active packaging technology by 2008

Progress

Annual Performance Goals		Achieved: 11		Delayed to 04-05: 1		Unachievable: 3
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This theme has a high percentage of commercial funded projects. Major initiative for IP generation in 'new refrigerated container'; design concepts progressing well.

Response

Negotiations continue for commercial support for tamper evident packaging. Three other packaging projects were abandoned due to lack of company support.

Theme: Ingredient Functionality

Goals:

To gain an understanding of the molecular basis of physical functionality of food ingredients leading to the development of at least two IP positions for novel technologies for the delivery of bioactives by 2008 as well as the development of differentiated ingredients allowing Australian producers to realise a premium in the market place.

Progress

Annual Performance Goals		Achieved: 21		Delayed to 04-05: 0		Unachievable: 3
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Theme has been successful in negotiating a more strategic focus to the co-funded Dairy Ingredients Group of Australia program. Successful involvement of the Delivery Technologies stream in the pHealth Flagship with 3 provisional patents arising from expansion of the core platform for microencapsulation.

Response

Appointment of new director for ACTP expected in August-September. Lupin project abandoned due to lack of commercial support. Talks continuing on integration of process control and product innovation – these could be influenced by National Food Industry Strategy Plans for a Centre of Excellence in food processing.

Research Themes – 2004-05

Food Science Australia is moving from a management structure based on five Platforms reflecting science discipline strength to a themed-mission driven structure reflecting the major drivers in the food industry. These Themes will serve as the delivery mechanisms to take our science disciplines to our clients.

The Themes relate to prediction and provision consistent of food quality whilst delivering competitive advantage through process efficiency; ensuring physiological needs are met through nutrition whilst capturing opportunities that emerge through the understanding of the linkage between food nutrients and components and the development of chronic disease states; and ensuring safety and fitness for purpose.

Processing Innovation and Food Quality (\$17.85m)

Goal: To improve food quality, eating satisfaction and manufacturing efficiency through innovation so by 2008 new manufacturing processes result in at least three new food products and/or ingredients for Australian and/or international markets, with at least two new dairy or meat derived bioactive ingredients patented, and improvement in efficiency of supply chain handling results in a consequent reduction in wastage and product rejection by 10% nationally.

Healthy Foods (\$8.63m)

Goal: To enhance the nutritional and physiological function of foods so that by June 2005: novel delivery systems are developed to deliver a range of bioactive components to specific portions of the human gastrointestinal tract, and peptide hydrolysates are isolated from four agrifood sectors and are evaluated for use as cardiovascular nutraceuticals.

Integrated Food Safety (\$8.39m)

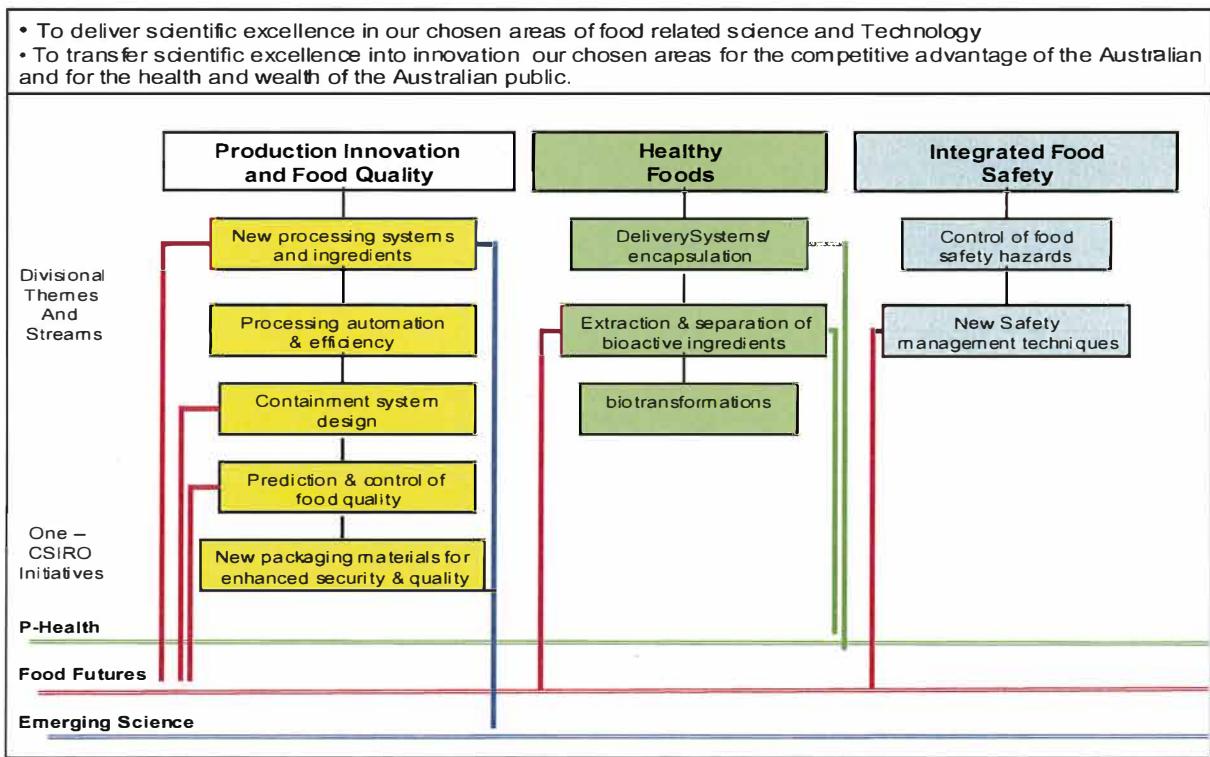
Goal: To control food hazards through integrated food chain intervention. By 2006 the key hazards/issues to be addressed include: standardization of bacterial challenging testing in foods and bacterial stress response to HPP and acid environs; mycotoxins -ochratoxin A in wine and Alternaria in grains; emerging hazards – Enterbacter sakazakii in dried infant powders, allergens in foods; and methods developed for a non-thermal gene amplification and non-animal botox test

Other Initiatives***Capability Building (\$4.47m)***

During 2004-04 FSA is giving priority to extending capability in separations technology, novel encapsulants, biopolymer science in relation to ingredients functionality and food quality/performance and capture processes for bioactive components from food and food waste. New capability is being

developed in microbial functional genomics as means of underpinning our work in microbial food safety and food spoilage.

Divisional Alignment Diagram



Resourcing – Food Science Australia

Note: Revenue and expenses shown here are for the Joint Venture. Due to Joint Venture accounting not all revenues and expenses are included in CSIRO's accounts.

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
20,741	39,340	231

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	3,320
Major Cross Divisional Programs	0
Emerging Science	330
Core Divisional Research	35,690
Total Expenses	39,340

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	13,600
Strategic R&D [Co-Investment]	21,490
Consulting and Services	3,885
Licensing and Exploitation of IP	365
Total Expenses	39,340



6.2 Forestry and Forest Products

Divisional Chief: Dr Paul Cotterill

Forestry and Forest Products' research improves the management and productivity of the nation's forests and the quality and value of forest products. Our core capabilities are:

- Asset Protection {16.8 EFT}
- Forest to mill {19.2 EFT}
- Forests of tomorrow {40.2 EFT}
- Growing plantations {35.4 EFT}
- Mill to market {36.7 EFT}
- Sustainable Futures{21 EFT}

Theme performance and response – 2003-04

Theme: Wood Quality Solutions

Goals:

To improve the value recovery from harvested timber resources - develop a suite of tools and technologies that link wood properties with wood value by 2008, with at least 50% industry uptake by 2010.

Progress

Annual Performance Goals	Achieved: 20	Delayed to 04-05: 8	Unachievable: 0
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Several activities are behind schedule due to the focus on initiating and commencing the Joint Venture with NZ Forest Research. Additionally budget adjustments indicate that some progress on delivering new tools/systems (SilviScan) must be delayed until next year. The focus on standing tree stiffness measurement has also diminished with the commercial availability of a reasonably performing tool. Overall the projects within the Theme are still on target and should achievement significant outcomes in the next 12 months.

Response

Standing tree stiffness focus has been taken over by Wood Quality Initiative Ltd, and thus our own investment in the area has been reduced. C-FFP retains some expertise in this area, but on a much smaller scale. Budget adjustments have resulted in the delivery of SilviScan systems being delayed until mid 2005 rather than end 2004 as indicated in the APGs.

Theme: Precision Plantation Solutions

Goals:

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

Progress

Annual Performance Goals	Achieved: 20	Delayed to 04-05: 5	Unachievable: 0
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Work this year has produced prototypes of a range of products, and has started to see industry uptake of theme outputs. Problems or delays in securing funding have held up a few APGs, however these should be on track and funded by the end of 04-05.

Response

Developing competition from private sector development may necessitate some refocussing of effort or re-evaluation of route to market for some products such as the LIDAR toolbox. Market analyses en-train may further indicate re-evaluation of focus. End of 04-05 will be time of major refocus with clear indication of those able to deliver by theme completion date.

Theme: Development of Improved Germplasm and Breeding Decision Support Tools**Goals:**

Increase by 50% the end-use value per hectare of plantations established from 2008 onwards compared with existing Eucalyptus pulp wood plantations in Australia. (End-use value per hectare is defined as: growth; survival; strength; stiffness; specific gravity; and, adhesive properties). The market target is replanting the existing Eucalyptus pulp wood plantation estate.

Progress

Annual Performance Goals	Achieved: 20	Delayed to 04-05: 7	Unachievable: 0
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Stream 1: Solid progress was made with the theme objectives for commercial plantation forestry with the definition of species, target environments and traits. The commercial marketing report for relevant germplasm was completed but recommended that this venture is two years premature. Total income from seed sales dramatically exceeded expectations with good markets eventuating for the tropical acacias and also from the recently mature orchards in Victoria.

Stream 2: The germplasm for CEF Stream has made significant progress during the last 12 months. It was decided that CSIRO will pursue research into short-rotation forestry systems, which it is pursuing cooperatively through the CRC for Plant Base Management of Dryland Salinity. Success in breeding long-rotation trees for the southern Australian sheep-wheat belt is expected to built upon with a new project (developed in cooperation with Queensland State Government) targeting Queensland's dry, summer rainfall zone scheduled to start during 2004. Work on propagation for CEF species is also expected to commence once new Queensland facilities have been fully commissioned.

Stream 3: Resources in stream 3 was shifted to stream 1and 2 project. The Division made a strategic decision to relocate funds for C-QG project into projects of other streams. Therefore, one research APG "Database for storing and retrieving pedigree genetic data identified or developed" and one Engagement APG "Data pre-process package DataPlus updated including automated genetic parameters estimation and a pedigree assembler based on pedigree structure for BV prediction" associated with the project were deleted.

Response

Due to the C-QG (CSIRO Quantitative Genetics) initiative not taking off, two APGS in stream 3 have been deleted as the APG was unachievable without the full strength of CSIRO behind it.

Theme: Firepak**Goals:**

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.

Progress

Annual Performance Goals		Achieved: 9		Delayed to 04-05: 3		Unachievable: 0
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Progress is on track with the following exceptions: Fire observers handbook – funding will come from the Bushfire CRC in the new financial year; Report on WA fire info to Eastern Aus. – delayed due to fire enquiries and consulting work and the absence of a key collaborator but components have been included in CRC fire reporting; Preliminary guidelines for aerial suppression – delayed due to CRC start-up and post-doc appointment process – report due in time for submission to national aerial suppression strategy discussions in September.

Response

The ramp up to full activity in the CRC is continuing with additional appointments to be made a new project on grassland curing in NZ commencing. Additional time will need to be allocated to obtaining full return from the WA experimental fires. This will be worked into our Bushfire CRC commitment.

Theme: Smart Products

Goals:

By 2008, develop a minimum of 14 new products and technologies for the Australian paper-making, wood preservation, wood composites and value added wood products industries which add value and diversify product ranges by:

- Reducing product manufacturing costs
- Improving product performance
- Reducing product and processing environmental impact

Progress

Annual Performance Goals		Achieved: 18		Delayed to 04-05: 6		Unachievable: 1
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Steady progress has been achieved in all streams in 2003-2004. The project portfolio has been actively managed, with some projects stopping and others starting in response to specific opportunities. The completion of several projects has been delayed due to unavailability of resources.

Response

Substantial focussing of resources into priority areas will occur in 2004-2005. The formation of the Joint Venture (Ensis) will assist with this process, as all areas of research within the theme are contained within the Wood Processing & Products and Pulp, Paper & Packaging business units. These areas are currently under review.

Theme: Commercial Environmental Forestry

Goals:

By 2007, develop a toolbox that will make low rainfall farm forestry profitable.

Progress

Annual Performance Goals		Achieved: 10		Delayed to 04-05: 10		Unachievable: 3
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Overall strong progress given that Theme largely dependent on signing of a major contract with DAFF – delayed until Oct 03. Given the short time frames several significant outputs have been produced, eg identification of target areas for joint environmental and economic benefit in case study catchment. Good progress this year has lead to large funding support from collaborators for the next two years, including DAFF, WfHC Flagship, DPI Vic, and Forest Industries. Collaboration across divisions has

been a strength of this Theme. Yellow lights were due mostly to delays in contract signing and will be achieved in 04-05.

Response

All three projects under 'red lights' were peripheral to the main thrust of the Theme and dependent upon acquiring additional external funds. Two of the projects will be abandoned, and the third will be supported by others funds that have now been secured.

Research Themes and Other Initiatives – 2004-05

On July the 1st around half of CFFP's science delivery capability will become part of the new Joint Venture with New Zealand Forest Research. The three themes (see below) that are to be managed from the JV will undergo a process of alignment with the similar investment programs in Forest Research to identify synergies and refocus these as appropriate. It is expected that discussions with Forest Research will progress during 2004-05 such that a significant component of the Precision Plantation Solutions theme will be rolled into the JV. It is also expected that we will seek opportunities for creating synergies between the Commercial Environmental Forestry theme and related themes in the Environment and Natural Resources Group.

Themes managed from the JV

Wood Quality Solutions (\$2.769m)

Goal: To improve the value recovery from harvested timber resources - develop a suite of tools and technologies that link wood properties with wood value by 2008, with at least 50% industry uptake by 2010

Improved Germplasm (\$5.458m)

Goal: Increase by 50% the end-use value per hectare of plantations established from 2008 onwards compared with existing Eucalyptus pulp wood plantations in Australia. End-use value per hectare is defined as: growth; survival; strength; stiffness; specific gravity; and, adhesive properties. The market target is replanting the existing Eucalyptus pulp wood plantation estate

Smart Products (\$5.329m)

Goal: By 2008, develop a minimum of 25 new products and technologies for the Australian paper-making, wood preservation, wood composites and value added wood products industries which add value and diversify product ranges by: reducing product manufacturing costs; improving product performance; reducing product and processing environmental impact

CFFP Business Units (\$2.016m)

Goal: To deliver established CFFP technology and services to industry stakeholders. Three of the four CFFP Business Units are managed from the JV.

Themes managed from CFFP

Precision Plantation Solutions (\$3.469m)

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.

Commercial Environmental Forestry (\$3.091m)

Goal: By July 2006 develop a toolbox that demonstrates scenarios for profitable farm forestry in low rainfall zones.

FirePAK (\$2.679m)

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.

CFFP Business Units (\$1m)

Goal: To deliver established CFFP technology and services to industry stakeholders. One of the four CFFP Business Units is managed outside the JV.

Other CFFP Initiatives (\$10.109m)

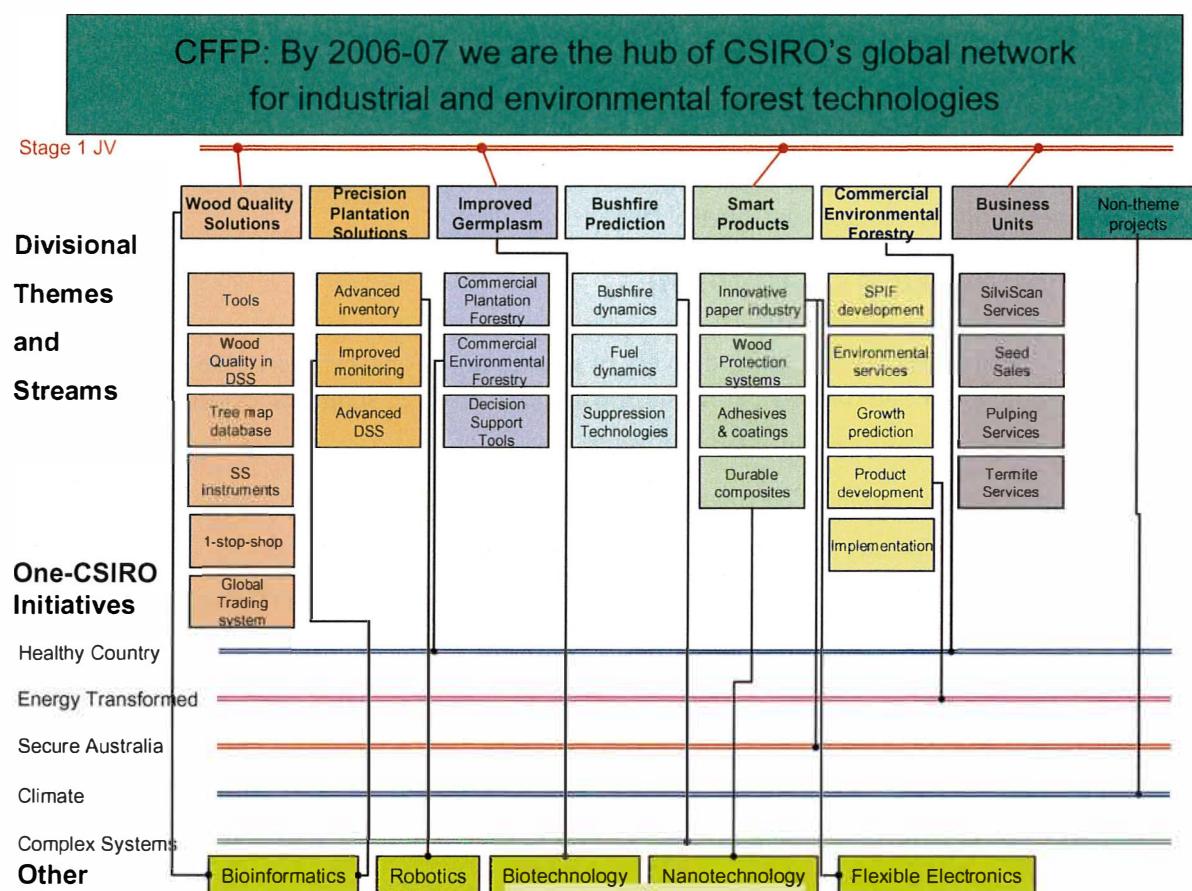
In addition to the JV start-up, CFFP will start implementation its Regional Development Strategy in 2004-2005. This involves expanding the delivery of science in regional centres of the forestry and forest products industry and forming partnerships with other research suppliers and industries.

The other major non-Theme activities in CFFP are focused on:

- Completing the Sustainable Production Forestry CRC.
- Delivering on forestry related global aid activities.
- Participating in the Climate MXDA, particularly on the role of trees and wood in greenhouse gas mitigation.
- Delivering a wide range of research services to the forestry and forest products industry.

These activities are both in the JV and CFFP areas, but mainly in CFFP.

Divisional Alignment Diagram



Resourcing – Forestry and Forest Products

Note: Revenue and expenses include the proposed Joint Venture. Due to Joint Venture accounting not all revenues and expenses are included in CSIRO's accounts.

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
18,944	35,383	212.8

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	1,180
Major Cross Divisional Programs	1,470
Emerging Science	1,555
Balance	31,625
Total Expenses	35,830

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	5,415
Strategic R&D [Co-Investment]	21,735
Consulting and Services	8,412
Licensing and Exploitation of IP	268
Total Expenses	35,830



6.3 Health Sciences & Nutrition

Divisional Chief: Dr Graeme Woodrow

Health Science and Nutrition's research improves human health and well-being by:

- establishing the health benefits of food, developing dietary strategies and by providing leadership in nutrition-related research
- developing pharmaceutical and biological drugs and diagnostic technologies
- partnering locally and internationally with food, diagnostic and pharmaceutical industries and providing input to government agencies involved in health policy

Our core capabilities are:

- Health potential of food {66 EFT}
- Protein Engineering, Protein Structure determination and Drug design {75 EFT}

Theme performance and response – 2003-04

Theme: Prevention, Diagnosis and Treatment of Human Cancer

Goals:

To contribute to the reduction in human cancer burden by having, by 2008:

- Four novel dietary approaches and technologies developed
- At least one new diagnostic technology commercialised
- One new therapeutic agent in clinical development.

Progress

Annual Performance Goals		Achieved: 10		Delayed to 04-05: 7		Unachievable: 0
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The long term goal (to 2008) is on track with the majority of goals being met. Progress has been delayed in the area of dietary approaches through delays in receiving food grade product from the manufacturer to be used in human intervention trials. In the diagnostic area the goals for 03-04 have proven to be ambitious but all projects are expected to deliver in the next 12 months. In the therapeutic area good progress has been made in relation to EGFR whereas difficulties around expression of IGFR antagonists have delayed proof-of-principle experiments.

Response

The strategic direction for the division has resulted in the development of new themes for 04-05. All of the projects within this theme will continue but will be allocated to new themes and will continue towards their long term goals.

Theme: Substantiation of Health Benefits of Foods and Functional Foods

Goals:

To add value to the Australian community and the Australian food industry by:

- Clinically assessing the health attributes and consumer acceptance of at least 30 food products and technologies by 2008.

Progress

Annual Performance Goals		Achieved: 15		Delayed to 04-05: 2		Unachievable: 2
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Industry involvement in 03-04 has assisted in moving towards achievement of the goal for this theme. The health benefits of 6-8 food products have been assessed or are in the process of being assessed. Progress is also being made in the search for new bioactive compounds in food in plants and dairy products. Consumer acceptance of novel foods and technologies has been recognised as important and this work has been included as a theme in the Food Futures Flagship.

Response

All of the projects in this theme will continue in the new themes developed for 04-05 but the decision has been made to focus on obesity and obesity-related conditions.

Theme: Prevention and Treatment of Diabetes**Goals:**

Help arrest the increase in diabetes and obesity by:

- Development and introduction of a clinically substantiated long term weight control strategy by 2008.
- Progressing an insulin receptor-based therapeutic into clinical development by 2008.

Progress

Annual Performance Goals		Achieved: 7		Delayed to 04-05: 4		Unachievable: 0
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Good progress has been made in relation to development of a clinically substantiated long term weight control strategy. The development of the CSIRO Wellbeing Diet has attracted much attention from the public and the media. Progress in the obesity and exercise stream (which equates to a Federation Fellowship) is still hampered by the lack of freedom-to-operate in this area. Good progress has been made around building an IP portfolio in the stream addressing insulin receptor-based therapeutics.

Response

The weight control research will form a stream in the new theme related to Health Benefits of Food and will seek industry and public good funding. The emphasis on the Obesity and Exercise stream is on drug development and will be transferred, together with the insulin receptor research, to the new Rational Drug Design theme.

Theme: New Nanotechnology Platforms**Goals:**

To develop four new platform technologies that improve human health through the diagnosis and treatment of disease by 2008 and to exploit these technologies in conjunction with industry.

Progress

Annual Performance Goals		Achieved: 15		Delayed to 04-05: 4		Unachievable: 1
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The longer term goal to develop platform technologies is on track with significant progress being made in 03-04 in the development of array technologies. Progress has been made in the Nanoscale Molecular Design Stream but the projects in this stream are diverse and in a number of cases under resourced. The Diagnostics stream is on target and in the case of projects in the CRC for Diagnostics is working with commercial partners to develop new technologies. The work in this stream in relation to IL-6 receptor is not yet at the stage of approaching commercial partners.

Response

The streams on Biochips and on Diagnostics have been transferred to the new Protein-based Diagnostic Technologies theme. The projects under Nanoscale Molecular Design have been re-assigned to the new themes as appropriate giving more focus. The Ecdysone receptor project will not be achieved because of the need for input of expertise through collaboration. This was not achieved and the project has been suspended.

Research Themes – 2004-05

HSN is moving from a structure based on six research programs which related to discipline areas to a structure based on themes and streams which will align with corporate thinking and facilitate reporting. The four themes in 03-04 were:

- Prevention, diagnosis and treatment of human cancer
- Substantiation of health benefits of foods and functional foods
- Prevention and treatment of metabolic diseases, especially diabetes
- New nanotechnology platforms

Through this change in structure we aim to facilitate greater integration of our research effort and in making these changes we have re-aligned our research into three themes (shown below). We have integrated our nutrition research from three separate small programs into a single theme focused on obesity and obesity-related conditions (e.g. diabetes and cardiovascular disease) since this is a major issue facing Australia in the future. In addition, we have brought together our diagnostic and drug design (therapeutics) projects under two specific themes. Some projects which no longer align with the current divisional themes are grouped under “other initiatives”. These projects contribute to Flagship themes or ESA initiatives and despite being grouped in this way for administrative purposes continue to have the full support of the division.

Dietary & Lifestyle Strategies for the Control of Obesity & Obesity-related Conditions (\$7.86m)

Goal: To develop three well validated alternative total dietary and exercise packages to prevent and treat obesity by 2008 and substantiate the dietary benefit of four novel functional foods in 2004-05. By integrating our laboratories, animal and human clinical capabilities, we are able to develop and test the efficacy and safety of dietary and exercise strategies and their impact at the genetic, physiological and clinical levels. We also will test functional foods designed by industry partners to have impact on obesity or on the complications of obesity (e.g. cardiovascular disease and colon cancer).

Protein-based Diagnostic Technologies (\$6.74m)

Goal: 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. Protein engineering and proteomics approaches will be applied to the development of high affinity reagents, to the discovery of new biomarkers of disease and to the development of biochips.

Rational Drug Design (\$8.99m)

Goal: By 2010, have one New Biological Entity (NBE) and one New Chemical Entity (NCE), based on Insulin, IGF-1, EGF and IL-6 receptor targeted therapeutics, in clinical trials. The impact on metabolic disease, cancer and/or inflammatory disease will be based on the application of our protein engineering, protein structure determination ad drug design capabilities in partnership with biotechnology and pharmaceutical companies.

Flagship/ESA Initiatives outside Divisional Themes (\$3.86m)

P-Health:

Colorectal Cancer Theme Goal: To contribute to the reduction in colorectal cancer incidence by 10% and increase survival from around 63% to 70% by 2020 through prevention and early diagnosis. HSN will contribute by determining the role of butyrate as a protective agent and through the assessment of barriers to uptake of colorectal cancer screening and development of mechanisms to increase uptake of colorectal cancer screening by consumers.

Food Futures:

Breed Engineering Theme Goal: To apply breed engineering to boost the product value of Australia's animal-based food industries by \$350M for beef and by \$550M for seafood by 2013. HSN will contribute by developing methods to measure genetic stability in bovine spermatogonial stem cells.

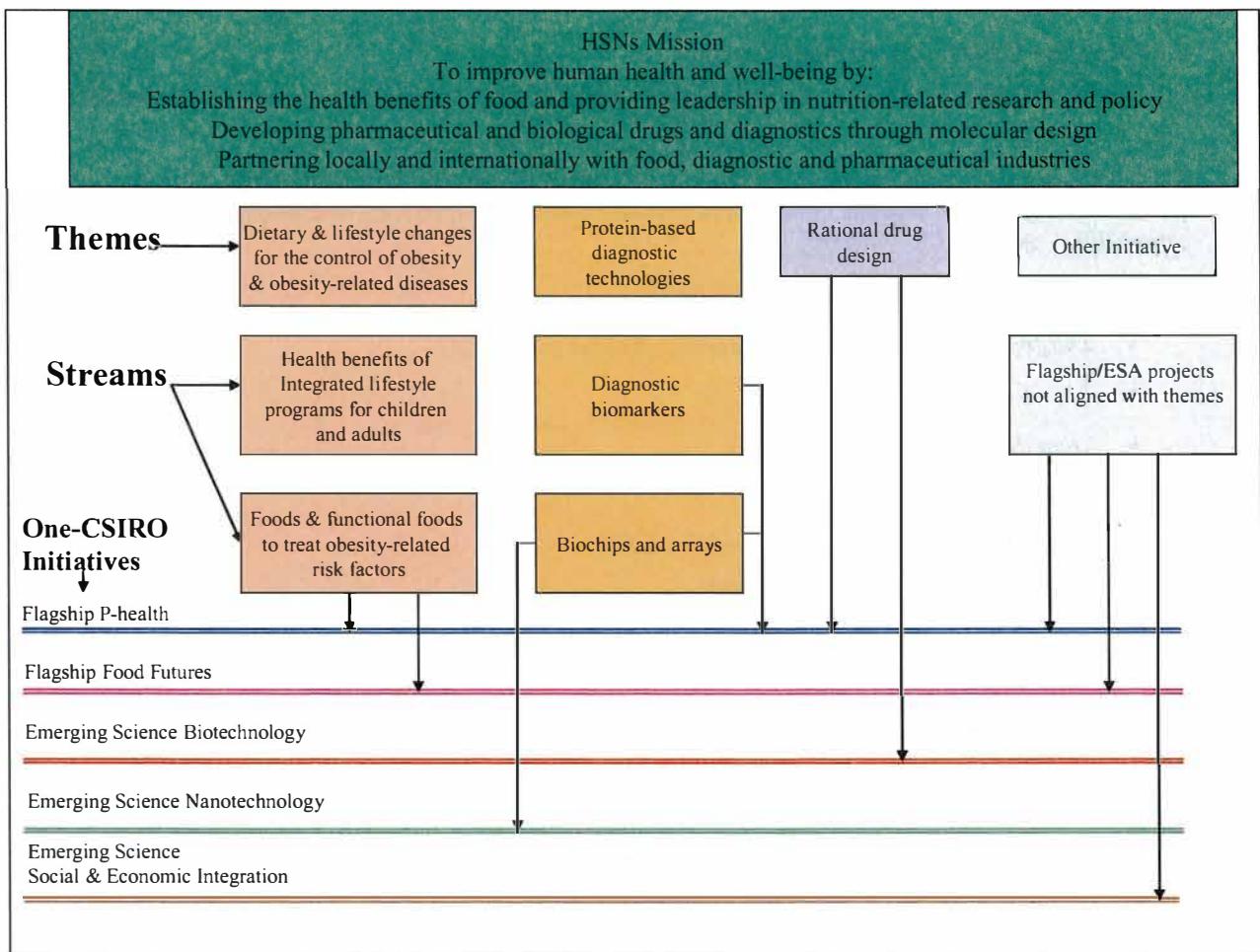
High Pressure processing Theme Goal: To apply non-thermal processing to create a new Australian industry generating \$350M sales of "preserved-fresh" foods for global convenience markets by 2013. HSN will contribute by determining the nutritional properties of fruits and vegetables after high pressure processing.

Advanced Genetics Theme 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. HSN will contribute by identifying the regiospecific distribution of omega-3 fatty acids required in triglycerides of high omega-3 canola for optimal human nutritional benefit.

ESA Social & Economic Integration : Environmental and Investment Decision Analysis.

Goal: HSN will undertake a literature review to inform development and testing of a tool that can be used in environmental decision making involving lay stake holder groups.

Divisional Alignment Diagram



Resourcing – Health Sciences and Nutrition

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
21,612	27,700	183.6

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	11,138
Major Cross Divisional Programs	-
Emerging Science	1,003
Core Divisional Research	15,314
Total Expenses	27,455

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	16,155
Strategic R&D [Co-Investment]	9,150
Consulting and Services	2,150
Licensing and Exploitation of IP	0
Total Expenses	27,455



6.4 Livestock Industries

Divisional Chief: Mr Shaun Coffey

Livestock Industries develops technologies for novel products, new production options, improved production efficiency, disease control and product quality for livestock and allied industries. Our core capabilities are:

- Exotic disease preparedness {59 EFT}
- Diagnosis and prevention of endemic disease {115 EFT}
- Livestock management {67 EFT}
- Genetic Development {31 EFT}
- Post genomic science {31 EFT}
- Market driven consumer demand {54 EFT}
- Advanced reproduction {14 EFT}
- Mammalian Biology {45 EFT}

Theme performance and response – 2004-05

Theme: Improve the Environmental and Social Impact of Livestock Production Systems

Goals:

- Develop innovative and profitable livestock systems with beneficial environmental and social impacts.
- Quantify and improve livestock well-being and reduce potential for disease in intensive and extensive husbandry systems.
- Develop technologies to reduce methane emissions while improving livestock productivity.

Progress

Annual Performance Goals	Achieved: 15	Delayed to 04-05: 3	Unachievable: 1
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The majority of goals have been achieved in this theme; those that have not been achieved primarily reflect a change in industry priorities and timelines.

Response

Animal welfare is a growing issue for industry and a number of our stakeholders have now released action plans in this area. These actions plans have provided a focus point for CLI activities in the area and we have fundamentally realigned our portfolio over the last year to reflect this.

A major growth area in this theme over the next year will be in the area of ensuring food safety, to reflect increasing consumer concerns with a particular emphasis in on-farm aspects of food safety.

Resources have been reallocated from our work on methane abatement to enhancing on farm productivity.

Theme: Improve Livestock Productivity

Goals:

- Develop enhanced breeding and selection techniques to increase disease resistance, productivity and product quality appropriate to the various production systems.
- Develop new feedstuffs and improve feed utilization in ruminants.
- Develop and refine decision support tools that enhance livestock performance and optimise management of the production system's resources.

Progress

Annual Performance Goals	Achieved: 42	Delayed to 04-05: 10	Unachievable: 1
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Good progress has been made in the majority of objectives; those that have not been achieved to date involve new contracts for industry co investment that have been more difficult to negotiate than expected.

Response

In 04-05 we will be focusing our work in this theme to increase our impact and to reflect industry interests. The extended times to achieve contract sign off has been addressed by the appointment of key account managers at both a CLI and CSIRO level. CLI is putting more resource into key account management to try and speed up our execution.

Theme: Enhance Market Access for Australian Livestock Product

Goals:

- Maintain AAHL as a world-leading high microbiological security laboratory and the national reference laboratory for the diagnosis and control of exotic animal diseases.
- Extend national and international linkages that promote cooperative approaches to research on endemic animal diseases and exotic disease threats.
- Provide expert scientific advice and comment/appraisal on government policies and protocols relating to animal disease control.
- Develop and commercialise detection methods for managing animal health and assuring food safety.

Progress

Annual Performance Goals	Achieved: 17	Delayed to 04-05: 6	Unachievable: 1
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The majority of goals in this theme have been achieved in 2003-04 with reasonable progress made in each stream. With increasing public concern on food safety this stream will be realigned next year and will fall within our Environmental Sustainability and Social Acceptance Theme.

Response

Resources in some areas being shifted to other Themes to reflect change in demand and new opportunities. Increasing public and government concerns in the area of biosecurity, safeguarding trade and food supply represent a number of opportunities in this area.

The diagnostic component of the theme has separated from research and is a stand alone business unit offering services to both the private and public sectors. This has already benefited revenue collection, and will strengthen our focus of research in diagnostic technologies.

Theme: Designer Livestock and Products

Goals:

- Lead Australia's efforts to capture the benefits of international genome sequencing initiatives in livestock species.
- Develop whole of life cycle farming systems and genetic improvement and health management strategies for commercial aquaculture species.
- Develop advanced reproductive technologies to underpin more rapid genetic improvement.
- Deliver innovative feeding and management systems to deliver meat and dairy products to tight market specifications.

Progress

Annual Performance Goals	Achieved: 31	Delayed to 04-05: 8	Unachievable: 1
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Solid progress has been made in all streams, some activities in our flagship portfolio did not commence until later than originally anticipated.

Response

The international bovine genome initiative and our work on advanced reproduction continue to make CLI major players in these areas, and we will continue to support these initiatives with appropriation resources. Our experience with the international bovine genome initiative has generated a more confident approach to the investment and has generated a large measure of good will in the Australian and global investor community. We will seek other opportunities to maximise our impact as a result.

Research Themes – 2004-05

During 03-04 CLI moved from a science structure organized around seven site based programs into one of four themes, each addressing a major issue for Australia's livestock industries. The major driver of this reorganization was to increase the impact of our science by moving away from multiple small projects as our primary delivery vehicles towards larger more focused streams that have clear objectives, and the critical mass to deal with major issues. The drivers of change have been identified after extensive staff consultation and in response to stakeholder surveys, customer value surveys and invaluable feedback identified during the process of reappointment of the Chief.

The movement in research theme goals reflects a holistic approach to achieving our outcomes with an increased emphasis on understanding the complete animal, its production environment and the international market drivers in which our industries operate within.

To improve understanding, the four themes have been renamed following extensive consultation. In their new form the themes reflect an increasing focus on areas where research solutions will have major impacts, and have allowed some rearrangement of stream activity under themes to reflect progress in our research activities.

Achieving Environmental Sustainability and Social Acceptance (\$11.128)

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 re-design production systems to meet community expectations. Develop four technologies to contribute to resource sustainability in fragile marginal grazing lands or degenerated environment, or to enhance environmental quality in production environments in general.

Enabling Technology Innovation (\$9.925m)

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

Ensuring Product Integrity and Market Access (\$30.82m)

Goal: By 2008 improve Australia's disease risk management systems to progressively remove disease-related market-barriers to trade, and deliver enhanced on-farm productivity. Develop five new significant developments in key areas such as molecular diagnosis, epidemiology and vaccines.

Understanding and Transforming the Animal and its Products (\$21.5m)

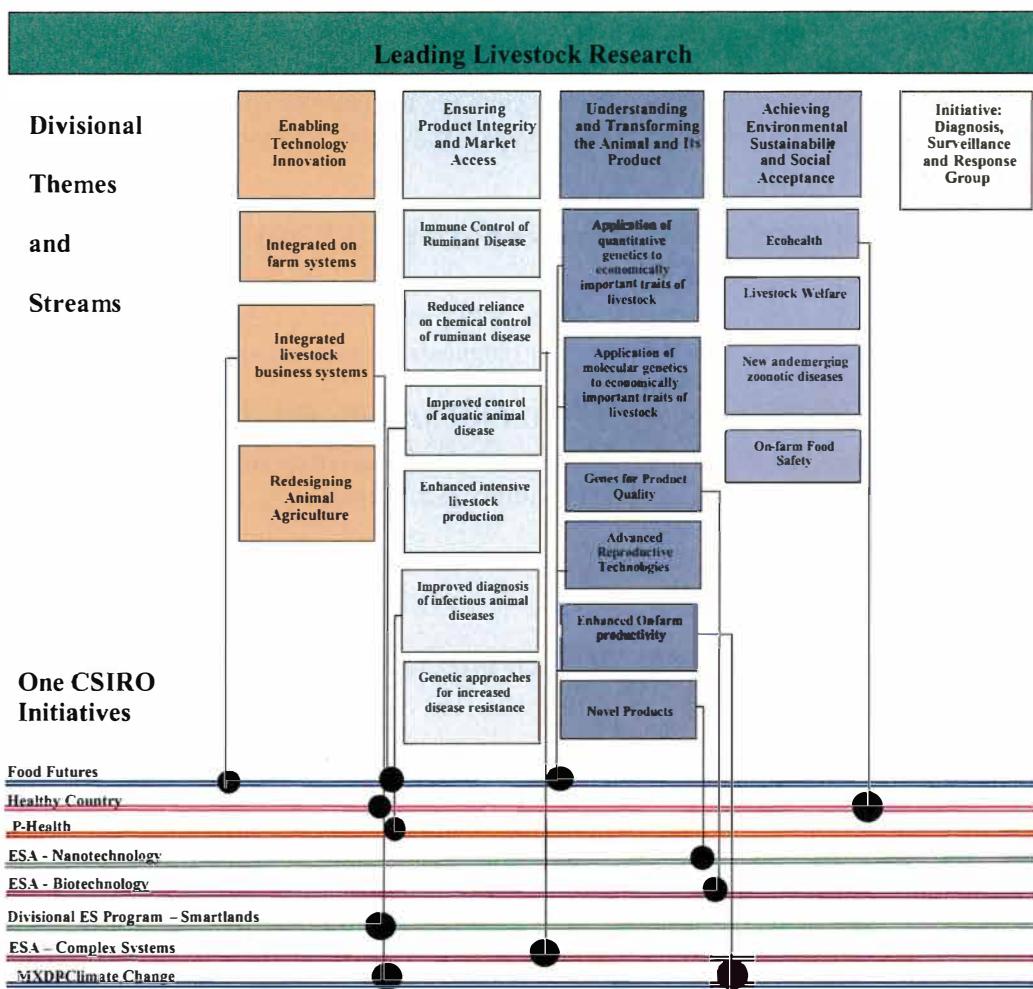
Goal: Utilize new and emerging capabilities in molecular biology, computational mathematics and bioinformatics to develop at least ten enhancements to animal performance and product quality and differentiation by 2008.

Other Initiatives

Diagnosis, Surveillance and Response Group (\$5.04m)

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

Divisional Alignment Diagram



Resourcing – Livestock Industries

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
51,943	78,814	646

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	6,737
Major Cross Divisional Programs	462
Emerging Science	3,486
Core Divisional Research	67,728
Total Expenses	78,413

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	9,857
Strategic R&D [Co-Investment]	61,108
Consulting and Services	6,448
Licensing and Exploitation of IP	1,000
Total Expenses	78,413



6.5 Plant Industry

Divisional Chief: Dr Jeremy Burdon

Plant Industry applies strategic research in the plant sciences to make Australia's agrifood, fibre and horticultural industries more profitable and sustainable, to develop novel plant products and improve natural resource management. Our core capabilities are:

- Gene discovery and utilisation {261 EFT}
- Host pathogen genetics {54 EFT}
- Nutritional modification of crops {61 EFT}
- Integrated crop management systems {142 EFT}
- Plant soil interactions {17 EFT}
- Biodiversity assessment {50 EFT}
- Organoleptics {13 EFT}

Theme performance and response – 2003-04

Theme: Advanced Gene Technologies for New Agricultural & Industrial Products

Goals:

Utilise the new platform technologies of functional genomics and bioinformatics to develop 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, development, and renewable industrial feedstocks.

Progress

Annual Performance Goals	Achieved: 35	Delayed to 04-05: 0	Unachievable: 0
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Solid progress was achieved in functional genomics and gene discovery, including flowering and rust avirulence genes, and full functioning of the CSIRO Bioinformatics Facility. All APGs were achieved without delays.

Response

A new Stream will be established in the area of industrial raw materials, related to Stream 3 in Theme 2, to reflect the breakthrough gene technologies emphasis in this emerging priority area. The Division has reviewed its bioinformatics effort to ensure that it delivers world-class capabilities.

Theme: Quality, Differentiated Food & Fibre for Health and Market Access

Goals:

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

Progress

Annual Performance Goals	Achieved: 27	Delayed to 04-05: 4	Unachievable: 0
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The Food Futures Flagship Program has contributed to further strengthening beneficial interactions with Health Sciences and Nutrition, Food Science Australia and Marine Research. The structure of the spin-off company Ascentia, to commercialise Barley Max, has been revised to focus on capturing new commercial opportunities in the health food market. Some APGs were delayed due to a combination of unfavourable seasonal conditions, disease and staffing delays.

Response

A shift of some of the more mature Alliance activities such as GrainGene into this Theme is foreshadowed from 2004-2005, in closer alignment with the objectives of this Theme.

Theme: Restructured Agriculture and Biodiversity Sustainability**Goals:**

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.

Progress

Annual Performance Goals	Achieved: 37	Delayed to 04-05: 8	Unachievable: 0
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Major GRDC funded programs were established during the year, although other Rural Industry R&D Corporations, in particular the Cotton RDC, found themselves under some financial stress due to the drought, and Australian Wool International remains problematic for management-related work in the Division. Despite the drought, most APGs were completed as scheduled.

Response

Divisional investment in areas of production sustainability and natural resource management was reviewed, and a new initiative related to larger-scale regional management in the high rainfall zones of southern Australia will be developed through the year. Biometrics capabilities will need reinforcement to ensure we capture the full benefit of complex field experimentation.

Theme: Partnerships for Global Agribusiness Development**Goals:**

By 2008 increase by 30% the value of major national and multinational corporation and publicly funded institution alliances aimed at the development of proprietary intellectual property for application in major crop improvement programs.

Progress

Annual Performance Goals	Achieved: 13	Delayed to 04-05: 2	Unachievable: 6
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The wheat and cotton alliances have either expanded or been consolidated through the year, although there were some difficulties in establishing certain delivery mechanisms through partnerships with commercial companies. Australian Wool International continues to have significant difficulties in contemplating funding of longer-term strategic production research, supporting only a small part of the Provisor proposal. The establishment of an Australian Wine Industry Alliance to promote greater interactions between the partners was deemed unnecessary in light of our current partnership with the Australian Wine Research Institute (Provisor) and the new Wine CRC and Food Futures Flagship.

Response

In 2004-2005 the Theme will embrace introduction of a Sugar Alliance with establishment of the Bureau of Sugar Experiment Stations Joint Venture, and the Sugar CRC. The Commercial Group has been more directly involved in the Annual Reviews of the Division's activities, and has identified a number of areas for further development in the coming year. We anticipate issuing a significant number of gene silencing licenses now that the relationship with Benitec has been formalised.

Research Theme – 2004-05

Theme 1 now incorporates a new Stream, Bioengineering for industrial raw materials, previously incorporated in Theme 2 Stream 3, to reflect the breakthrough science focus in this emerging priority area. Theme 2 now incorporates projects in the Graingene Alliance; previously in Theme 4 Stream 1, in close alignment with the objectives of Theme 2 and acknowledging the relatively mature nature of this Alliance. There is to be greater emphasis in Theme 3 on larger-scale regional sustainability and natural resource management research, and reinforcement of our capabilities in biometrics. Theme 4 will reflect a consolidation of high rainfall zone wheat, and cotton and grape alliances, also introduction of a sugar alliance and development of a new relationship with GRDC. The Australian Wool International Alliance, Prosper, has been put on hold for the time being.

Advanced Gene Technologies for New Agricultural & Industrial Products (\$17.78m)

Goal: Utilise the new platform technologies of functional genomics and bioinformatics to develop five 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, development, and renewable industrial feedstocks.

Quality, Differentiated Food & Fibre for Health and Market Access (\$36.27m)

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 and animal products having a uniquely Australian brand image, and with yield, nutrition, flavour and or health attributes tailored for specific domestic and export markets.

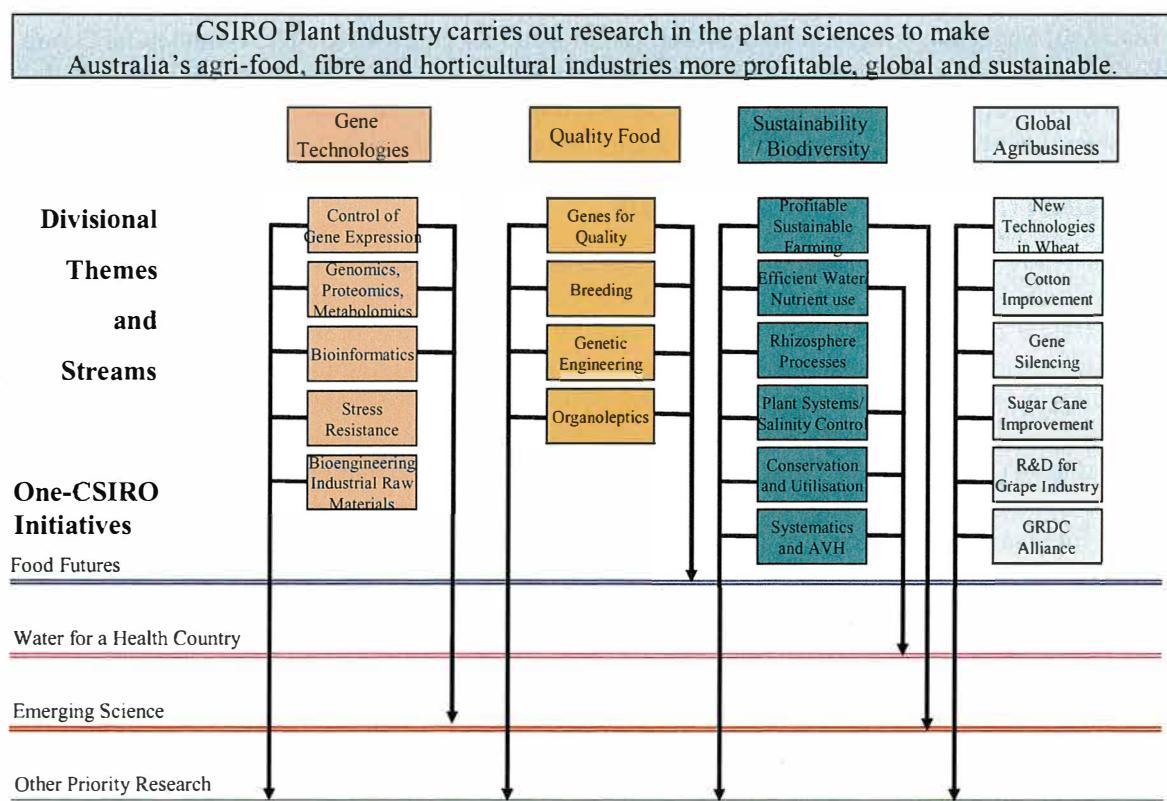
Restructured Agriculture and Biodiversity Sustainability (\$24.36m)

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.

Partnerships for Global Agribusiness Development (\$7.12m)

Goal: By 2008 increase by 30% the value of major national and multinational corporation and publicly funded institution alliances aimed at the development of proprietary intellectual property for application in major crop improvement programs.

Divisional Alignment Diagram



Resourcing – Plant Industry

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)*
47,332	85,942	764.8

* Includes staff of Black Mountain Library, Black Mountain Site Services and Cotton CRC Management (under Cost Centre 05) and some staff of the Australian National Botanic Gardens.

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	8,459
Major Cross Divisional Programs	911
Emerging Science	1,218
Core Divisional Research	74,933
Total Expenses	85,520

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	31,407
Strategic R&D [Co-Investment]	53,658
Consulting and Services	85
Licensing and Exploitation of IP	370
Total Expenses	85,520

Section 7: Environment and Natural Resources Group

Group Executive: Dr Steve Morton

Overview

CSIRO's ENR Group exists for two key purposes:

- to develop and share best practice in managing environmental research
- to develop and to apply leading edge environment and natural resources research which meets Australian needs and benefits Australia

Because environmental matters are pervasive in CSIRO, the core Group of environmental Divisions has many interactions across CSIRO and to the many collaborators beyond. Environmental research as a significantly public good activity interacts with and inputs strongly to policy development, public information and awareness as well as producing tools and technologies. The ENR Divisions are also active in building links with the private sector in the growing area of environmental industries and in meeting the needs for knowledge and practical solutions to environment and wider sustainability challenges in all sectors.

The ENR Group includes the following Divisions:

- Atmospheric Research
- Entomology
- Land and Water
- Marine Research
- Sustainable Ecosystems

The Environment and Natural Resources Group also includes two National Research Flagships:

- Water for a Healthy Country
- Wealth from Oceans

The entry for the Major Cross Divisional Program CSIRO CLIMATE, also managed from within the group, appears in Section 5.

Key Lessons Learnt in 2003-2004

The importance of Flagships in the Environment and Natural Resources Group grew in 2003-2004, in particular the recognition of the need for further effort to establish the Water for a Healthy Country and Wealth from Oceans Flagships as major contributions to the national R&D arena. Also in the cross-Divisional domain, the CSIRO Climate Program is beginning to re-establish impetus following the appointment of the new Director in early 2004 and following re-commitment by the Government to the Australian Greenhouse Office and its Climate Change Science Program.

The Environment and Natural Resources Divisions need to continue partnership building with Universities in a focused number of areas of science as one contribution towards growing our scientific capacities and international reputation. Ongoing discussions will continue with James Cook University, University of Queensland, Charles Darwin University, and other agencies where critical mass is needed.

The Environment and Natural Resource Management Sector advised us that CSIRO should continue to build science and business in the coastal zone, and urge us to consider the best means of achieving this objective.

Further effort is required to develop more comprehensive talent management across Divisions.

Lessons learnt from the Wentworth Group experience, as well as ongoing public and media interest in other environmental issues through 2003-04, indicate that a more proactive management of the Environment and Natural Resource Group's involvement in public debate around environmental issues is required.

While good progress to end subsidy of consulting was made in 2003-04, a continued effort is required to eliminate it in the Group.

External earnings in two Divisions (Land & Water and Entomology) have plateaued, and reconsideration of future science and business strategy is required.

Significant Initiatives Planned for 2004-2005

In the coming financial year the continued development of partnerships in science with the University of Queensland in Brisbane, with James Cook University in Townsville and Cairns, and with the Northern Territory Government and Charles Darwin University remains a priority, as does the development of an alliance with the Bureau of Meteorology in climate and atmospheric science. Plans are underway to relocate CSIRO Atmospheric Research from Aspendale to Clayton and these plans should be finalised in 2004-05.

The 2004-05 financial year will see the beginning of the new formal process of science review in CSIRO in which all Divisions will regularly review capabilities and scientific outputs. Entomology will be among the first group of Divisions to be reviewed.

Restructuring of the portfolio will take place in CSIRO Land and Water to focus and hone this important Divisions portfolio. Several of our Divisions, and the two Flagships housed within the Group, will develop a coastal zone initiative during the year.

We need to develop a more effective business model for environmental biotechnology research, most of which is in the Environment and Natural Resources Group. A review of this domain will be used in the upcoming financial year to reconstitute our portfolio, in consultation with the Biodiversity Strategy Group. Similarly, there is a need to consider our portfolio in farming systems R&D, and a review of this area will indicate how best to invest in this field.

The Environment and Natural Resources Group will increasingly aim at addressing the sustainability challenge from an Australian perspective. The science behind this challenge is likely to be built upon two fundamentals, namely systems approaches incorporating bio-physical, economic and social sciences, and an embedding of these systems approaches in real-world situations. To be at the leading edge of this challenge means completing a longer term strategic analysis for the ENR Group.

There is intense public and media interest in environment issues. It is vital that we develop proactive input to public debate around the numerous issues where Environment and Natural Resources science contributes to matters of national significance, and so we will be identifying issues where we wish to assist such discussion.

Alignment with CSIRO's Strategic Plan – ENR Group

Strategic Objective	Activity
1.1 Play a significant role in delivering on Australia's National Research Priorities	CSIRO's ENR research is closely aligned with the NRP "An Environmentally Sustainable Australia", and delivers to several other NRPs ("Strengthening Australia's social and economic fabric" and "Protecting Australia from invasive diseases and pests"). In particular, our two Flagships meet a number of NRP needs in a focussed way.
1.2 Build critical mass and ensure quality in our core research programs	The Complex Systems Science and the Social and Economic Integration Emerging Science initiatives build mass and quality in key environment-related areas. ENR Divisions are further focusing their efforts in environmental biotechnology and farming systems work in order to remain competitive in these research areas.
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Water for a Healthy Country and Wealth from Oceans Flagships are well established activities for ENR and other Divisions.
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	CSIRO climate research occurs across more than 10 Divisions and has numerous potential applications. The CSIRO Climate Program is a major cross Divisional activity designed to harness our capabilities in climate variability, climate change, greenhouse gas emissions, and climate modelling.
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	CSIRO's ENR Group has instituted a coordinated approach to developing potential senior leaders and now is extending that approach to leadership development at all levels of the Divisions.
2.2 Optimise delivery of all research activities by improving project management	Ensure adherence to PMI.
2.3 Build our global recognition for science leadership in our chosen science domains	CSIRO environmental research has been objectively rated as world leading (ISI), a position which will continue to be developed.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Particularly through our Flagships, ENR Divisions will drive a strong portfolio of active partnerships with universities, government agencies and CRCs. Our CRC portfolio will be closely aligned with strategic intent and new CRC bids carefully targeted.
3.2 Service the needs of government for informed policy setting	ENR effort is devoted to systematic representation by CSIRO staff-members at Standing Committees and their Working Groups, on Inter-Departmental Committees, and on numerous ad hoc committees. Together with a broad informal network of input to government policy discussions, this fact-based service aims to meet Government need in a timely fashion.
3.3 Enhance communication to raise public and stakeholder excitement and trust in science	The Group is working to retain, and extend the high public recognition and trust in outputs from CSIRO's environmental research.
3.4 Partner with other agencies to advance Australia's global development contributions	The ENR Group is building its extensive global networks in environmental and sustainability science including, for example, through the Global Research Alliance.
4.1 Intensify engagement with RDCs to grow regional and new industries	The ENR Group contributes to CSIRO's goal of increasing business with RDCs, especially in terms of better resource management, a

	keystone of regional prosperity.
4.2 Structure deeper and more meaningful relationships with large corporations	Continue to develop client relationships and R&D business with the environmental industry sector.
4.3 Accelerate the growth of promising technology-based SMEs	Continue developing relationships with SMEs in areas such as environmental remediation, agricultural systems and aquaculture.
5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research	ENR Divisions lead CSIRO investments in Complex Systems Science and in the interaction of knowledge systems inherent in CSIRO's Social and Economic Interactions science initiative
5.3 Adopt a unified approach to dramatically improve service and grow top accounts	Participate in client service teams in fields such as environmental remediation and management, and in climate applications.
6.3 Deliver customer value for money and eliminate subsidisation in consulting services	ENR Divisions will eliminate all subsidies in consultancies.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	ENR Divisions will work closely with the Corporate Operations Group to identify and realise savings opportunities.



7.1 Atmospheric Research

Divisional Chief: Dr Greg Ayers

Atmospheric Research conducts research into climate and weather, air quality and health, and atmospheric observations. It provides world-class scientific advice and solutions on issues such as air pollution, climate change and variability, ozone depletion and wind resources. Our core capabilities are:

- Climate and Weather Prediction {39 EFT}
- Air Pollution Assessment {24 EFT}
- Global Atmospheric Change Assessment {25 EFT}
- Environmental Monitoring and Natural Resource Management {12 EFT}
- Emerging Capability: Earth Systems Science Applications {5 EFT}
- Emerging Capability: Model-Data Fusion for Natural Resource Management Applications {3 EFT}

Theme performance and response – 2003-04

Theme: Climate and Weather

Goals:

Major outputs are tools for weather and climate prediction and methodologies for climate impact assessment that can lead to strategies for adaptation to variations in weather and climate. The outcome for Australia is minimisation of climate and weather-related risk, and enhanced capacity to respond to impacts of future climate change. This work will deliver better natural resource management, particularly for Australian agriculture and water resources, with additional contributions to the built environment, energy management and banking and insurance industries.

Progress

Annual Performance Goals		Achieved: 47		Delayed to 04-05: 6		Unachievable: 1
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All major goals achieved (one minor engagement goal did not eventuate). Particularly strong performance in climate impacts, weather applications, and wind energy. There have been some delays due to the complexity of the science, and the complexity of negotiating partnerships and clients (and in one case, over commitment). A major engagement achievement has been the ongoing (and renewed) relationship with the Australian Greenhouse Office.

Response

A strategic review during the year confirmed our focus on weather and climate applications, climate impacts and wind energy resource assessments, underpinned by strategic research on climate model development and validation. Efforts in geophysical fluid dynamics have ceased. Strategic model development allied to Wealth from Oceans, and delivery to clients on climate assessments via Water for a Healthy Country were also confirmed.

Theme: Air Quality and Health

Goals:

Major outputs of this work are novel methods to assess the risks of personal exposure to air pollution, building on our expertise in pollution measurement and air quality assessment, modelling and

prediction. Delivery is to both government and business and industry. Outcomes for Australia will be improved health, quality of life and amenity for our citizens and reliable Australian data essential to underpinning effective strategies for ongoing minimisation of the health effects of air pollution.

Progress

Annual Performance Goals	Achieved: 29	Delayed to 04-05: 2	Unachievable: 2
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The large majority of goals were achieved, but complex negotiations on a major prospective project in WA have had a negative impact on a number of commitments. The short-term nature of externally commissioned work has as a consequence that goals require to be adjusted during the year. Increased engagement with health professionals is proceeding to plan.

Response

A strategic review during the year resulted in a refocussing effort, resulting in a reduction in cloud physics experimental work, and in pollution dispersion theoretical work. Further development of the Bayside Air Quality Station was put on hold. Our strategic intent to strengthen the 'air quality and health' interface was confirmed, and a new project pursued with the p-Health Flagship.

Theme: Atmosphere and Earth Observation

Goals:

Major outputs are measurements of atmospheric and Earth surface properties and processes that are essential for natural resource management and for reducing uncertainty in climate change and global/regional greenhouse gas emissions. Research underpins national and regional policies on greenhouse gas mitigation. The outcomes for Australia and the international community are national and global environmental protection, contributions to climate change assessments and reduced uncertainty about future climate change.

Progress

Annual Performance Goals	Achieved: 62	Delayed to 04-05: 8	Unachievable: 0
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All major goals were achieved. Some goals have faced slight delays, but can be delivered in the near future. There still is a need to strengthen stakeholder engagement, and we need to continue to explore opportunities for flagship involvement.

Response

A strategic review during the year concluded that global work on greenhouse gas observations should be focussed on the Southern Hemisphere and the Australian region, and that the level of activity in greenhouse gas modelling may have to be reduced as a consequence of relatively low level of stakeholder interest. Overall the greenhouse gas observations and modelling teams were asked to increase the level of external support. Earth observation work at Aspendale was also identified for a more focussed effort, aligned more closely with the work of the Earth Observation Centre in Canberra. The appointment of a Head of COSSA, with half-time business development role for the EOC should strengthen external support for (and uptake of) this work. Research on the biosphere, greenhouse gas sources and sinks and land air interaction was confirmed to be of long-term strategic interest.

Research Themes – 2004-05

The Division's executive team carried out a **Strategic Review** early in 2003-2004. This had three significant outcomes:

- A number of peripheral activities, judged to be not central to the Division's mission, were closed down, resulting in a **stronger focus** on the main goals of the Division's three Research Themes.
- The three Research Themes were confirmed as being appropriate vehicles for achieving the Division's mission.. The themes complement each other, and all three contribute to delivering against National Research Priorities, to Emerging Science and to Flagship outcomes. The Division is also a major contributor to, and participant in, a Major Cross-Divisional Program, CSIRO CLIMATE.
- At the work-level, there will be a further shift towards **stronger strategic alliances** on the one hand (on climate model development with CMR and the Bureau of Meteorology, on links with health professionals in air pollution, and on social and economic integration in climate impacts and for greenhouse gas life-cycle assessment), and on the other hand a **stronger regional applications focus** (in weather applications, in personal exposure to air pollutants, and in greenhouse gas observations).

Climate and Weather (\$9.39m)

Goal: Development of tools for weather and climate prediction and methodologies for climate impact assessment that can lead to strategies for adaptation to variations in weather and climate. Applications geared to minimisation of climate- and weather-related risk and delivery of enhanced capacity to respond to impacts of future climate change 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.

Air Quality and Health (\$4.17m)

Goal: Development of novel theoretical and observational methods to assess the risks of personal exposure to air pollution. Delivering enhanced health, quality of life and amenity for our citizens through the provision of reliable Australian air quality data and assessments and procedures essential to underpinning effective strategies for ongoing improvements in environmental health.

Atmosphere and Earth Observation (\$10.46m)

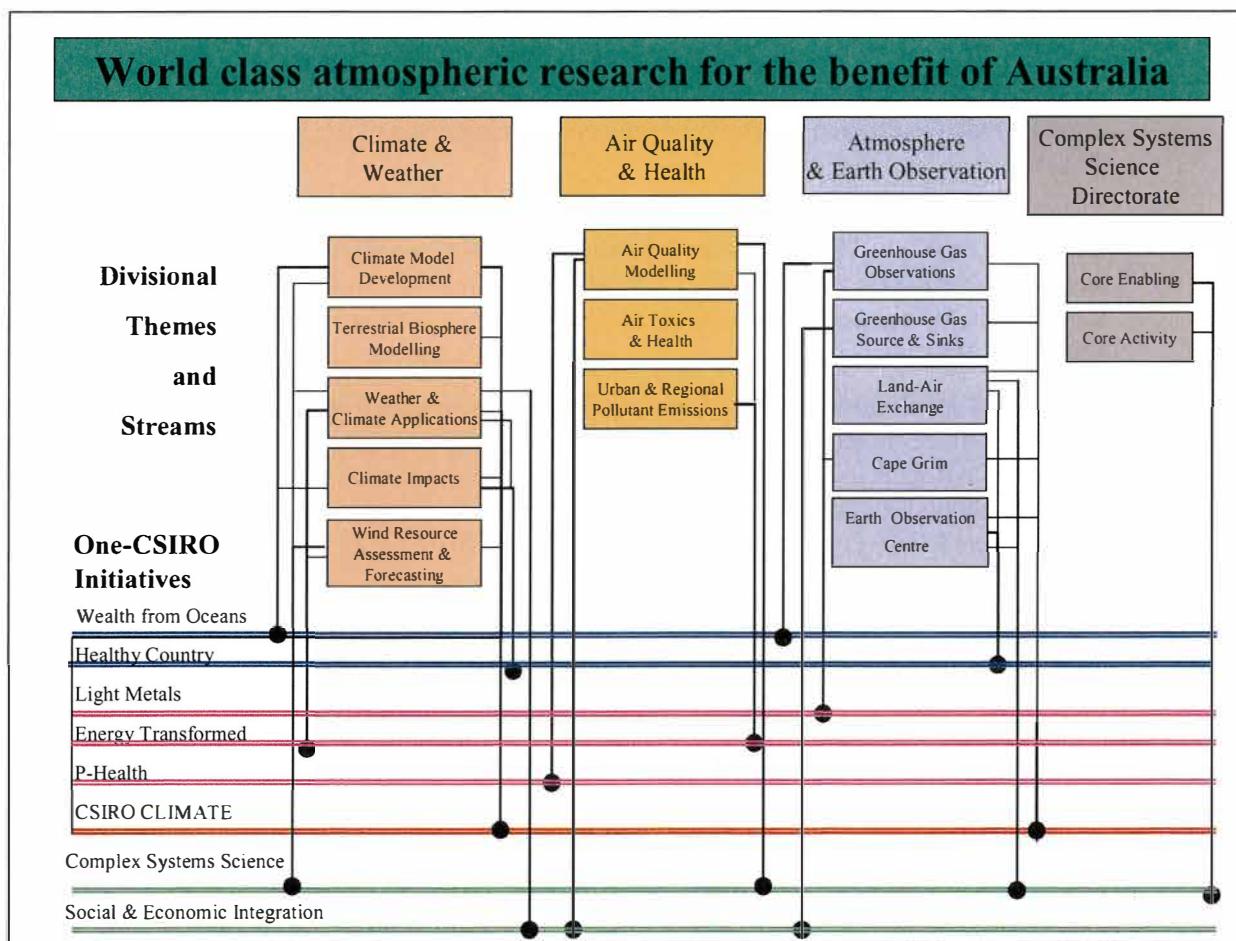
Goal: Observations of atmospheric and Earth surface properties and processes that are essential for monitoring, modelling, predicting and managing natural resources, climate variability and change, and global and regional greenhouse gas emissions. Application of this science base to underpin national and regional policies by government, business and industry on sustainable natural resource management, responses to climate variability and change, and greenhouse gas mitigation.

Other Initiatives

Complex Systems Science Directorate (\$1.61m)

The Division hosts the Directorate for Complex Systems Science – playing a coordination and enabling role, promoting a one-CSIRO approach to Complex Systems Science. The CSS projects in CAR are integrated with the Division's strategic science activities and carried out (and accounted for) under the Themes.

Divisional Alignment Diagram



Resourcing – Atmospheric Research

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
15,761	24,286	149.1

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	4,160
Major Cross Divisional Programs	15,731
Emerging Science	2,401
Core Divisional Research	3,333
Total Expenses	25,626

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	7,531
Strategic R&D [Co-Investment]	15,121
Consulting and Services	2,847
Licensing and Exploitation of IP	126
Total Expenses	25,626



7.2 Entomology

Divisional Chief: Dr Joanne Daly

Entomology generates economic, social and environmental benefits for all Australians through its research into invertebrates and weeds and their management. It achieves this in partnership with industry and the community. Our core capabilities are:

- *Plant Biosecurity Solutions {80.45 EFT}*
- *Invertebrate Species Interactions {32 EFT}*
- *Invertebrate Biodiversity and Evolution {23 EFT}*
- *Discovery and Use of Invertebrate Molecular Pathways {39.65 EFT}*

Theme performance and response – 2003-04

Theme: Biosecurity

Goals:

- Provide a scientific framework for characterising risk and risk assessment so that biosecurity risks can be efficiently and effectively assessed.
- Provide primary producers with knowledge and tools for managing biodiversity risks at the farm and whole-of-industry scale.

Progress

Annual Performance Goals	Achieved: 4	Delayed to 04-05: 1	Unachievable: 1
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Tools and knowledge were delivered as in the theme goals, including two software packages that were commercialized with an Australian software SME. Nevertheless, we became convinced that this theme needed to be better integrated with other themes and with external agencies (Strat. Plan 3.1, 3.2).

Response

Specific actions taken are:

- To increase collaboration with universities, and better service the needs of government in agricultural biosecurity, we are playing a lead role in a new CRC for Plant Biosecurity; we have also negotiated a shared appointment in the economics of biosecurity with ANU.
- Biosecurity continues as a stream with increased effort through refocusing of related activities.
- Activities formerly contributing into the biosecurity theme now deliver into two larger themes focused on protecting agriculture and natural resources.

Theme: Product Protection

Goals:

- As the leading provider of stored product and termite management solutions, expand our position in product protection generally, with initial emphasis on soil and timber fumigation
- Deliver new commercial products in grain aeration and fumigation and create international linkages with research institutes and commercial entities for development and commercialisation of new product protection products
- Create a national centre of expertise in aroma-sensing technology for grain quality applications.

Progress

Annual Performance Goals	Achieved: 10	Delayed to 04-05: 0	Unachievable: 1
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Progress in the theme has been satisfactory. Work has been stopped on one APG: “Compile and submit a registration package for carbonyl sulfide (as a replacement for phosphine) to the Australian Pesticide and Veterinary Medicines Authority”, which relates to the second theme goal, “Deliver new commercial products...” Registration was shelved as a result of the Dec 2003 meeting of the COS commercialization committee, which was attended by CSIRO, GRDC, and the Australian Bulk Handling Companies.

Response

We have put in place measures to increase the strategic fit of activities in this theme through a better integration with market trends. This theme will be combined with the Product Protection and Biosecurity Themes to create a single larger theme that focuses on securing agriculture from biological threats and that is better aligned with national priorities.

Theme: Bioindustries

Goals:

- In association with Orica, develop enzymes for remediation of organophosphates produced during industrial processes in the horticulture and wool industries
- Evaluate the merits of utilising insects, microbes and associated invertebrates as models to develop biological pathways for development of value added raw materials in conjunction with other researchers, and industry.

Progress

Annual Performance Goals	Achieved: 13	Delayed to 04-05: 1	Unachievable: 1
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Progress satisfactory. One APG under the second Theme goal (above) will have to be addressed in 04-05: “Identify 3-5 developable lead series”.

Response

We aim to accelerate work on identifying 3-5 lead series in 04-05. Here, a focus on other higher priority activities meant that project commencement was delayed in 03-04.

Another objective was discontinued following discussion with BD&C: “Complete capital raising for spin-off Entocosm Pty Ltd.” The company was unsuccessful in raising capital and has been wound up, with CSIRO exiting from the activity.

Theme: Plant Protection

Goal:

Develop resources and methodologies for protection of Australian food, feed and fibre crops against the major insect pests and selected diseases and weeds through:

- identify key components of insect lipi-proteins, pesticidal proteins and peptides
- identification and validation of novel insecticide targets
- improved understanding of the biochemistry of insect-host plant interactions
- improved methods for management of insecticide resistance

Progress

Annual Performance Goals		Achieved: 21		Delayed to 04-05: 1		Unachievable: 0
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Progress satisfactory.

Response

This theme will be combined with the Product Protection and Biosecurity Themes to create a single larger theme that is better aligned with national priorities and focuses on securing agriculture from biological threats.

Theme: Natural Resource Management

Goals:

- Provide knowledge to manage exotic species affecting natural environments and tools and knowledge to assess and manage risks of other incursions
- Develop novel tools and techniques in NRM such as bioinformatics and molecular diagnostics for environmental health
- Develop underpinning knowledge on insect fauna and biodiversity.

Progress

Annual Performance Goals		Achieved: 30		Delayed to 04-05: 2		Unachievable: 0
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Satisfactory progress. The year has been dominated by the change management required to redirect our efforts into the Water for Healthy Country Flagship. We have refocused staff from activities in forest entomology, soil biodiversity and the ANIC to commence a new better integrated activity on terrestrial biodiversity and ecosystem services, in partnership with Plant Industry and Sustainable Ecosystems, all delivering into the Flagship.

Response

Two streams had the same APG: "Redesign the weeds science portfolio in the Division". Significant progress has been made but this has not yet been completed because of significant initiatives in the external arena, including a Senate Inquiry into invasive species that may result in changes to the funding base for weed research. We will complete this APG in 04-05 to create a new research activity with a systems-based approach to plant invasions.

Research Themes – 2004-05

After review of our capabilities and research portfolio in 03-04, we have focussed our research into three themes (reduced from five in 03-04) that are more closely aligned to the national priorities of safeguarding Australia by protecting our agricultural, natural and managed ecosystems from invasive pests, thus contributing to an environmentally sustainable Australia, and to build and transform

Australian industries by stimulating the growth of Australian based industries based on innovative technologies.

The “Securing agriculture against biological threats” theme encompasses our contributions to the Food Futures Flagship, and we will be recruiting new research staff (3 EFT) into the high priority research activities associated with biosensor technologies. In addition, we are playing a lead role in a new CRC for National Plant Biosecurity proposal (5 EFTs). The “Protecting ecosystem function, biodiversity and water quality” theme has been reshaped and includes new priorities set by the Water for a Healthy Country Flagship, and we are recruiting new research staff into this area (2 EFTs). The “Developing innovative bio-industries” theme will see the greatest growth with on finalisation of our commitment to two major joint ventures in 04-05 (net increase of >10 EFTs). In total it is anticipated that the number of research staff in the division will increase by a minimum of 20 EFTs in 04-05, significantly boosting our ability to contribute to flagship, emerging science and national priority goals.

Securing agriculture against biological threats (\$14.73M)

Goals: In major joint ventures with the grains, cotton and horticultural industries, develop new technologies to protect and build export markets. Research focus:

- Develop novel biosensors to monitor quality in the supply chain to meet consumer demand for higher quality and safety in food, improving international competitiveness.
- National framework adopted for detection, preparedness and response to invasive species.
- Increased profitability and sustainability of crop production through enhanced protection and storage technologies.

These technologies will support high value export growth and import replacement, as Australian agriculture increasingly moves to higher intensity production and higher value crops, maximizing quality and profitability.

Protecting ecosystem function, biodiversity and water quality (\$13.62M)

Goals: Determine the role of insects and other invertebrates in supporting sustainable natural, rural and urban environments. Research focus:

- Quantify the role of invertebrate biodiversity in ecosystem function, and develop landscape scale options for ecosystem protection and reconstruction.
- Build the knowledge base to enable the management of invertebrate biodiversity in regional sustainability.
- Develop invertebrate information systems to support the management of nationally important species and ecological communities.

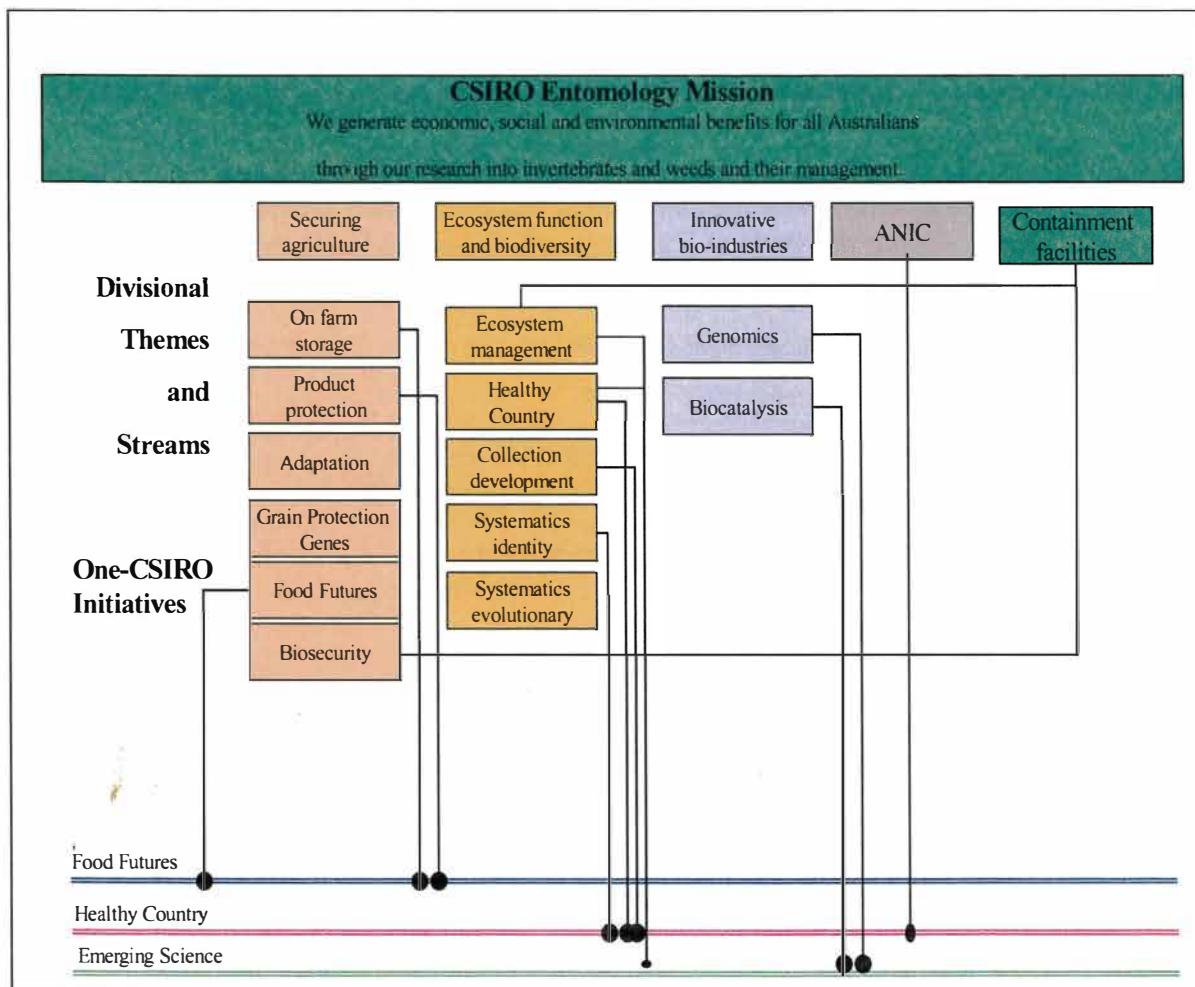
This research will provide the science base for triple bottom line sustainability of Australia’s natural and agricultural ecosystems, manufacturing and urban environment.

Developing innovative bio-industries (\$7.75M)

Goals: In partnership with the private sector and selected rural industries, we will develop new products and businesses while contributing to regional development. Research focus:

- Develop, in association with industries, biological pathways and products for remediation of environmental contaminants.
- Evaluate the merits of utilising insects, microbes and associated invertebrates as models to develop novel pathways for industrial process to support emerging bioindustries.

Divisional Alignment Diagram



Resourcing - Entomology

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
19,864	36,177	246

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	3,449
Major Cross Divisional Programs	0
Emerging Science	324
Core Divisional Research	32,315
Total Expenses	36,088

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	12,723
Strategic R&D [Co-Investment]	22,432
Consulting and Services	555
Licensing and Exploitation of IP	378
Total Expenses	36,088



7.3 Land and Water

Divisional Chief: Dr Rob Vertessy

Land and Water seeks to develop innovative solutions to Australia's land and water management challenges, with the aim of delivering options to policy makers and land and water managers that are economically viable, socially acceptable and environmentally sustainable. Our core capabilities are:

- Sustainable Integrated Catchment Management Systems {EFT: 89.2}
- Urban Water Resources Assessment {EFT: 8.2}
- Sustainable Land Use Systems {EFT: 143.5}
- Environmental Contamination Risk Assessment {EFT 52.4}
- Environmental Prediction, Monitoring and Reporting {EFT: 52.6}

Theme performance and response – 2003-04

Theme: Water Allocation & Quality

Goals:

- Predictions, methods, models, guidelines, social assessments and policy advice on surface and groundwater management and allocation for different users in water utilities and the irrigation industry
- Guidelines for restoration of aquatic ecosystems and environmental flow demands
- Development of management strategies for water bodies to minimize contamination and algal blooms.

Progress

Annual Performance Goals	Achieved: 43	Delayed to 04-05: 2	Unachievable: 1
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Most goals have been achieved, with good progress on all APGs bar one relating to a study of water balance of a large inland swamp, which could not go ahead due to restructuring within a partner organisation. We have delivered various reports to inform this area of major national debate, including water use in the Murrumbidgee and integrating climate impacts with decision making. Water allocation and quality is a national research priority, remains an issue of major national debate, and will continue as an area of high priority.

Response

This area delivers to a national research priority and to Water for a Healthy Country and the CSIRO Climate Program. It has strong engagement with national and international partners including the UNESCO HELP program and continues as planned as a high priority. Some shifts of emphasis are anticipated in 04-05 in response to opportunities, with more emphasis on environmental flows. Increased emphasis will also be placed on water security in the Murray Darling Basin and water quality in the Great Barrier Reef catchments. This will largely be achieved through Water for a Healthy Country projects.

Theme: Urban Water Reuse

Goals:

To provide the research that will create Australia's water-smart cities of tomorrow. New systems understanding and technologies will improve water use efficiency at various scales (household, suburban, city and catchment); enable increased reuse of waste water, and improve understanding of societal attitudes to differing water allocation and water use scenarios.

Progress

<i>Annual Performance Goals</i>		<i>Achieved: 18</i>		<i>Delayed to 04-05: 3</i>		<i>Unachievable: 0</i>
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Most goals have been achieved, with good progress in all streams. We have delivered reports on water reuse to inform this area of major national debate. Some extra staff were devoted to this area in 03-04. The Divisional executive recognises the need to more adequately resource this area.

Response

This area delivers to a national research priority and into Water for a Healthy Country, and continues as planned as a high priority, though with modest resources. We seek to increase this area through engagement with partners, particularly through the National Water Initiative. We propose to confer with other divisions including CMIT, DET and CSE to coordinate a one-CSIRO response to seizing very attractive research opportunities in the urban water domain. We believe the division should direct much more resources into this area in 05-06, following some detailed planning and organisation.

Theme: Land Use Options

Goals:

- Guidelines and methodologies for land managers providing new land use options which are sustainable in terms of catchment, soil, groundwater and economic and social factors
- Engineering solutions for salinity control
- Advice to governments on impacts of landscape and climate change in temperate and tropical environments.

Progress

<i>Annual Performance Goals</i>		<i>Achieved: 52</i>		<i>Delayed to 04-05: 5</i>		<i>Unachievable: 0</i>
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Most goals have been achieved, with good progress in all streams. We have worked with growers and delivered various reports and tools for sustainable agricultural practices. These include precision agriculture, the provision of real-time information on soil water conditions in the field, and catchment assessment and revegetation strategies to balance productivity and salinity control.

Response

No major change of direction was undertaken in 03-04, though one stream APG was refocussed to align better with the Water for a Healthy Country urban node. This theme delivers to major national initiatives (including the National Action Plan on Salinity and Water Quality), to three flagships (WfHC, WfO and Food Futures) and the emerging science areas, and to a range of industry partners including the GRDC. It remains a high priority. In 04-05, some shifts in emphasis are planned to increase focus and partner engagement. Salinity research is anticipated to focus at the implementation (small area, as opposed to synoptic large area) scale. Landscape systems work will be refocussed and integrated with other streams and themes and tropical land and water work will be brought into this theme. The refocussing will be influenced by the review of strategy currently ongoing.

Theme: Environmental Contamination

Goals:

New guidelines based on assessment of risk from contamination, including impacts on ecological systems and human health, and development of inexpensive technologies and clean-up options.

Progress

<i>Annual Performance Goals</i>	Achieved: 29	Delayed to 04-05: 2	Unachievable: 1
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Although grouped under a single theme, this area covers both environmental contamination work and natural resources management triple-bottom-line research. Both parts of the theme showed good progress, with most goals being achieved. Major deliverables include: on the environmental contamination side, the patenting of a mineral bioleaching bacterium, leading to commercial prospects now under development; and, on the triple-bottom-line research side, the provision of information for the major national debate on water issues. One failed APG was a correction to under-resourced work on groundwater and contaminants in the Douglas Shire, with the goal being reduced to match what was achievable with available resources.

Response

This theme delivers into the National Research Priorities, and to Water for a Healthy Country and emerging science, and so remains a priority area for the division. It has been redefined in 04-05 into two themes, to reflect the difference between the environmental contamination work and natural resources management triple-bottom-line research. This will provide a clearer focus and engagement with partners. The direction of research in the tropics has been internally reviewed and will be refocussed to provide more integration (with partners) of hydrology, ecology and oceanography to examine land / ocean interactions and impacts on the reef, and more triple-bottom-line integration.

Research Themes – 2004-05

Our themes all align strongly to national research priorities, and to major national programs such as the National Water Initiative and the National Action Plan on Salinity and Water Quality. They are also well aligned with flagships, particularly Water for a Healthy Country, and emerging science, particularly Social and Economic Integration. We therefore retain in 04-05 the broad priorities from the 03-04 themes, with theme goals revised to reflect greater focus on outcomes, and a greater focus on major issues such as water security in the Murray Darling Basin and water quality in the Great Barrier Reef catchments.

One theme (Environmental Contaminants in 03-04) is now split into two (Environmental Contamination, and Triple Bottom Line Land and Water Management Options). The tropical land and water stream will be refocused on integrated science and has been moved to the Land Use Options theme to provide greater alignment with similar work.

As previously indicated, the division is currently reviewing strategy and program alignments. Our objective is to bring our themes and streams into closer alignment with our management structure during 2004-05.

Water Allocation and Quality (\$16.02m)

Goal: Integrate knowledge and reduce uncertainty in the predictions of environmental flows, water use, irrigation efficiency, groundwater / surface water interactions, and the impact of climate change and variability on water. This will assist Australia to improve in five years by twenty percent at a national level the economic, social and environmental outcomes of water use. This will occur through improved allocation and whole of water cycle management based on the application of improved scientific methodologies and enhanced social and economic evaluation.

Urban Water Re-use (\$1.48m)

Goal: Integrate knowledge on water reclamation and reuse technologies, including aquifer storage and recovery, with research into biological safety and social acceptability of reused water. This will lead to greater re-use of urban water, with a target of twenty percent re-use on a national basis by the year 2010.

Land Use Options (\$25.78m)

Goal: To assess farm and land management options, including precision agriculture and native foods, that are economically and environmentally sustainable, that mitigate salinity risks, and that help protect the Great Barrier Reef by reducing sediment delivery from tropical coastal catchments. This will lead to management and policy options for the economic, social and environmental sustainability of Australia's farms and landscapes.

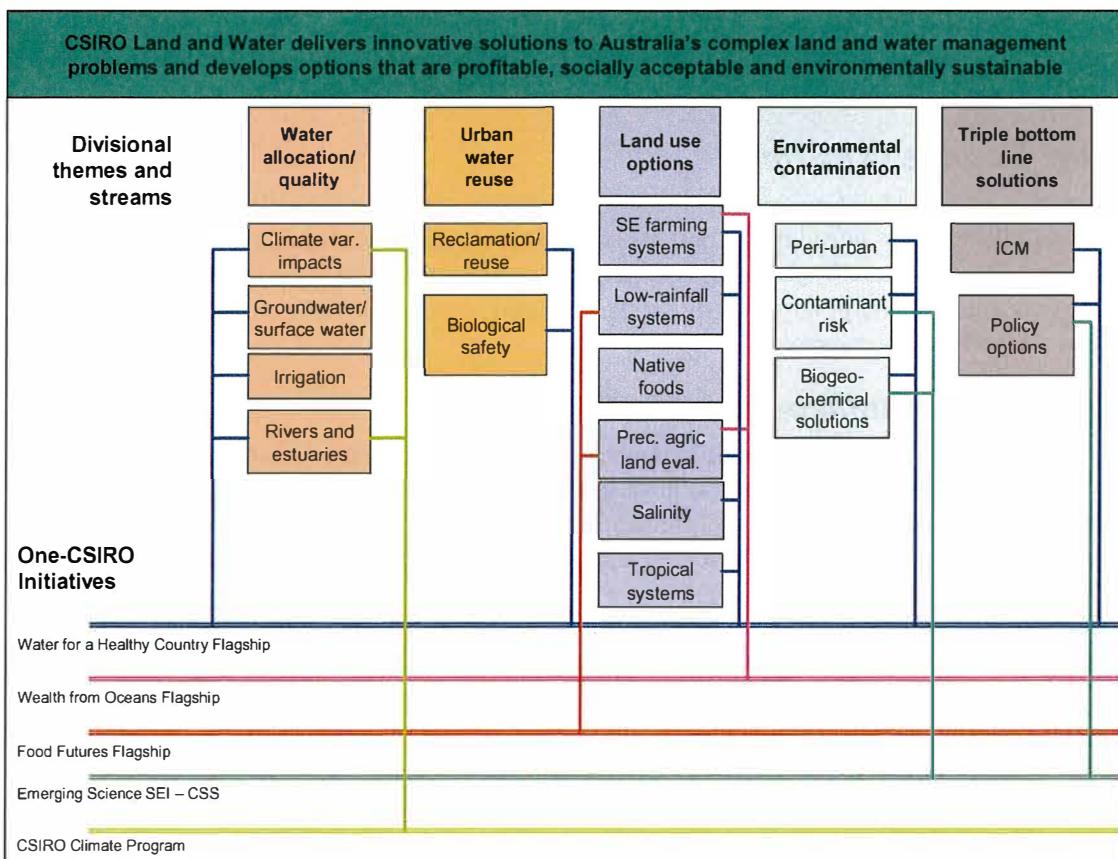
Environmental Contamination (\$9.42)

Goal: To enhance knowledge of biosolids management, contaminant risk assessment and reduction, and to develop biogeochemical solutions to industrial and environmental contamination. This will lead to healthy environments – assessment and prevention of risks from contaminants (toxins, metals, organics) in our urban and rural areas, and their impacts on ecological systems and human health, and the development of remedial solutions.

Triple Bottom Line Land and Water Management Options (\$9.45m)

Goal: To integrate social, economic and biophysical science for water policy and catchment management. This will provide land and water policy makers, planners and managers with triple bottom line options for the improved management of Australia's natural and agricultural resources.

Divisional Alignment Diagram



Resourcing – Land and Water Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
39,080	62,376	460.9

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	12,938
Major Cross Divisional Programs	2,584
Emerging Science	1,811
Core Divisional Research	44,812
Total Expenses	62,145

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	21,440
Strategic R&D [Co-Investment]	34,392
Consulting and Services	5,784
Licensing and Exploitation of IP	529
Total Expenses	62,145



7.4 Marine Research

Divisional Chief: Dr Tony Haymet

Marine Research's mission is to explore and understand the marine system and its relationship with the climate system, the terrestrial environment and the utilisation of marine resources. Our core capabilities are:

- *Marine Ecosystem Assessment {74 EFT}*
- *Living Marine Resource Assessment {66 EFT}*
- *Integrated Aquaculture Systems {32 EFT}*
- *Climate and Ocean Prediction {23 EFT}*
- *Environmental Monitoring, Integration and Prediction {26 FTE}*
- *Future Capability: Marine Genomics {9 EFT}*

Theme performance and response – 2003-04

Theme: Sustainable Fisheries

Goals:

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.

Progress

Annual Performance Goals		Achieved: 17		Delayed to 04-05: 3		Unachievable: 0
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High delivery of scientific reports along with effective consultation with stakeholders. The use of sophisticated electronic fish tags has contributed to an increased collection of data for analysis.

Response

The unsuccessful FRDC proposal on "Identification of key aspects affected by the harvest of top predators from tropical pelagic ecosystems" will impact on the design and sampling surveys. Reduction in resources will mean a narrowing of research focus to significant areas.

Theme: Sustainable Aquaculture Production

Goals:

Integrate the development of novel breeds, feeds and production environments 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.

Progress

Annual Performance Goals		Achieved: 14		Delayed to 04-05: 3		Unachievable: 0
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In the Improved Breeds stream all APG's were achieved for science outputs and industry impacts including one million progeny of second generation black tiger prawns produced for commercial trials.

An oyster data base completed and supplied to client. Work with key clients ongoing for example SALTAS for the commencement of a selective breeding program and APFA for future prawn breeding work. In the Improved Feeds the majority of APG's were achieved and a patent filed for genes controlling PUFA production in microalgae.

Response

The number of streams reduced by one to a total of two. The revised structure to target effectively key research priorities and improve reporting on progress. Of the three APG's not achieved, one (Stripey Trumpeter) will cease due to lack of resources. The other 2 will be achieved by publication of papers currently in press, and resubmission of a refined high intensity prawn culture project with enhanced industry commitment.

Theme: Sustainable Marine Ecosystems

Goals:

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.

Progress

Annual Performance Goals	Achieved: 17	Delayed to 04-05: 2	Unachievable: 0
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High percentage of APGs achieved with the balance scheduled to be concluded in the following year. A number of key publications produced, and new externally funded co-investment projects secured. The availability of the Atlas of Regional seas on the web is indicative of the research being made increasingly available to industry and the community.

Response

Following an in-house review, this theme has been recast as Managing Multiple Uses with the streams increasing by two to a total of five. The focus of the new stream is towards national planning and management of marine resources. This change in focus is to improve alignment with Environment and Natural Resources Group priorities and level of reporting.

Theme: Climate Processes and Prediction

Goals:

Reduce the uncertainty in climate predictions by advancing the knowledge of ocean physics and ocean biogeochemical cycling through observations and models. This will 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

Progress

Annual Performance Goals	Achieved: 12	Delayed to 04-05: 2	Unachievable: 0
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Achievement of the output of deploying robotic in-situ floats. Collated data to form the basis of providing advice to the Australian Greenhouse Office regarding sea surface temperature north and west of Australia.

Response

The streams for this theme continue unchanged following the in-house review. The data for the Hydro Tasmania seasonal climate parameters project has been received and being used to develop different

models. The Southern Ocean climatologies project is progressing with the allocation of additional expertise.

Theme: Marine Environment Prediction

Goals:

Develop and support the delivery of systems for marine environment prediction in partnership with the Bureau of Meteorology and the Royal Australian Navy. 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.

Progress

Annual Performance Goals		Achieved: 16		Delayed to 04-05: 2		Unachievable: 0
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The theme is on track to deliver outputs (in-situ and satellite observing systems and ocean forecast systems) within the assigned timeframe to major clients (BoM, RAN, other themes in WfO flagship). There has been good initial progress towards an eddy-resolving national biogeochemical model, and nested coastal-estuarine models have been implemented in Qld (Fitzroy – Keppel Bay), Tasmania (Huon-D'Entrecasteaux and Derwent) and SW WA.

Response

Delays in ARGO deployments caused by manufacturer recall of faulty floats will be overcome by deploying additional floats in 2004-05. A matched in-situ and ocean colour satellite database will be created in 2004-05. 2004-05 will be a key year for progress in developing and testing eddy-resolving biogeochemical models, and for decisions about design and resourcing of ocean observing strategies.

Research Themes 2004-05

Significant changes to CMR's themes between 2003-4 and 2004-5 are as follows:

- The **Marine Environment Prediction** theme (identified as having high potential in 2003-4) will almost treble in size as a result of investment by the Wealth from Oceans Flagship. To some extent, this is being driven by a refocusing of effort formerly in the **Climate Processes & Prediction** theme, though in total these two themes will grow by 33% (cf 14% for the Division as a whole).
- The **Sustainable Aquaculture Production** theme will grow by 23% as a result of investment by the Food Futures Flagship.
- The Sustainable Marine Ecosystems theme from 2003-4 has been closed and refocused. The majority of these resources have been re-invested in a new theme called "**Managing Multiple Uses (of the Marine Environment)**", which has five streams responding to the Wealth from Oceans Flagship (Theme 4), the National Research Priorities (D3 Protecting Australia from invasive diseases & pests), and feedback from the E&NR Sector Advisory Committee on the importance of sustainable coastal management. This theme will be led by CMR's Japan Prize-winning scientist, Dr Keith Sainsbury.
- The **Sustainable Fisheries** theme will also grow (by 27%). This theme will be subject to an independent scientific review early in 2004-5, which will enable the Division to internationally-benchmark its science quality in a reasonably bullish funding environment (driven by state, national, regional and international imperatives). This is an exciting opportunity to showcase some "horizon one" science, which remains the bulk of what CSIRO does.

Managing Multiple Uses (\$13.41m)

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.

Sustainable Fisheries (\$17.83m)

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.

Sustainable Aquaculture Production (\$5.18m)

Goal: Integrate the development of novel breeds, feeds and production environments 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.

Climate Processes and Prediction (\$4.85m)

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.

Marine Environment Prediction (\$7.00m)

Goal: Develop and support the delivery of systems for marine environment prediction in partnership with the Bureau of Meteorology and the Royal Australian Navy. 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.

Other Initiatives

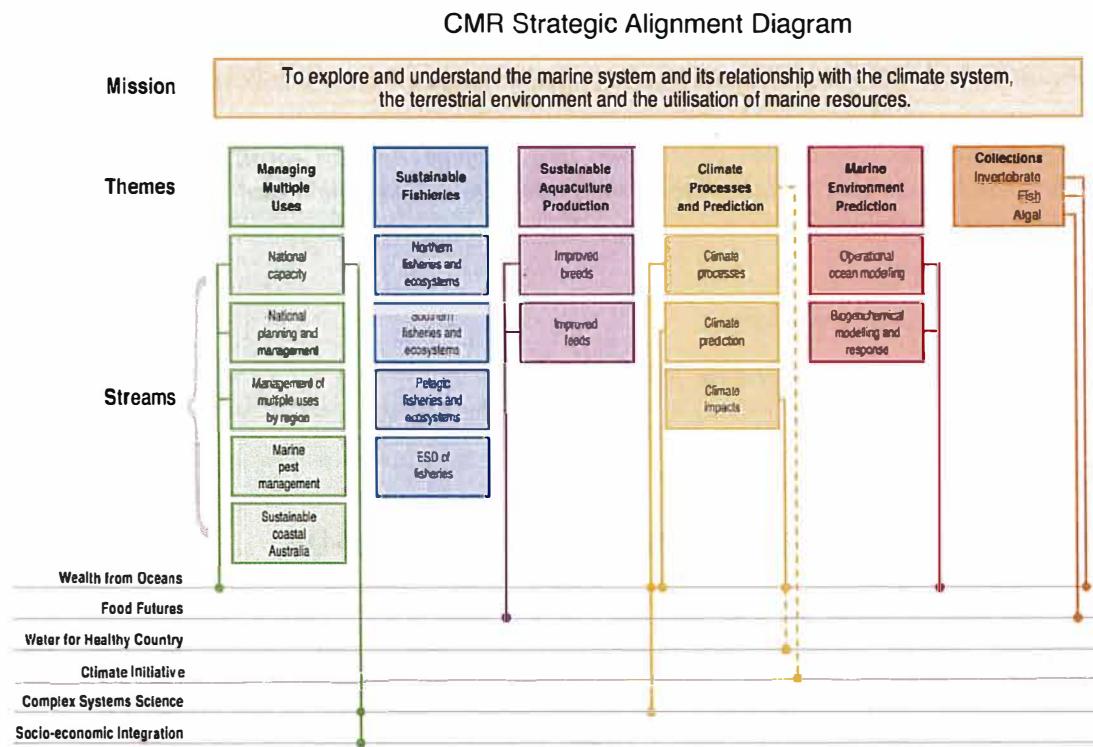
National Collections (\$0.59m)

Goal: Curation of the Living Microalgae, Invertebrate and Fish Collections by ongoing maintenance and management of specimens, records and database management, photographs, radiographs, genetic samples and taxonomic reprints. This work provides a repository for voucher material allowing the undertaking of research on biodiversity, biogeography, ecological sustainability and environmental issues.

National Facility Southern Surveyor (\$9.62m)

Goal: The Marine National Facility the Southern Surveyor provides Australian marine researchers a platform for research work at sea. The vessel operates for 180 days per annum as the National Facility, and a further 80 days per annum through a recently-established pooled "research charter" arrangement between NOO, GA and CMR. The budget for the vessel is managed through a separate cost centre. A ministerially appointed steering committee oversees the operation of the vessel, which has its own planning and reporting requirements.

Divisional Alignment Diagram



Resourcing – Marine Research (excludes the National Facility)

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
31,356	47,963	333.4

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	14,360
Major Cross Divisional Programs	0
Emerging Science	1,135
Core Divisional Research	33,360
Total Expenses	48,855

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	10,885
Strategic R&D [Co-Investment]	36,500
Consulting and Services	1,470
Licensing and Exploitation of IP	0
Total Expenses	48,855

7.5 Sustainable Ecosystems

Divisional Chief: Dr Andrew Johnson



Sustainable Ecosystems strives for ecosystems that support healthy rural, regional and urban communities, landscapes that sustain viable enterprises and management that allows biodiversity to prosper. Our core capabilities are:

- Ecology {72 EFT}
- Agricultural Systems {71 EFT}
- Social and Economic Integration {65 EFT}
- Emerging capability - Complex Systems {21 EFT}
- Enabling capability - Biotechnology {16 EFT}

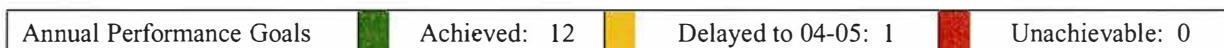
Theme performance and response – 2003-04

Theme: Wildlife Pests and Diseases

Goals:

Conservation of agricultural and natural ecosystems nationally and internationally through the generation and application of knowledge of the ecology of vertebrate fauna and vertebrate pest control

Progress



The majority of goals in this theme have been achieved in 2003-04 with reasonable progress made in each stream. Despite this there is recognition that the structure of the Theme, which has been based on disciplinary skills has limited some opportunities, and would make new business development increasingly difficult into the future. There are more effective ways to deploy the strong capabilities we have in vertebrate management .

Response

An internal review of this theme was undertaken this year. In response to the weaknesses identified in that review, these streams will no longer be contained within a separate research Program, but delivered through CSE's landscape based research Programs. This will open new opportunities for delivery of this capability, and allow for exploration of the science frontier around application of biotechnology at the landscape scale.

Theme: Resource Futures

Goals:

Deliver environmental, social and economic benefits to Australia in partnership with the people who influence, use and manage the nation's ecosystem by applying systems thinking to the integration of environmental, economic and social knowledge; embracing an adaptive learning culture that ensures excellent science and science delivery; and generating new knowledge and brokering and synthesising existing knowledge.

Progress



CSE has invested in considerable growth in this Theme over the past two years, thereby building CSIRO's capacity to provide socio-economic dimensions to systems consideration of resource use and sustainability. This is consistent with the SEI ESA and the needs of WfHC. 03-04 was therefore a year of growth and consolidation in emerging areas (such as multiple use, property rights and urbanising landscapes) as well as delivery in more mature areas of the Theme's portfolio. This investment and delivery was in line with the 03-04 plans.

Response

Given that the streams contained within this Theme are in the early part of the investment cycle and performed closely to plan in 03-04, no change in direction or resourcing is required for 04-05. However, the Theme's research has been consolidated around three core and one emerging stream in 04-05 in response to growing capacity and clear market signals.

Theme: Tropical Landscapes

Goals:

To help endow tropical and sub-tropical Australia with ecosystems that sustain viable enterprises, allow our unique biodiversity to prosper and support the development of robust rural and urban communities, and to deliver benefits to Australia by applying our scientific skills in partnership with the people who influence, use and manage tropical and sub-tropical landscapes.

Progress

Annual Performance Goals	Achieved: 23	Delayed to 04-05: 0	Unachievable: 0
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All of the goals in this theme have been achieved. Strong engagement with the sugar industry has continued as that industry faces major change and new research opportunities were developed during the year, which will commence in 2004-05. The year also saw strong links forged between this theme and the Water for Healthy Country Flagship in the GBR node and the Terrestrial Biodiversity cross-cutting area.

Response

The strong performance of this theme supports CSE's investment in the science and management of tropical landscapes, which is likely continue to grow in the near future. . The integration of former Wildlife Pest and Diseases streams has catalysed some changes to the arrangement of streams relating to Tropical Landscapes research.

Theme: Agricultural Landscapes

Goals:

Prosperous rural industries and communities underpinned by bio-diverse and resilient landscapes achieved by working in partnership with rural industries, communities, and governments towards improved ecological integrity and economic performance in agricultural landscapes.

Progress

Annual Performance Goals	Achieved: 17	Delayed to 04-05: 0	Unachievable: 0
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This theme has shown excellent progress, achieving all annual performance goals in 2003-04. We have strengthened our integration and capacity building streams, in line with the Division's strategic decision to increase the relative effort in these areas, which have strong social and economic integration linkages. Meanwhile, focus on the farming systems and natural resource management streams has been maintained despite a decrease in their relative size.

Response

Our impact in integration of ecological and economic drivers in agricultural landscapes continues to be recognised by our partners. In order to build on our success in this area, we will continue to invest in the participatory action research, and systems based approaches which form the basis of our integration and capacity building streams.

Theme: Rangelands & Savannas

Goals:

In partnership with the people who use, manage and live in the rangelands build understanding of these vast ecosystems and their complex socio-economics to achieve prosperous enterprises, resilient regional communities and healthy landscapes.

Progress

Annual Performance Goals	Achieved: 17	Delayed to 04-05: 1	Unachievable: 0
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This theme has made excellent progress, particularly in new streams associated with intensification and diversification and aboriginal enterprises and communities. This has involved developing business with a range of new clients in indigenous organisations and the Desert Knowledge CRC. The impact the indigenous work is having in the Top End is exceeding our expectations. New science and business partnerships have also been established with regional bodies as part of the NAP/NHT2 process and the Bushfire CRC.

Response

Some of the new initiatives associated with the Desert Knowledge CRC have been slower to implement than anticipated leading to one APG not being achieved but this will be achieved in 04-05. In light of the interest and opportunities in research associated with sustainable aboriginal communities increased resources will be allocated to this stream in 04-05.

Research Themes – 2004-05

In 2004-05 CSE has revised its approach to Research Themes and as a result, the set of themes included is entirely different to those in the 2003-04 Operational Plan. In 2003-04 CSE's themes were based on our Research Program structure, and as such reflected the Division's management structure and geographical focus, rather than its key outcome areas. After a review, the Wildlife Pests and Diseases Research Program was dissolved, with research to be delivered via the Divisions Agricultural Landscapes and Tropical Landscapes Research Programs.

In CSE we recognise that matrix organisation structures are highly integrative and found more frequently in rapidly changing, high innovating organisations. In our Divisional innovation strategy "Realising Impact Through Innovation (RITI)" we undertake to explore the viability of alternative organisational structures with two loci of responsibility; project delivery and functional management.

In response to this challenge, the Division is taking an outcome focussed approach to planning and reporting against Themes in 2004-05. Whilst the Division maintains four research Programs : Agricultural Landscapes, Rangelands and Savannas; Resource Futures, and Tropical Landscapes, our 2004-05 Themes reflect the Division's key outcome areas. These key outcome areas have developed and evolved since CSE's inception in 2001, and Research Programs have delivered to them in a loose matrix arrangement. This year we are tightening that matrix by recognising our Research Programs as business units, but using key outcome areas as Themes for planning and reporting.

We see 2004-05 as a transition year where our well developed themes comprise sets of streams which lack some cohesion and structure, because they reflect the streams developed in our Research Programs. During this year we will undergo a planning exercise "streams for the future" where the

transition from a research program to key outcome focus is completed and a cohesive and comprehensive set of streams is developed.

Healthy Regions and Communities (\$10.20m)

Goal: Rural and regional communities with options to address and adapt to economic, environmental and social change. This includes use of systems analysis to help guide sustainable regional development, research on best use and management of limited resources through resource governance models, and investigation of methods for working in partnership in provision of R&D for community development.

Prosperous Rural Enterprises (\$14.45m)

Goal: Prosperous and sustainable rural enterprises driven by innovative management, attuned to the Australian environment, and adapted to global change. This theme focuses on conducting on-farm systems analysis, in partnership with landholders, to inform and improve management of agricultural enterprises. A key challenge of this work is the need to balance production and conservation goals for an environmentally sustainable Australia.

Sustaining Biodiversity and Ecosystem Services (\$10.58m)

Goal: Natural and modified landscapes retain the biodiversity and the ecosystem goods and services needed to support prosperous and viable rural and urban communities. This Theme seeks to identify means for achieving conservation on natural and modified landscapes and to analyse potential methods for rewarding landholders who provide ecosystem goods and services (such as pest control and waste assimilation) that benefit the wider community. Included in this work is the wise use of molecular ecology for improved human welfare and ecosystem sustainability.

National Options for Long-term Sustainability (\$3.82m)

Goal: An Australian society making well-informed choices about national resource policy, management and investment options. The research will model the stocks and flows of materials and energy in the physical economy that supports sustainability in Australia., also taking into consideration climate change and variability and its impact on biodiversity and the management of water, cropping and pastoral lands.

International Partnerships for Sustainability (\$2.60m)

Goal: Partnerships with Australian aid agencies, international NGOs and international research agencies that lead to research, development and capacity building in other countries and within CSIRO. Our systems approach to sustainability will be specifically applied in the areas of biodiversity and conservation planning, farming systems, and pest control. The geographic focus will in the Asia-Pacific and Southern Africa, driven by the relevance of our skills and Australia's international interests.

Healthy Urban Ecosystems (\$1.20m)

Goal: Healthy urban ecosystems, bringing together environmental health and community well being, through innovative approaches that reduce consumption of resources and improve quality of life. On the basis of an initial workshop held in early 2004, some focus has been brought to this emerging theme. CSE recognises its niche in the field of complex urban systems in researching the nexus between biophysical and social and economic implications of the urbanization process. The importance of partnerships with other CSIRO Divisions working in the urban domain (eg CMIT, CLW, CAR) is recognized as integral to success in this area.

Other Initiatives

Social and Economic Integration Directorate (\$0.90m)

The Division hosts the Directorate for Social and Economic Integration - playing a coordination and enabling role, promoting a one-CSIRO approach to the Social and Economic Integration Emerging Science Area. The actual SEI projects in the Division are integrated with (and accounted for) under the Themes.

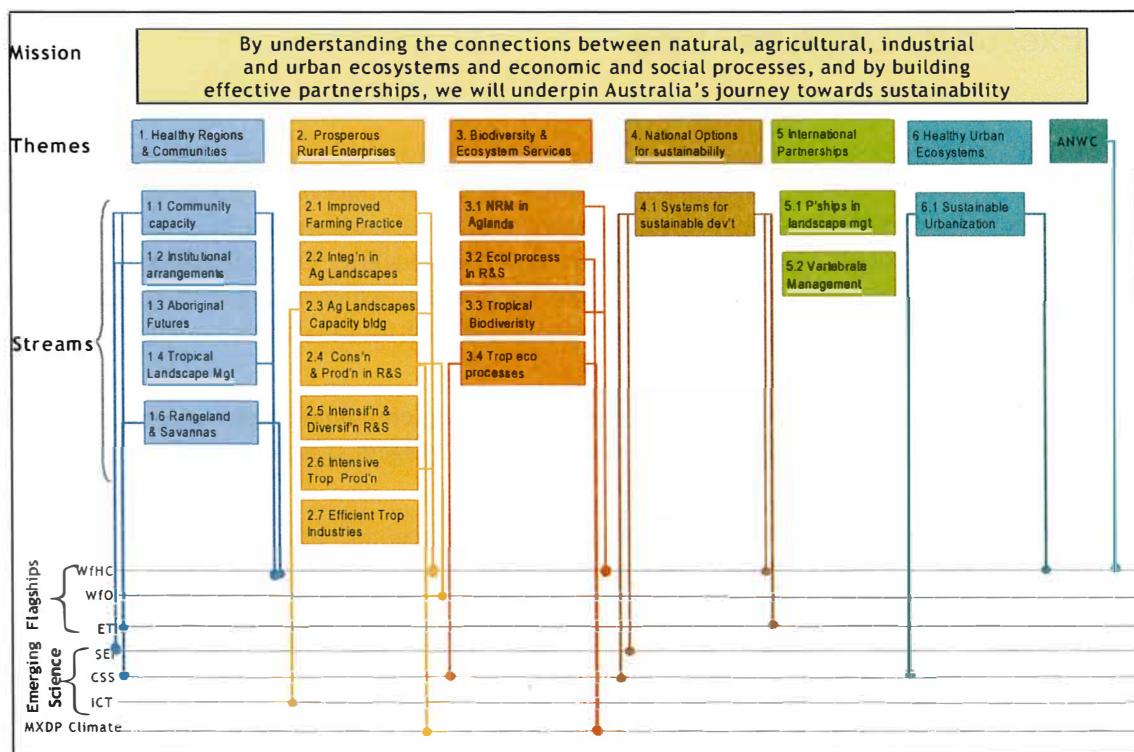
Realising Impact Through Innovation – RITI (\$1.00m)

RITI, CSE's blueprint for organizational development, includes a range of mechanisms and actions that foster innovation, including an Internal Venture Capital Fund (IVCF) which provides seed funding of projects that are outside the normal business of our research programs, but aligned with the Division's strategic intent.

The Australian National Wildlife Collection – ANWC (\$0.45m)

The ANWC is the official Commonwealth collection of Australian land vertebrates. The Collection is administered by CSE which is charged with its development. The Collection aims to provide up-to-date information about what kinds of vertebrates Australia has and, where each lives. It also contributes more broadly to systematic understanding of vertebrate diversity of Australia and the surrounding region, and use of genetic data to understand the processes that threaten native fauna.

Divisional Alignment Diagram



Resourcing – Sustainable Ecosystems

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
30,337	44,868	338.7

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	6,376
Major Cross Divisional Programs	*
Emerging Science	1,720
Core Divisional Research	37,102
Total Expenses	45,198

* Investment in CSIRO Climate is currently being negotiated, and this work has a high level of overlap with the Water for a Healthy Country and Wealth from Oceans Flagships, so appears in Flagship investment.

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	16,810
Strategic R&D [Co-Investment]	27,313
Consulting and Services	1,030
Licensing and Exploitation of IP	45
Total Expenses	45,198

Section 8: IT, Manufacturing & Services Group

Group Executive: Dr Warren King

Overview

The IT, Manufacturing and Services Group contains the core of CSIRO's research focus in the ICT, manufacturing, and service sectors. The main aim of the Group is to improve the competitiveness of Australian industry with particular emphasis on the service sector, manufacturing, ICT, textiles, pharmaceuticals, human health, chemicals and plastics, and infrastructure. The external drivers demanding research in these areas include requirements for products which are globally competitive, are cleaner, cheaper, smaller, faster, and less power consuming, and for the delivery of sophisticated services which are available anywhere, anytime.

Common strengths across the Group include materials technology, communications systems, information handling, simulation and modelling, robotics and intelligent systems, interface engineering, and bio, nano and micro technologies.

In addition, the Australia Telescope makes an important Australian contribution to international science via its operation and development of the telescope for international radio astronomy.

The IT, Manufacturing and Services Group includes the following Divisions:

- Australia Telescope National Facility
- ICT Centre
- Industrial Physics
- Manufacturing and Infrastructure Technology
- Mathematical and Information Sciences
- Molecular Science
- Textile and Fibre Technology

Key Lessons Learnt in 2003-2004

The IT, Manufacturing and Services Group underwent significant structural change during 2003-2004, with the creation of the ICT Centre in September 2003, drawing together a critical mass of CSIRO's information and communication technology research, which was previously housed in the Division of Telecommunications and Industrial Physics (CTIP) and the Division of Mathematical and Information Sciences (CMIS). CTIP subsequently changed its name to Industrial Physics (CIP). In addition, the National Measurement Laboratory (NML), which was formerly housed in CIP, left CSIRO as of July 1, 2004, to join with the National Standards Commission and the Australian Government Analytical Laboratories to form the National Measurement Institute.

The impact of these changes and the manner in which they were handled provided some valuable lessons. The relatively long delay between the recommendation to form the ICT Centre and its implementation and launch caused a deal of uncertainty and consequent low morale for many of the affected staff. This experience reinforces that when strategic or structural change may be required, available options should be carefully but rapidly considered and, when considered appropriate, action should be swiftly taken. This principle will be applied in the forthcoming review of the strategic direction of the Division of Textile and Fibre Technology (see below).

A more positive outcome of the creation of the ICT Centre has been the reinvigoration and renewed sense of purpose that has developed in the smaller, more focussed divisions of CMIS and CIP. Within CMIS revenues for 2003-04 are up 17% against the same group of staff for 2002-03 and the Division continues to lead the organisation in terms of its overall rating for value on the Customer Value

Survey. A similar growth was shown by CIP, which has shown a 38% increase in external revenue when compared to last financial year. If anything, the situation has improved post NML-separation, as the change has allowed both the Division and the former NML to develop a much clearer sense of purpose and their respective roles in the Australian scientific community.

The manner in which the NML separation was handled clearly demonstrated that major structural change can be achieved with minimal disruption, provided staff are kept well informed and have confidence in their management team.

The IT, Manufacturing and Services Group has a heavy bias towards advanced technologies, which requires heavy engagement with the private sector in a highly volatile marketplace. The Group has attempted to grow its business through significant involvement in one-CSIRO business development initiatives, such as Customer Service Teams, and by setting difficult stretch targets. The former initiative is beginning to show signs of delivering real benefit. However, the setting of overly ambitious external earnings targets (the Group initially budgeted a 21% increase for 2003-04 and achieved a 12% increase) has proven to be counterproductive, as it places unrealistic pressures on divisional management, who then face a constant struggle to generate revenue. Divisional earnings targets for 2004-05, and subsequent years, have been set with this lesson in mind.

Significant Initiatives Planned for 2004-2005

During the coming financial year, the first phase of the reinvigoration of CSIRO's ICT research will be completed. The new Director of the ICT Centre, Dr Alexander Zelinsky, is now onboard full time, with initial plans to fully review the Centre's research portfolio prior to the end of the calendar year. The ICT Centre is also currently exploring options with the NSW Government for a significant co investment to create a new world-class wireless and multimedia research centre, sited at Wollongong University's Wollongong Innovation Campus.

The ICT Centre, Molecular Science, Manufacturing and Infrastructure Technology (CMIT) and CMIS are heavily involved in one-CSIRO discussions with the Victorian Government around joint investment in e-health, security, intelligent transport systems and low emissions transport. Expressions of interest will be submitted on July 30th for the Victorian 2004 Science Technology and Innovation (STI) Initiative for e-health, security and intelligent transport systems. These submissions are among 21 proposals that involve CSIRO to the \$60M scheme. CMIT and Molecular Science are involved in a number of the other proposals, including smart enclosed spaces, integrated casting, biomedical manufacturing and bioprocessing.

The Queensland e-Health Research Centre (QEHR), a co-investment between the ICT Centre and the Queensland State Government, was opened by Minister McGauran on May 18th. Currently operating with a skeleton staff, in the coming year the QEHR will build its numbers and plans to take two CSIRO technologies to trial in the next 12 months.

As discussed above, CMIS and CIP are more focussed and showing a renewed sense of identity following the separation of ICT research from the Divisions. Against this significant advantage, however, are the disadvantages of being significantly smaller (CMIS and CIP currently have 159 and 168 EFT staff, respectively), specifically the high proportional costs of support services. It is for this reason that CMIS, CIP and the ICT Centre will continue to move towards sharing all support services, other than Business Development and Commercialisation. During 2004-2005, the question of the long-term shape of these Divisions will be explored.

Plans to consolidate CSIRO sites in Sydney in the near - to medium - term will impact on staff of the ICT Centre, CMIS, CIP and the Australia Telescope National Facility (ATNF), who are sited at Marsfield, Lindfield and Macquarie University. Two options are considered to be realistic: relocation to Riverside Corporate Park, or to a new building at Macquarie University. Discussions are continuing to identify the preferred option and to develop a relocation plan by the end of the financial year. A current initiative to further develop the Clayton site in Victoria will impact the ICT Centre, Molecular

Science, CMIS and CMIT, who will use the opportunity to consolidate existing and future research support and collaboration across the site, both within and external to CSIRO.

Following a somewhat unproductive year in 2003-2004, which was primarily caused by the rapid turnover of two Coordinators, the Secure Australia Major Cross Divisional Program will gain increased traction in 2004-2005. Dr Greg Simpson, who was appointed Coordinator in April, has identified biosecurity, counter-fraud devices and detection technologies as three areas where CSIRO can make a significant impact in the security domain. The security proposal to the Victorian STI scheme (see above) will focus on counter-fraud devices. During the year, Greg will complete a comprehensive audit of CSIRO's capabilities in the security domain, identify synergies and areas of critical or near-critical mass in research capability across the organisation, and develop a plan or plans to leverage this expertise into the security domain, via cross-Divisional and external collaboration.

The Division of Textile and Fibre Technology (TFT) has considerable strengths in terms of its knowledge of the post-production wool industry, its textile physics, chemistry, engineering and instrumentation research and its successes in commercialising breakthrough wool textile technologies into the world economy for the benefit of the Australian wool industry. However, TFT also faces significant challenges, including a heavy reliance on a single dominant customer (Australian Wool Innovation), the small range of other Australian customers in the textiles and fibre markets, the continued erosion of staff numbers and capabilities in recent years and a reduced potential for substantial growth given the continuing global decline in demand for wool. Consequently, a strategic review of the Division has been commissioned to investigate the Division's response to these challenges and to consider possible alternative management models. The review will occur in August, with the expectation of submitting its recommendations to the Executive Team in late September 2004.

Alignment with CSIRO's Strategic Plan – ITMS Group

<i>Strategic Objective</i>	<i>Activity</i>
1.1 Play a significant role in delivering on Australia's National Research Priorities	Make significant contributions to NRP in the areas of breakthrough science, frontier technologies and advanced materials transforming Australian industries, safeguarding Australia and environmentally sustainable Australia.
1.2 Build critical mass and ensure quality in our core research programs	Use the Program Performance Framework and science impact assessment to focus research efforts. Conduct strategic reviews of TFT and hydrogen research. Incorporate SSL into CMIT.
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Take significant roles in the Light Metals, Energy Transformed and P-Health Flagships and continue to increase engagement in the Water for a Healthy Country, Wealth From Oceans and Food Futures Flagships.
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	Make a significant contribution to the Secure Australia MXDP. Continue multilateral involvement in nanotechnology and complex systems emerging science areas. Through the ICT Centre, take the lead in use of critical ICT in a non-ICT divisional application Sponsor two more communities of interest across CSIRO.
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	Improve people management and leadership development through sharing of best practice between Divisions. Maintain or increase existing levels of postdoctoral fellows and postgraduate students.
2.2 Optimise delivery of all research activities by improving project management	Continued compliance with PMI and analysis of CVS results. Sponsor a LRE project on PMI metrics.

2.3 Build our global recognition for science leadership in our chosen science domains	Maintain the position of the ATNF as a global leader in radioastronomy; continue to publish in peer reviewed journals.
2.4 Maximise Australia's chances of hosting major international science facilities such as the SKA	Establish sources of funding and develop a resourced project plan for the siting of a new technology demonstrator site for SKA in Western Australia.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Continue to foster close ties with selected Universities and engage actively in CRCs. Build closer ties with other government science agencies in areas of mutual interest. Establish large-scale National ICT Goals in collaboration with DSTO, NICTA and the ICT CRCs via the ICT Roundtable.
3.2 Service the needs of government for informed policy setting	Continue to provide policy advice to government in ICT, security issues, transport, building and manufacturing.
3.3 Enhance communication to raise public and stakeholder excitement and trust in science	Continue Open Days on annual basis; participate in Science Meets Parliament; Science in Schools; celebrate International Year of Physics; continue to support Parkes Visitor Centre and cooperate with NICTA, DSTO, and CRCs to organise the second National ICT Outlook Forum.
4.1 Intensify engagement with RDCs to grow regional and new industries	Develop closer working relationships with AWI and GRDC.
4.2 Structure deeper and more meaningful relationships with large corporations	Participate or lead CST teams on Boeing , BAE Systems, Pacifica Holding, Dow, Procter and Gamble, GMH, DuPont, TRW, Schering Plough, Pfizer and 3M. Investigate and be receptive to coinvestment opportunities with State Governments.
4.3 Accelerate the growth of promising technology-based SMEs	Expand existing relationships with SMEs and, with the help of corporate BD&C, identify a set of ICT candidates who will be targeted as receptors for technology insertion.
4.4 Reinvent our ICT capabilities to strengthen Australia's knowledge-based industries	Evaluate strengths and establish a strong direction and presence for the ICT centre. Identify Divisional collaborators for maximum impact of ICT in their application space, and partner with at least one in a major collaborative ICT project. Build the staff at the Queensland e-Health Research Centre (QEHRC) and trial two CSIRO technologies in the next 12 months. Submit at least one co-investment proposal to a Star ICT SME.
5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research	Continue to promote cross-Divisional work at the interfaces – biomaterials, biocatalysis, polymer electronics, flexible electronics, advanced materials, biomimetics.
5.2 Be among the best in governance, OHS&E and performance management processes	Maintain existing high standard OHS&E through regular assessment and sharing of best practice at Group meetings.
5.3 Adopt a unified approach to dramatically improve service and grow top accounts	Continue strong involvement with CSTs (see 4.2, above). Be actively involved in BD&C initiatives, such as Fastrack, Revenue Pipeline.
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Be actively involved in the implementation of one-IT through the Client Advisory Board. Continue to push for extranet sites to engage key clients.
6.2 Proactively manage patent and equity portfolios to multiply IP-based	With Corporate BD&C, implement strategies to maximize IP returns from 802.11.

revenue streams	Work with BD&C to ensure that existing licensing agreements are honoured.
6.3 Deliver customer value for money and eliminate subsidisation in consulting services	Continually review fee-for-service pricing and customer service; continue to reduce subsidisation by education and communication; ensure all costs are specified at the planning stage. Improve quality of data entered into PSS to allow effective monitoring of research subsidisation.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Maintain and expand existing Preferred Supplier arrangements to continue to deliver reduced purchasing costs. Continue to work towards site consolidation, co-location and shared support services, where appropriate.



8.1 Australia Telescope National Facility

Divisional Chief: Dr Brian Boyle

ATNF operates a world-class National Facility for radioastronomy for the Australian astronomical community supported by leading-edge technical innovation and high quality astrophysical research. Our core capabilities are :

- *Telescope Operations {30 EFT}*
- *Receiver Technology {20 EFT}*
- *Signal Processing {20 EFT}*
- *cm-wave astronomy {20 EFT}*
- *mm-wave astronomy {5 EFT}*

Theme performance and response – 2003-04

Theme: National Facility Operations

Goals:

Operate a world-class National Facility in radio astronomy.

Progress

Annual Performance Goals		Achieved: 20		Delayed to 04-05: 2		Unachievable: 0
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Excellent progress made in all key areas. User community (key stakeholder in this theme) is very satisfied with progress.

Response

ATNF will continue to focus on world-best performance in operating the National Facility. Response to user committee recommendations now an important performance indicator.

Theme: Technology Development

Goals:

Develop technology to continuously upgrade our own telescopes, build instruments for other observatories and develop international linkages.

Progress

Annual Performance Goals		Achieved: 9		Delayed to 04-05: 1		Unachievable: 0
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Excellent progress made in all key areas, despite an extremely challenging set of goals.

Response

We aim to capitalise on success/international visibility of ATNF technology development in 04-05 via new programs involving international partners/customers (e.g. Jodrell Bank, NASA). Also we wish to incorporate part of the former SKA/LOFAR theme under this theme, so that technology development for current telescopes feeds through better to the SKA development and vice versa. The theme title has been changed to Technologies for Radioastronomy to reflect this focus.

Theme: SKA (Square Kilometre Array) / LOFAR (Low Frequency Array)

Goals:

Play a key role in developing the next generation of major radio astronomy facilities.

Progress

Annual Performance Goals	Achieved: 23	Delayed to 04-05: 6	Unachievable: 4
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Good progress toward SKA outcomes. However, based on community input and the Dutch decision to use their funding to build the LOFAR telescope in the Netherlands, the ATNF withdrew from the LOFAR negotiations.

Response

It has been decided to spread the SKA/LOFAR streams across technologies for radio-astronomy and astrophysics themes to represent the extent to which strategic SKA research also advances these two major themes. It is also hoped that these more successful themes will improve performance in this area. This cross-theme (matrix) approach to SKA, also makes it easier to incorporate into a one-CSIRO cross-divisional program. Particular focus is being placed on the New Technology Demonstrator stream (now under Technologies for Radio Astronomy) to establish an SKA prototype facility at one of the candidate SKA sites in Western Australia.

Theme: Astrophysics

Goals:

Conduct cutting-edge research in astrophysics to solve fundamental problems of the Universe and stretch the performance of our telescopes.

Progress

Annual Performance Goals	Achieved: 16	Delayed to 04-05: 3	Unachievable: 0
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It has been a Highly successful year in this Theme. A high number of high impact scientific discoveries made including the discovery of the first double pulsar, a new spiral arm for the Milky Way and the first detection of ammonia in a distant galaxy.

Response

Our future direction will involve greater focus on using the scientific breakthroughs made to enhance the performance of the ANTF telescopes and drive the science requirements for future facilities such as the SKA. This will be achieved by closer coupling of astrophysics resources to technology outcomes, and by including some of the former SKA/LOFAR theme under the astrophysics theme.

Research Themes – 2004-05

The ATNF themes are as for 03-04, with the exception of the SKA/LOFAR theme. Streams in with the former SKA/LOFAR are now distributed across technologies for radio-astronomy and astrophysics themes to demonstrate extent to which strategic SKA research also advances these two major themes. This cross-theme (matrix) approach to SKA also makes it easier to incorporate into a one-CSIRO cross-divisional program. The disbursement of the Australian Gemini subscription via MNRF program which CSIRO manages is also included as a separate initiative.

Technologies for Radio Astronomy (\$6.47m)

Goal: To provide a platform for the development of front-line technology for the advancement of radio astronomy in Australia. The ATCA/Mopra upgrade program (MNRF 1997) will be completed with the finalising of the ATCA 3mm systems and the installation of the Mopra 12/3mm receiver. A

new digital spectrometer with 8GHz bandwidth will be installed at Mopra. Under contract with NASA, the ATNF will complete a Large Array Study for the Deep Space Network. Work towards the SKA will continue with the completed project plan for construction of the “New Technology Demonstrator” radiotelescope.

Astrophysics (\$3.11m)

Goal: To conduct cutting-edge research in astrophysics to solve fundamental problems of the Universe and stretch the performance of our telescopes. Important goals for 2004-05 are: to complete 6200 sq.deg of high-frequency (20 GHz) all-sky continuum survey over declination range –30 to –10 deg; establish instrumentation and procedures to give sub-microsecond precision on at least 10 pulsars to enable possible tests of general relativity; conduct observations to test the feasibility of detection of the epoch of reionisation all-sky signal, the expected signature of a key stage in the development of the early Universe.

National Facility Operations (\$16.19m)

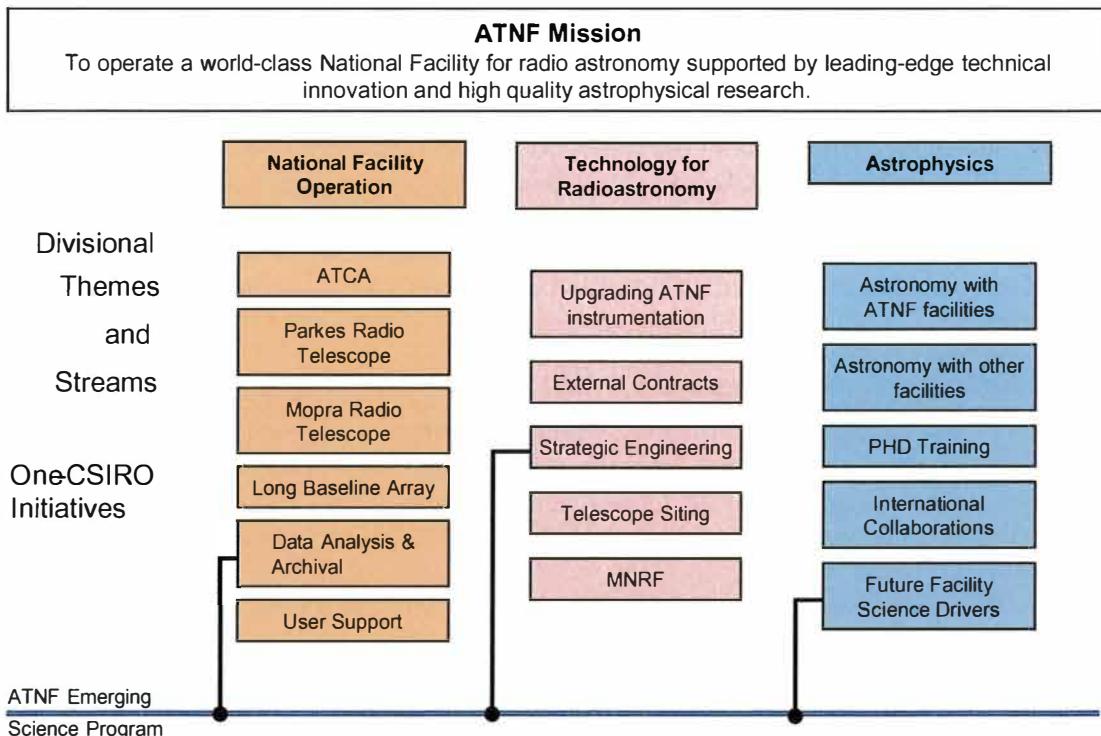
Goal: To serve the Australian and international scientific community by providing radio astronomy facilities to conduct world-class research programs in astronomy. We will continue to offer more than 75% of the time on our major instruments for astronomical observations. The new 3mm systems on the ATCA will be commissioned and integrated into the observatory, as will the new digital spectrometer on the Mopra radiotelescope. The refurbished 21cm multibeam receiver will be reinstalled on the Parkes telescope for major new 21cm observing campaigns. A plan will be developed to use high-speed fibre-optic links across eastern Australia for connected long baseline interferometry (eVLBI). The entire ATCA data archive will be made publicly available through a web interface.

Other initiative

Gemini Subscription (\$3.11m)

Goal: To facilitate Australia’s contribution to the Gemini program. Australia is a member of an international partnership that operates the Gemini Observatory comprising two 8-metre optical telescopes. Part of Australia’s subscription is funded by the MNRF2001 program.

Divisional Alignment Diagram



Resourcing – Australia Telescope National Facility

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
21,228	32,060	146.6

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	0
Major Cross Divisional Programs	0
Emerging Science	1,954
Core Divisional Research	26,927
Total Expenses	28,881

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	6,790
Strategic R&D [Co-Investment]	7,518
Consulting and Services	14,472
Licensing and Exploitation of IP	100
Total Expenses	28,881



8.2 ICT Centre

Director: Dr Alex Zelinsky

The ICT Centre is a CSIRO wide focal point for internationally competitive ICT research. Our goals are to change the way people live their lives by:

- contributing to the development of new ICT industries and opportunities that enhance the capabilities and competitiveness of business and
- partnering with domain specialists from across CSIRO to enhance the delivery of scientific programs that will deliver a competitive edge to CSIRO's diverse customer base.

Our core capabilities are:

- Networked Data Systems {20 EFT}
- Advanced Networks {25 EFT}
- Antenna Systems {15 EFT}
- Wireless Technologies {35 EFT}
- Electronic Content {30 EFT}
- Biomedical Sensing {25 EFT}
- Dynamic Systems {20 EFT}
- Security and Privacy {5 EFT}

Theme performance and response – 2003-04

Theme: Wireless Futures

Goals:

Deliver new wireless products and services to increase economic efficiency, improve national security and enhance sustainability.

Progress

Annual Performance Goals		Achieved: 21		Delayed to 04-05: 14		Unachievable: 0
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Generally good progress against this years goals, especially related to the mm-wave imaging and adaptive wireless activities. A number of goals have been delayed as a result of the difficult research questions, impact of the EpiTactix semiconductor start-up and the difficulties in engaging with our prime commercial prospect for our position location technologies.

Response

Research effort will be scaled back in Position Location Technologies and the commercialisation strategy for will be reviewed in 04-05 with the increase in commercialisation resources. This will release resources for redeployment to Ultra Wide Band (UWB) research in 04-05, the lack of which has delayed activity in this area to date.

Theme: High-Performance Networks

Goals:

Working with information-intensive applications areas (such as entertainment, education) to deliver with new network architectures, features, products and services that enable economic efficiency and enhanced sustainability

Progress

Annual Performance Goals		Achieved: 5		Delayed to 04-05: 1		Unachievable: 0
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Excellent progress on all APGs – with all except one having been successfully achieved in 03-04. The one APG which has been delayed relates to deployment of the Extranet on Demand technology on the CeNTIE Network. The technology has been tested in the lab, the users have been trained and legal work has been underway for over 6 months. The deployment delay is totally due to the difficulty in Nortel and CSIRO negotiating terms acceptable to both parties. Importantly, the success of our activities has secured another 3 years of funding for CeNTIE in the BAA2 announcements.

Response

Considerable pressure has been applied by CSIRO and Nortel technical staff to their respective legal departments. We expect resolution of this matter within 30 days, after which deployment of the technology will proceed rapidly. Frank feedback and recommendations have been made to CSIRO legal and business staff on this matter.

Theme: Information Superiority

Goals:

Develop new tools, methods, architectures and products that allow people to effectively manage, query, analyse and refine information from multiple sources and to navigate and deliver information that improves decision-making anywhere and anytime.

Progress

Annual Performance Goals		Achieved: 51		Delayed to 04-05: 1		Unachievable: 4
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There has been a stronger than expected business engagement this year, particularly through Boeing and Panoptic customers. This engagement has not significantly altered our APG's as the work was aligned well with the theme goal. The only changes have been as a result of specific business decisions, or reduced resources.

Response

In areas of reduced resources we have taken the decision to cut these activities and consolidate – there are fewer streams and fewer APGs for 2004-05.

Theme: e-Science

Goals:

Enabling major scientific endeavours by using novel computing, communications, information systems and future knowledge services.

Progress

Annual Performance Goals		Achieved: 7		Delayed to 04-05: 7		Unachievable: 3
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The Health Data Integration project was undertaken as a preventative health flagship project. APGs have been developed, updated and reported through the flagship. Delays in achievement can be

attributed to the search for an end-user to provide clear performance specifications and to the loss of a number of staff during the year.

Within Grid Computing, a larger than anticipated effort was required to generate the metadata over the ATNF data archive to support workflow generation. Effort in data assembly was directed at the particular problem of integration of the spatial component of the data. The LOFAR activity was suspended as a result of the suspension of the project by the astronomy participants.

Response

In 04-05 resources will be increased through engagement with Qld Health in the newly established e-Health Research Centre. Only a very small part of the original research goals will remain in this e-Science theme, with an emphasis on security and privacy, and activity required to transfer the technology to EHRC. Resources and research goals will be reviewed over the coming months.

Theme: Electromagnetic Information & Intelligent Systems

Goals:

To deliver new technologies for information systems that are distributed, adaptive and intelligent and which sense and respond through the use of electromagnetic waves.

Progress

Annual Performance Goals	Achieved: 16	Delayed to 04-05: 6	Unachievable: 0
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Very good progress was achieved against all research objectives. With respect to the partly achieved goals, completion was impacted by the decision in April to split this Theme. The Intelligent Systems Stream was re-defined and combined with the Robotics Theme. The Electromagnetics and Antennas Stream was merged with the Future Wireless stream. Some of the progress made on investigating overlapping activities between antennas and intelligent systems will not be pursued in the new structure. The lengthy (and to date) unsuccessful technology sale process for the MultiBeam Antenna has been a source of disappointment and frustration.

Response

Some continuing APGs have been redefined but will continue in another form in 04-05. The achievements of the Smart Spaces emerging science program will be pursued under a different Theme in 04-05. We expect resolution on the MultiBeam Antenna sale within the next month.

Theme: e-Health

Goals:

Ensuring the right treatment is available for each patient, specialised to each individual's context and situation and delivering healthcare where patients and providers need not be in the same place at the same time.

Progress

Annual Performance Goals	Achieved: 17	Delayed to 04-05: 6	Unachievable: 0
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The APGs for 03-04 were largely achieved. Two of the projects (ViCCUT™ and PERSiMON™) have been sufficiently successful that they are now being seriously considered for spinoff/commercialisation. Some stream activities were proposed in the expectation of increased resources, however some delays occurred due to the reduced availability of resources..

Response

In Telehealth, a focus on ViCCUT™ made it difficult to activate some proposed international collaborations, and leadership remains an issue to be resolved in this area during 04-05.

Research Themes – 2004-05

As a result of our first year of operation, we have conducted some rationalisation of our Research Themes. The addition of skills in robotics and automation allowed us to achieve critical mass in the area of Autonomous Systems by combining robotics with intelligent systems. This then led to the merger of the wireless theme with the remaining antenna activities to strengthen the focus on the complete wireless communications chain under the banner of Wireless and Antennas Futures. The initial year of assessment has brought some minor changes in direction as the Centre develops its strategic goals. The eScience Theme has developed into the Networked Information Systems Theme, reflecting a recognition that eScience is one application within this broader area. Networking for the Information Economy is the new name for Network Futures indicating the strong applications focus on using broadband as a development platform for improved efficiencies. The change of name from Information Superiority to Information Agility is both a response to the very specific inference that former term creates and a move to the provision of information tools that are responsive to a complex and changing environment.

Stephen Giugni has been the Acting Centre Director since September 1, 2003. Alex Zelinksy was appointed Director of the ICT Centre in January 2004 and commenced full-time involvement from the end of July 2004. Between August and November, he will conduct a full review of the current research themes, streams and projects through a panel that will include external and internal academic and industrial assessment. It is envisaged that, as a result of this review, there will be a reduction in focus and a strengthening in effort in the Centre's research portfolio. The implementation of this review will be completed in the first quarter of 2005.

Networked Information Systems (\$3.90m)

Goal: To improve the international competitiveness of Australian enterprises by accelerating their adoption of networked information systems for electronic service delivery. We will do this by providing new technology that overcomes the barriers of inflexibility, narrow applicability and inadequate safeguards for security and privacy in current Web Services technology.

Wireless and Antenna Futures (\$11.84m)

Goal: To shatter the barriers to high-speed, wideband and untethered communication. Wireless technologies will provide the underpinning communications platform that will deliver improvements to industries as diverse as mining, agriculture, media, health and marine.

Networking for the Information Economy (\$8.00m)

Goal: To create new networking technology and advanced applications that address impediments to faster growth of the Information Economy in Australia. We collaborate with key industry partners to identify and overcome technological and economic impediments in their business systems. This theme also includes the CeNTIE project (Centre for Networking Technologies for the Information Economy) which is supported by the Australian Government through the Building on IT Strengths (BITS) Advanced Networks Program (ANP) of the Department of Communications, Information Technology and the Arts.

Information Agility (\$4.60m)

Goal: To change the way that Australians engage with information as individuals and teams. Delivery of the required information at the right time, with the right context, at the right speed and at an appropriate level of detail to meet our needs.

Autonomous Systems (\$4.90m)

Goal: To improve the international competitiveness of diverse Australian enterprises through the adoption of autonomous systems, capable of performing advanced tasks in changing environments. Sensors intelligently linked to control, actuate, communicate and cooperate to achieve complex tasks. These systems will perform tasks that humans do not wish to do, or that they cannot do safely or well.

e-Health (\$4.45m)

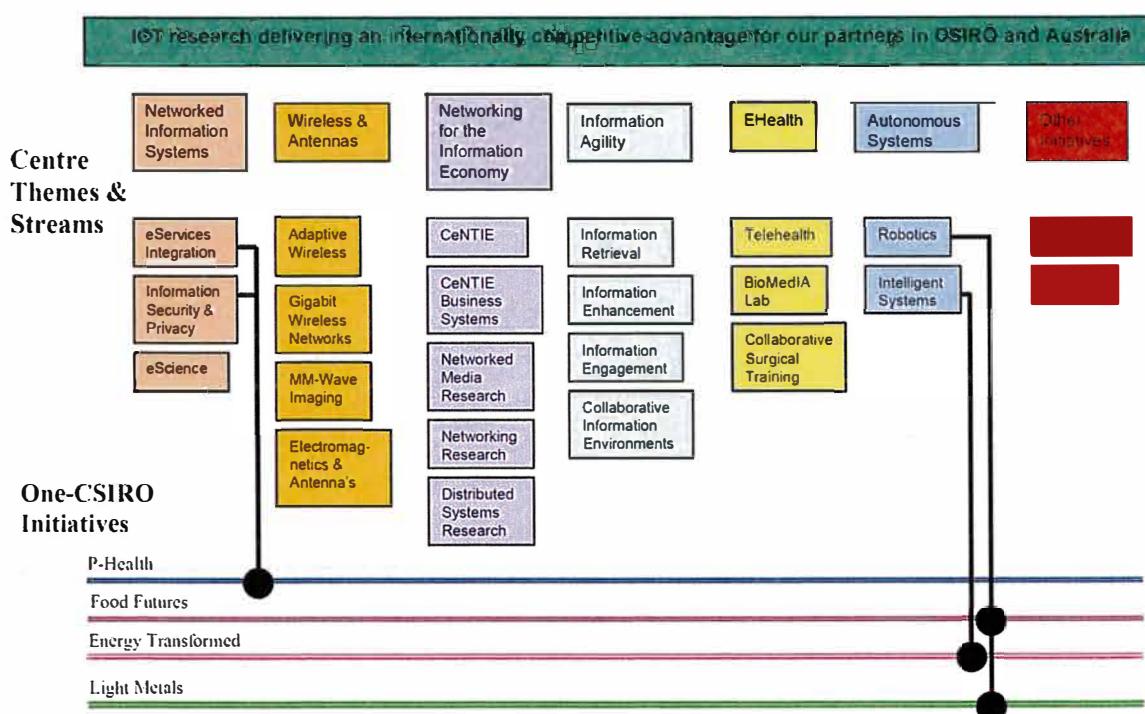
Goal: To apply information and communications technologies and closely related technologies such as sensing and imaging to the delivery of health care. These applications will be developed in collaboration with clinical partners and deployed to achieve improvements in outcomes such as improved clinical effectiveness and cost-effectiveness, overcoming distance for users of the system who live outside major centres, safety through better trained practitioners and less invasive or dangerous therapy.

Other Initiatives

QeHRC (\$4.00m)

Queensland e-Health Research Centre – a joint initiative between CSIRO and the Queensland Government. Officially launched in May 2003, the QeHRC will become a focal point for the delivery of eHealth research, leveraging the capabilities of CSIRO's ICT research and the Queensland Health network for improved health outcomes and efficiencies.

Divisional Alignment Diagram



Resourcing – ICT Centre

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
32,193	42,346	189

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	3,220
Major Cross Divisional Programs	0
Emerging Science	1,650
Core Divisional Research	36,816
Total Expenses	41,686

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	23,455
Strategic R&D [Co-Investment]	14,7556
Consulting and Services	2,030
Licensing and Exploitation of IP	1,445
Total Expenses	41,686



8.3 Industrial Physics

Divisional Chief: Dr Gerry Haddad

Industrial Physics applies its specialised knowledge of physical science to develop new products and services for the aerospace, energy, environment, security and manufacturing industries. Our core capabilities are:

- Precision optical fabrication, coating and metrology {15 EFT}
- Design and development of energy-efficient electric machines and drives {9 EFT}
- High T_c superconducting devices and systems {14 EFT}
- Surface science {21 EFT}
- Nanoscience {12 EFT}
- Intelligent sensing and response systems {15 EFT}

Theme performance and response – 2003-04

Theme: Product Innovation

Goals:

Improve the diversity and competitiveness of the Australian manufacturing industry by introducing revolutionary new or improved products based on nanotechnology, self-assembling, self-repairing and intelligent systems, and molecular electronics.

Progress

Annual Performance Goals	Achieved: 14	Delayed to 04-05: 5	Unachievable: 2
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APGs not met in the Ultra Micro Indentation System (UMIS) area were due to overestimation of market. In the case of Security Radar there was sign of user demand for 3D imaging functionality which has now been developed. In case of the Offset Printing Thickness Instrument (OPTI), delays were due to lack of a clear value proposition for the industry which has now been clarified. Optics activities were successful apart from minor project redirections.

Response

Low impact in the general instrumentation market has been a factor in the strategic restructuring of CIP; de-emphasising instrumentation development except in areas where multi-application technology platforms give stronger market penetration (eg, superconductivity and optics). Commercialisation of legacy instruments now occurs in an Instrumentation Program Stream under ‘Other Initiatives’. The 04-05 Theme and Stream structure has been developed from the new Divisional Strategy to more efficiently align our capabilities with major impact delivery themes of Clean Energy, Physical Security, Frontier Industrial Technologies and Aerospace Systems.

Theme: New Materials and Devices

Goals:

Improve the competitiveness of the Australian manufacturing industry by introducing revolutionary new or improved processes for manufacturing, monitoring and control in the transport, food, automotive, biomedical and other industries.

Progress

Annual Performance Goals		Achieved: 23		Delayed to 04-05: 4		Unachievable: 2
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Successful Theme outcome for the year. Two activities terminated for scientific redirection and reallocation of resources to higher priorities. Some minor delays in deal closure and equipment delivery.

Response

No missed APGs were due to poor performance. In the new 04-05 Theme and Stream structure Frontier Industrial Technologies provides a more output oriented focus for linked activities in micro and nano-fabricated systems, while the new theme of Physical Security provides an appropriate platform for growth in the NRP area of Safeguarding Australia..

Theme: Energy and Sustainability**Goals:**

Develop new energy systems which result in either incremental or disruptive changes to the economics of fuel production, storage and utilization.

Progress

Annual Performance Goals		Achieved: 12		Delayed to 04-05: 6		Unachievable: 0
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Generally strong performance in this Theme with the increase in involvement with GM and Holden, and increased involvement with Flagships. Major cause of APGs not met was the demonstration by CSIRO that water splitting efficiencies for TiO₂ claimed in the literature were incorrect, leading to a scientific redirection of that Stream activity.

Response

Theme goal and name revised following the strategic realignment, however Efficient Energy Systems Stream remains largely unchanged. The redirected water splitting project was combined with a new activity, responding to industry interest in modelling the effects of the H₂ economy, to form a new second Stream called Hydrogen Technology – an anticipated growth area.

Theme: National Measurement Laboratory**Goals:**

To develop and maintain Australia's national standards of measurement and to provide calibration services in terms of those standards that satisfy the needs of Australia's industry, trade, commerce and defence

Progress

Annual Performance Goals		Achieved: 30		Delayed to 04-05: 4		Unachievable: 1
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Very successful Theme performance. Delays in commercialisation APGs due to relocation of the Melbourne Lab, the separation from CSIRO and a cessation due to A E Bishop acquiring their own CMM capability during the year.

Response

NML separated from CSIRO to form the National Measurement Institute at the end of the reporting period (June 2004).

Theme: Space Activities

Goals:

To expand the Australian satellite presence by the development of new technology and by growing national and international linkages through the CRC for Satellite Systems. Provide effective management oversight of the Canberra Deep Space Network at Tidbinbilla on behalf of NASA.

Progress

Annual Performance Goals		Achieved: 4		Delayed to 04-05: 2		Unachievable: 0
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APGs achieved except for delays in concluding international agency-to-agency agreements and slower than anticipated sign on of new participants to CRC.

Response

Aerospace Systems Theme created to exploit synergies between NASA and CRC activities and the division's activities in Space Optics and aerospace applications of Intelligent Systems. No other changes anticipated other than pursuit of new strategies to replace the CRC-model funding following the unsuccessful renewal bid.

Research Themes – 2004-05

In the context of the formation of the ICT Centre and separation of the National Measurement Laboratory from CSIRO, the Division took the opportunity in May 2004 to reassess and revise its long-term strategy. This resulted in a revised Theme and Stream structure and new divisional name. The new Frontier Industrial Technologies Theme provides a more output-oriented focus for linked activities in micro and nano-fabricated systems, while the new Physical Security Theme provides an appropriate platform for growth in the NRP area of Safeguarding Australia. An Aerospace Systems Theme was created to exploit synergies between NASA and the CRC activities, the division's activities in Space Optics and aerospace applications of Intelligent Systems. CIP's low impact in the general instrumentation market was a factor in the strategic restructuring; de-emphasising instrumentation development except in areas where multi-application technology platforms give stronger market penetration (eg, superconductivity and optics). Commercialisation of legacy instruments now occurs in an Instrumentation Program Stream under 'Other Initiatives', along with a number of activities undertaken for the Light Metals Flagship.

Clean Energy (\$3.51m)

Goal: Improve the economics and sustainability of energy conversion, storage and utilisation by creating, developing and assessing new technologies based on electro-magnetics, photocatalytic materials and biophysics. Examples are developing sustainable energy conversion based on photo-electrochemical production of hydrogen from water and modelling the environmental effects of the Hydrogen Economy.

Physical Security (\$2.74m)

Goal: Improve the security of people and property by creating and developing new technologies based on applied superconductivity, acoustics, electro-magnetics, optics and complex multi-agent systems approaches. This new theme includes MAGSafe, the superconducting magnetic anomaly detection system developed by CIP, sub-surface security radar and new technologies for airport security.

Frontier Industrial Technologies (\$6.36m)

Goal: Improve the present productivity and future viability of Australia's manufacturing and environmental industries using nanotechnology, photonics, biomaterials and quantum engineering. We will develop revolutionary nanoscience-based printing and etching technologies for the electronics industry and sensing technologies for geophysical exploration..

Aerospace Systems (\$11.42m)

Goal: To develop new technologies, components and systems for the aerospace industry of the future, underpinned by the application of space-based science and engineering to satellite, optical and intelligent systems. This theme includes collaboration with NASA on the Ageless Aerospace Vehicle and development of leading edge optical sub-systems for space applications with JPL and NASA.

Other Initiatives

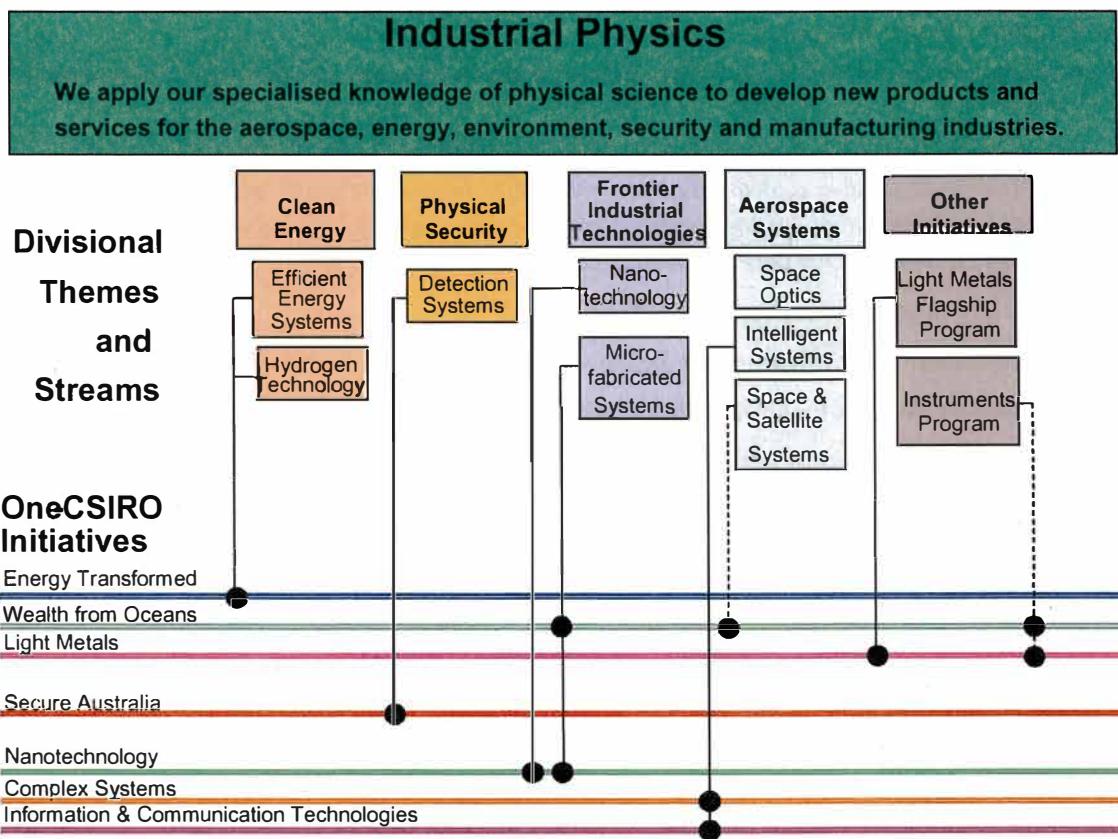
Light Metals Flagship Program (\$1.31m)

Goal: To develop and deliver physical technology solutions to identified problems in the Aluminium smelting industry. To develop new production technologies for Titanium Aluminides; following the successful demonstration of small-scale fabrication of this strategic material we will now scale-up towards demonstrating production of commercially-viable quantities with an industry partner.

Instrumentation Program (\$1.67m)

Goal: Transfer technology to industry in the form of products. Over time, CIP has developed seven different physics-based industrial instrumentation systems, such as OPTI and high-power ultrasound, which we are now commercialising as a centralised activity within the Division.

Divisional Alignment Diagram



Resourcing – Industrial Physics

Revenue and Staff Resources

Appropriation Revenue \$'000	Total Revenue \$'000	Total Staffing (EFT)
17,793	27,155	154.8

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	3,340
Major Cross Divisional Programs	0
Emerging Science	3,851
Core Divisional Research	19,818
Total Expenses	27,009

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	15,836
Strategic R&D [Co-Investment]	7,151
Consulting and Services	3,868
Licensing and Exploitation of IP	154
Total Expenses	27,009



8.4 Manufacturing and Infrastructure Technology

Divisional Chief: Mr Larry Little

Manufacturing and Infrastructure Technology works with Australian and global manufacturing and infrastructure industries to develop and commercialise innovative materials, processes and products. Specialised laboratory and testing facilities provide research and consulting and testing services to international standards. Our core capabilities are:

- Novel Materials and Processes {90 EFT}
- Sustainable Built Environment Systems {85 EFT}
- Complex Systems Integration {41 EFT}
- Elaborately Transformed Metals {58 EFT}
- Energy and Thermofluids Engineering {50 EFT}

Theme performance and response – 2003-04

Theme: Energy and Thermo Fluids Engineering

Goals:

Improve systems comprising flows of energy, heat and fluids, by using integrated mathematical and physical modelling tools to gain understanding and provide innovative solutions that underpin, for example: sustainable energy production and use; process innovation, control and design; reduced domestic, commercial and industrial emissions; and improved monitoring and treatment of human illness.

Progress

Annual Performance Goals	Achieved: 9	Delayed to 04-05: 2	Unachievable: 1
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1kW PEM fuel cell now operating through hundreds of hours and over 50 start cycles without degraded performance. Two APGs not achieved due to delays in budget approval for Energy Transformed Flagship & Queensland Energy Centre. This will not re-occur next year as budgets have been approved for 04-05.

Overall the APGs are on track for this theme.

Response

One APG not delivered because a new opportunity arose on microfluidic diagnostic devices, which offered greater potential return to the division. Resources reallocated to that new opportunity. Opportunity for stronger engagement in Energy Transformed Flagship has resulted further resources to accelerate progress.

During 2003-2004, as a result of industry consultation CMIT has realigned its resources into 7 new themes. They are: Manufacturing in a Carbon-Constrained Future, Efficiency and Intensification in the Process Industries, Manufacturing New Generation Transport Vehicles, Revitalising Product Manufacturing, Safe and Secure Australia, Smart Infrastructure, Sustainable and Competitive Cities. This APG has been subsumed in these new themes.

Theme: Complex Systems Integration

Goals:

Develop robust and high performance automated systems and adaptive networks using system theory, complex system science and information modelling for specialized applications Demonstrate intelligent engineering systems with automatic flexibility to deal with unforeseen events, and that will self-configure, self-repair and adapt to changing conditions or new requirements with minimal human intervention.

Progress

Annual Performance Goals		Achieved: 7		Delayed to 04-05: 2		Unachievable: 0
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Overall the Theme is on track.

Response

One APG not achieved because strategic research resources were redirected to accommodate an urgent client project. A further APG was not delivered because the Robotics and Automation group were transferred to the ITC. This was a one of situation.

Theme: Novel Materials and Processes

Goals:

Design and study materials at a molecular level to create high added-value products and associated manufacturing platforms in a sustainable manner.

Progress

Annual Performance Goals		Achieved: 10		Delayed to 04-05: 3		Unachievable: 0
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Demonstrated first commercial application of soft nano-lithography through the Australian Mint. Preliminary experiments have developed a selective membrane for water ethanol separation which is comparable with commercial products, with opportunities for further substantial improvements.

Demonstrated faster progress than expected. Developing the Nanotechnology Plan has been more challenging than anticipated. The scope of the plan has been expanded and will be finalised in September.

Response

Focussed research activities into surface conductivity of polymers, to deliver a more specific outcome. Polymerisable mesostructured surface coatings has proven more difficult than anticipated, not yet successfully proven. During 2003-2004, as a result of industry consultation CMIT has realigned its resources into 7 new themes.

Theme: Sustainable Built Environment

Goals:

Optimise whole of life performance of buildings and infrastructure systems via their design, construction and management.

Progress

Annual Performance Goals		Achieved: 13		Delayed to 04-05: 2		Unachievable: 1
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Three design tools (beta versions) currently being assessed for Australian and International markets. Faster progress than contracted from the CRC. Two APGs have been delayed due to delays in recruiting a UK based project leader, and finalisation of Flagship projects. Overall, the APGs are largely on track and within budget.

Response

Evergen project received good industry response, but failed to secure DITR support. This APG became unachievable and resources were redirected into other higher priorities. Team restructuring as a result of the CMIT Investment process has concentrated effort from Brisbane and Preston groups into Lifetime Engineering of Built Assets.

Theme: Elaborately Transformed Metals

Goals:

Develop new light alloys and extend casting, welding and surfacing processes to make new light alloy, fabricated and multi-layered parts more efficiently.

Progress

Annual Performance Goals		Achieved: 10		Delayed to 04-05: 4		Unachievable: 0
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These APGs represent an aggressive plan to develop a number of new technologies and transfer them to industry. Mg sheet production was slowed due to critical twin roll casting maintenance. T-Mag technology has now produced high quality prototype castings in significant quantities. Ti sheet activities on track to produce a low cost process. There is a high level of commercial interest, and initial contract discussions well advanced. Our Mg alloy has been chosen for the US car magnesium engine (highly confidential).

Response

Where APGs not met, this is largely due to reallocation of resources into Flagship activities. We are moving resources into Ti sheet Flagship project, and accelerating T-Mag activities in protective coatings for Al anodes and cathodes.

Research Themes 2004-05

The synergistic strengths of this new Division were identified in its first year of operation. These five core capabilities are now coming to the fore.

In our second year, enhanced productivity was evidenced through the achievement of a 9 percent growth in external earnings, with a reduction of 5 percent in resources. At the same time important targets were missed. However steps have now been taken to improve financial forecasting and budgetary controls with better performance expected in 2004-05.

Over the last six months 7 new Themes have been established through extensive industry consultation. Our core capabilities will be applied through these new Themes. Their focus is sharp, time bound and reflect industry as well as national priorities.

Progress on delivery of 2004-05 goals will be enhanced through improved accountability and resource allocation. In part this will be assured through appointment of Theme Leaders together with complementary business development and resource management skills.

Theme: Manufacturing in a Carbon-Constrained Future (\$4,180)

Goal: By 2015, the demand for crude oil feedstocks used in energy and polymer production, will exceed supply. By 2010, Australia will import 60% of its crude oil needs, which will contribute a \$7b – A\$8b to the trade deficit. CMIT will create new knowledge, and new technologies and will design strategies and systems that will reduce the demand for hydrocarbon feedstocks by 20% by 2015 in the areas of energy and polymer production. This will be achieved by:

- developing and deploying models, materials, and science and engineering in solid-state ionics and thermodynamics, to ensure that Australia has access to safe and efficient infrastructure and technologies for hydrogen production and use.
- developing and designing systems and processes to extract and transform agricultural waste, emission streams and natural polymers into alternative feedstocks and improving simulation models, new technologies and systems for renewable energy production and end use efficiency.

This Theme will utilise the capabilities of several CMIT teams and aligns strongly with the CSIRO Energy Transformed Flagship Project and National Research Priorities

Theme: Efficiency and Intensification in the Process Industries (\$9,364)

Goal: The challenge for competitive edge is driving demand for more intense, efficient, maintenance-free and sustainable processes. By 2008, CMIT will have helped develop new knowledge, materials, technologies and strategies to reduce costs of production processes by a minimum of 5%.

This will be achieved integrating information, thermo-fluid, materials, and manufacturing technologies to:

- increasing throughput (more efficient operating conditions, faster, more effective and on-line maintenance);
- achieve process technology breakthroughs which enable more intense and efficient operation (process flows and reaction technologies, higher performance materials, and technologies for applying them)
- extend the economical life of critical assets (re-manufacturing to better than new).

Theme: Manufacturing New Generation Transport Vehicles (\$12,924)

Goal: The vehicle manufacturing industries are a strategically important part of the Australian manufacturing sector. CMIT will introduce new products that provide a total benefit of \$25M p.a. by 2008 through cost reduction, enhancement of vehicle efficiency or reduction of environmental impact.

The theme will bring together research across the materials areas (light weight and multi-functional materials); and the IT and complex systems areas (through life support and multi-enterprise and user integration); and environmental areas (sustainable manufacturing) to deliver benefit to the industry.

Theme: Revitalising Product Manufacturing (\$10,239)

Goal: Using nano- & microstructure control over materials, we will create high value added products to compete with commodity-based manufacturing. By 2008, we will be well advanced in the development of technologies, which will underpin the successful creation of one company per year.

This will be achieved through:

- The generation of at least two product platforms, devices or implants for sustaining, improving or real-time monitoring of human health, through new materials development, simulation models and sensor design.
- Development of at least one new World-leading materials systems with optically adaptive capacity and radically new properties (electrical conductivity, optical, flexibility, dielectric properties) for use within the textiles, packaging, security, transport and construction sectors.

Theme: Safe and Secure Australia (\$9,954)

Goal: To develop products, services and strategies to detect, prevent and mitigate potentially catastrophic events, thereby minimising their socio-economic impact on Australia.

This will be achieved by delivering at least two significant new products and services by 2008 through:

- Development of micro technology based document security technologies and vision based surveillance systems.
- Development of complex arrays sensor systems, monitoring strategies, and technologies to mitigate the impact on human health from fire and contamination of air and water supplies
- Protection of critical infrastructure and utility networks from harmful human interference and mitigate damage by physical protective technologies.

Theme: Smart Infrastructure (\$10,487)

Goal: By 2008, deliver national benefits in excess of A\$200 million** per year through:

- Automation of design processes (eg. instead of taking weeks to cost an infrastructure project it will take minutes)
- Application of new IT tools to asset management (Australia's building & infrastructure industry spends about \$80 billion p.a. in asset management & facility management, through the creation of new tools like CMIT's PARMS, these costs can conservatively be reduced by 5%)
- Development of Smart Indoor Environments (The largest cost to industry is in the human workforces productivity & health. Based on a Californian study, small improvements in this area are worth billion's to Australian industry.)

** The derivation of this number was based on the calculations set out in Kats (2003). The Costs & Financial Benefits of Green Buildings. A Report to California's Sustainable Building Task Force, but is also consistent with Australia's 2003 Inquiry into Sustainable Cities, current state and federal government environmental targets and the Australian Infrastructure Report Card 2001 (AusCID).

Theme: Sustainable and Competitive Cities (\$6,413)

Goal: By 2008, reduce the ecological footprint of Australia's cities by at least 4% and increase economic efficiencies by 10% via radical re-design of water, waste, transport and energy networks in the context of more integrated and sustainable urban systems.

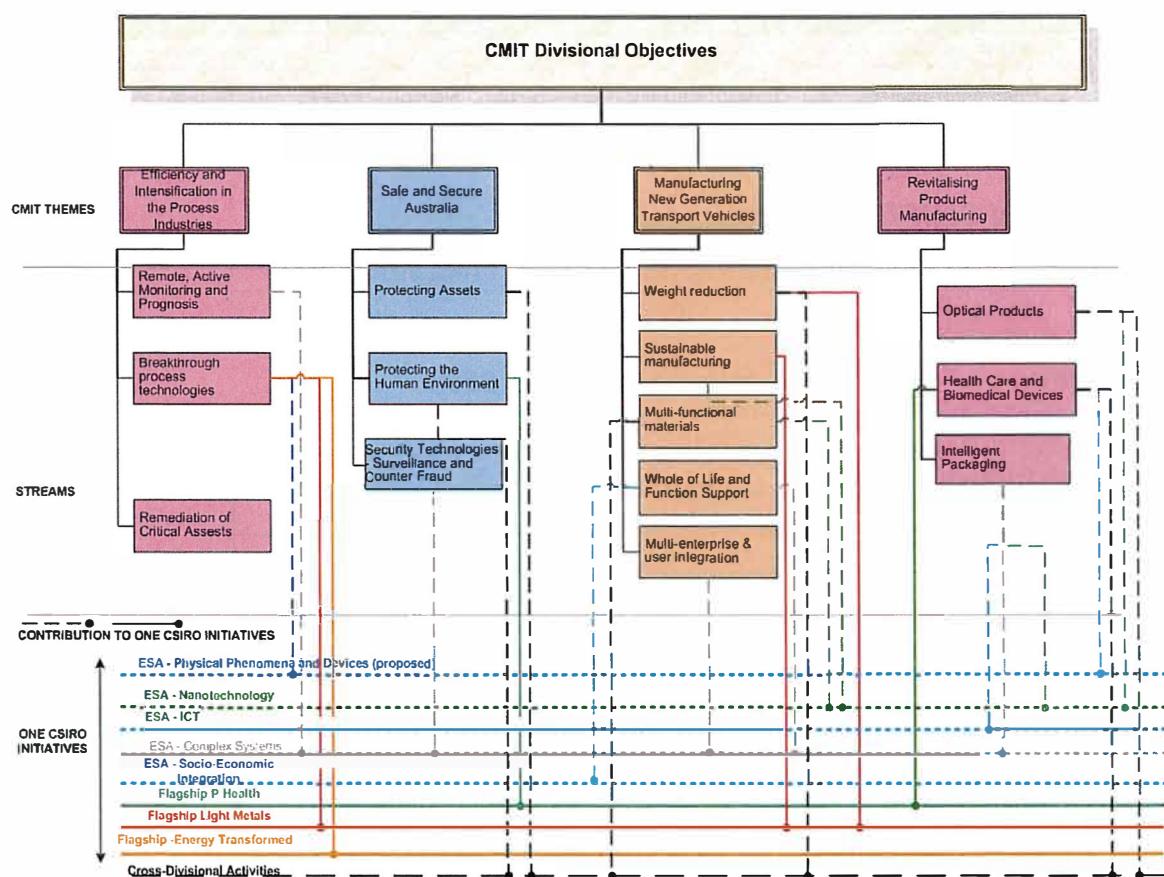
Over the next 25 years, fundamental changes will be needed across the critical infrastructures of water, energy, transport and waste in order to maintain Australia's position of having the world's most liveable and competitive cities. CMIT will be focussing on a number of key areas including integrated (stormwater, wastewater) urban water systems to drought proof our metropolitan regions; intelligent transport systems to ease pressures of costly traffic congestion in cities; distributed energy, in order to introduce more eco-efficient (and renewable) sources of energy into cities; and eco-industrial clusters of new industries based on utilisation of metropolitan waste streams currently disposed to air, landfill or receiving waters.

Other Initiatives

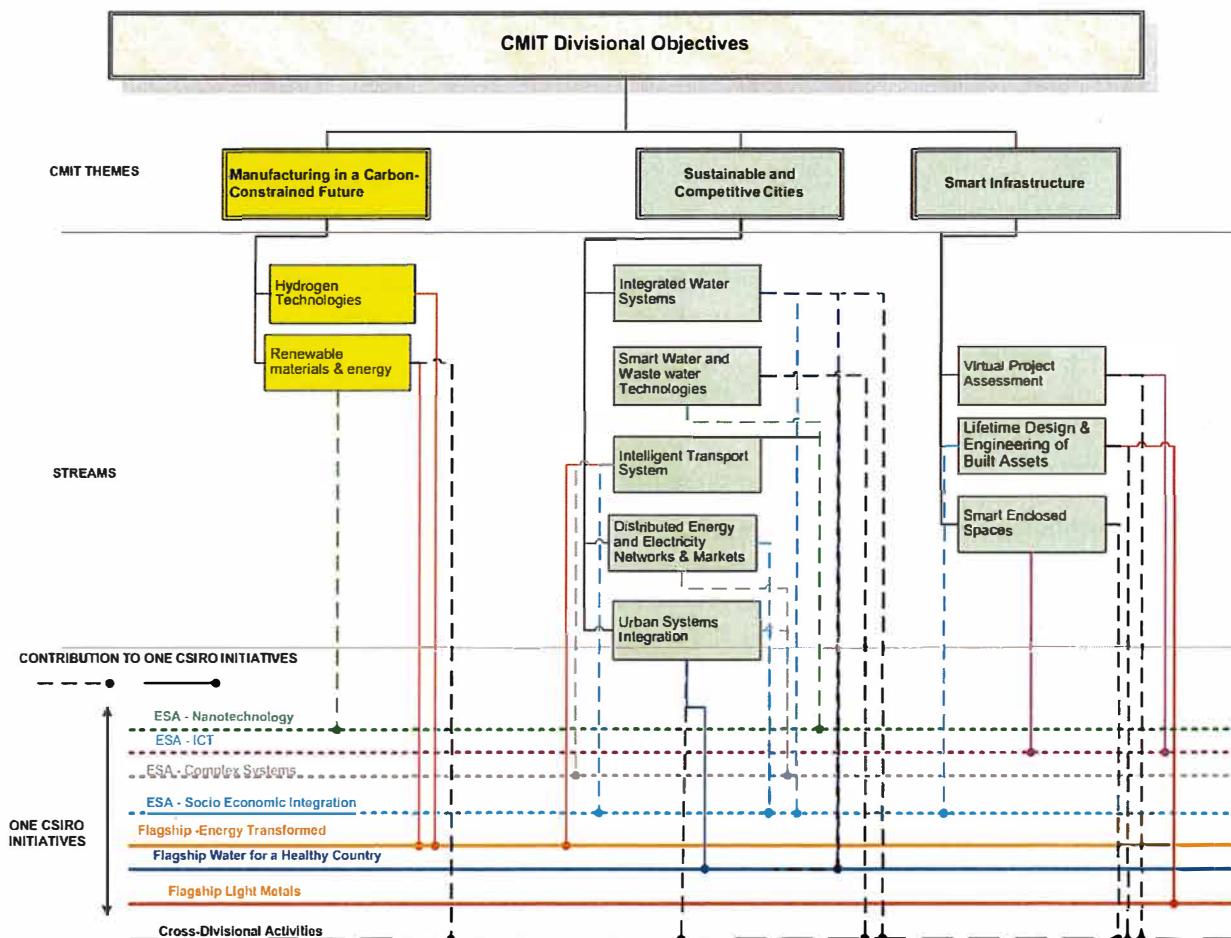
Industrial Research and Consulting Services - IRCS \$3,060

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.

Divisional Alignment Diagram – Part 1



Divisional Alignment Diagram – Part 2



Resourcing – Manufacturing and Infrastructure Technology

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
54,560	79,554	464

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	8,512
Major Cross Divisional Programs	8,261
Emerging Science	863
Core Divisional Research	61,208
Total Expenses	78,844

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	31,309
Strategic R&D [Co-Investment]	39,139
Consulting and Services	7,896
Licensing and Exploitation of IP	500
Total Expenses	78,844



8.5 Mathematical and Information Sciences

Divisional Chief: Dr Murray Cameron

Mathematical and Information Sciences performs leading-edge research in quantitative and computational disciplines to create innovative models and analytical methods, products and services to have an impact on industries where information is critical. Our core capabilities are:

- *Model Abstraction, Simplification, Solution, Inference, Validation & Evaluation – 'MASSIVE' {39 EFT}*
- *Numerical Algorithm Development {15 EFT}*
- *Inference from Integrated Information {13 EFT}*
- *Image segmentation and classification {11 EFT}*
- *Enabling Capability: Exploratory Data Validation and Analysis {9 EFT}*
- *Enabling Capability: Software engineering for numerical algorithms {9 EFT}*

Theme performance and response – 2003 -04

Theme: Biotechnology & Health Informatics

Goals:

By 2008 develop intellectual property for mining and analysing biological and clinical data that will impact applications in human health and agriculture.

Progress

Annual Performance Goals		Achieved: 31		Delayed to 04-05: 8		Unachievable: 2
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We have made considerable progress towards the Theme goal with a number of patents granted status and a number of new patents filed. Several good collaborations and commercial arrangements have been set up to enable the evaluation and implementation of technologies developed. This was a new Theme in 2003-04, established as part of changes to the CMIS structure resulting from the establishment of the ICT Centre. As part of that restructure the opportunity was taken to refocus our strategy for image processing towards biotech applications.

Response

The Theme was newly formed in the 2003-04 FY. There has been a major restructuring within the theme over the last half of 2003. The benefits of this are anticipated to be seen in FY 2004-05. As part of this restructuring it was identified that we lacked strong research management skills in the theme as well as a weakness in the area of postdoctoral researchers. We have appointed three very strong post-docs and are currently recruiting for 3 steam leaders.

Theme: Environmental Monitoring & Management

Goals:

By 2008 provide natural resource managers with at least 6 world-class quantitative analytical solutions to environmental issues focusing on the key areas of improving water quality and security of water supply; measuring and assessing indicators of environmental health (e.g. salinity, greenhouse gas emissions); and increase both the profitability and sustainability of our fisheries.

Progress

<i>Annual Performance Goals</i>		<i>Achieved: 33</i>		<i>Delayed to 04-05: 11</i>		<i>Unachievable: 4</i>
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CMIS' environmental theme has made good progress towards this goal during 2003-04. Each research stream has relevant projects and stories to tell that contribute to the goal. These include further development of mapping & monitoring technologies for broad-scale remotely sensed applications, most notably the National Carbon Accounting Scheme, new statistical methodologies and technologies for application in areas such as marine research and climate forecasting. A partnership has been developed in the past year with the Australian Greenhouse Office focussing on applying technologies internationally. In the main, delays and failure to achieve some APG's are the result of staffing issues and/or deferred milestones by collaborators.

Response

In the light of performance towards the goal during 2003-04, combined with very strong performance against the division's external earnings requirements, the division is seeking to recruit immediately to seven newly created positions. These are aimed at strengthening our contribution to fishery and environmental management and will build on our world-leading capabilities in continental scale monitoring.

Theme: Decision Making for Industrial Processes & Business Services**Goals:**

By 2008, substantially reduce costs and improve quality and productivity of processes in manufacturing, mining, infrastructure and service industries through the development of at least 6 world class analytical tools and technologies.

Progress

<i>Annual Performance Goals</i>		<i>Achieved: 27</i>		<i>Delayed to 04-05: 6</i>		<i>Unachievable: 3</i>
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The Theme has made good progress towards achieving the Goal, with the work in Adaptive Supply Networks in particular leading to development of some significant new technologies and commercial arrangements. There has also been significant new IP in a wide range of areas, including options pricing, a sophisticated and novel library of powerful simulation codes and physical asset management IP.

Response

Over the last few months, a substantial restructuring has taken place aimed at improving the focus of the Theme, generating better research momentum and building critical mass in areas where we have distinguished or niche offerings. This re-focus and the identification of some additional opportunities to explore has resulted in a revised Theme goal for 2004-05.

Research Themes – 2004-05

2003-04 was a very successful year for the Division, despite significant restructuring in the early part of the year in preparation for the splitting off from the Division of about 40% of research staff into the newly established ICT Centre. As a result, the Division will undertake a significant recruitment program to enable us to build on the commercial successes, enhance our leadership capacity and pursue emerging science activities.

The Research Themes remain unchanged from 2003-04, though there has been some restructuring of Streams within the Theme "Decision Making for Industrial Processes & Business Services" in order to (a) better capture opportunities, (b) derive tighter focus, (c) generate significant research momentum, and (d) build critical mass in certain areas where we have distinguished or niche offerings.

Biotechnology and Health Informatics (\$9.77m)

Goal: By 2008, develop and commercialise intellectual property for mining and analyzing biological and clinical data that will deliver high impact applications in human health and agriculture. This will deliver tangible benefit to the Australian economy through increased productivity in agriculture and savings in health care. The theme will deliver \$3B in national benefit by 2010.

Environmental Monitoring for Management (\$5.48m)

Goal: Enable the effective identification, monitoring, remediation and resolution of major environmental and natural resource issues by developing and implementing new statistical methodologies for smarter information use. 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.

Decision Making for Industrial Processes & Business Services (\$7.92m)

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”.

Other Initiatives

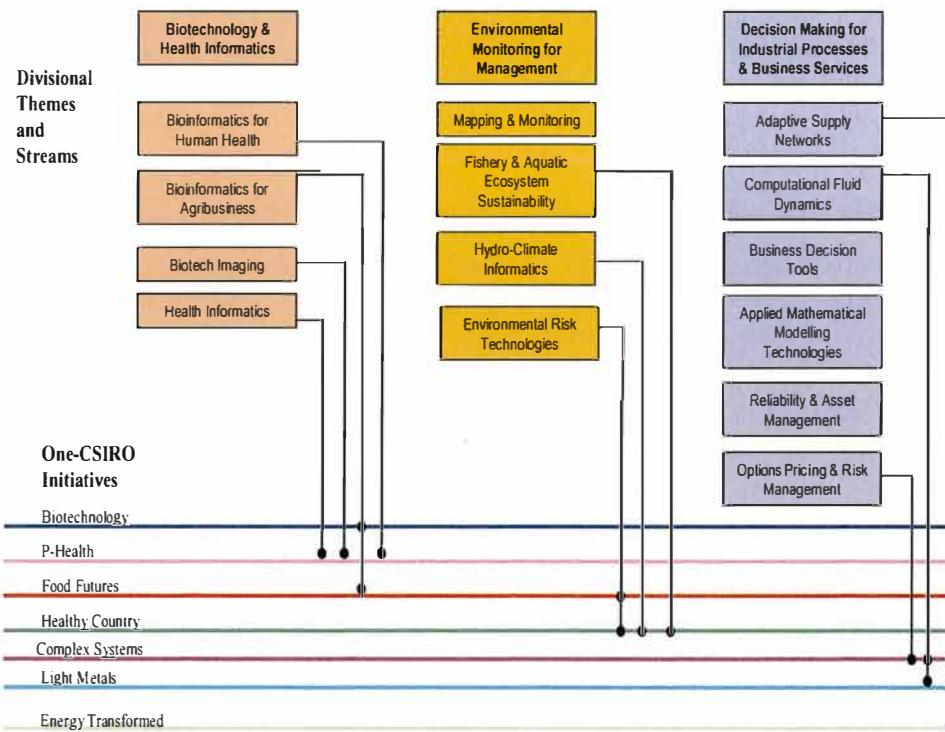
Software consulting and support (\$0.70m)

The S-PLUS statistical package has been a key platform for much of the Division's statistical work for many years and as a result CMIS is the main distributor of S-PLUS in Australia as well as providing both training and consulting services to licensees (external and internal). It is also used for the development and maintenance of CSIRO's CVS system.

Divisional Alignment Diagram

Strategic Alignment Diagram for Divisional Research

We deliver transformational tools and methods of analysis to decision-makers, researchers and information providers to enable well-informed action.



Resourcing – Mathematical and Information Sciences

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
16,761	24,082	175

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	5,318
Major Cross Divisional Programs	0
Emerging Science	514
Core Divisional Research	18,132
Total Expenses	23,964

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	12,221
Strategic R&D [Co-Investment]	7,380
Consulting and Services	3,412
Licensing and Exploitation of IP	1,069
Total Expenses	23,965



8.6 Molecular Science

Divisional Chief: Dr Annabelle Duncan

Molecular Science provides economic, environmental and social benefit to industry and the community through the application of expertise in chemical and biological sciences. Our aim is to assist the development of industries in the chemicals and plastics and the pharmaceutical and human health sectors of the economy. Our core capabilities are:

- Bioactive molecule discovery and optimization {32 EFT}
- Biotransformation {14 EFT}
- Biomaterials {33 EFT}
- Fit-for-function polymeric materials {25 EFT}
- Product protection and authentication {7 EFT}
- Gene expression - discovery and analysis {22 EFT}
- Nano-structured materials {11 EFT}

Theme performance and response – 2003-04

Theme: Biomaterials

Goals:

To develop synthetic materials that are compatible with biological systems to improve the health and well-being of Australians, e.g. artificial ligaments, extended wear contact lenses, engineered tissue/polymer hybrids.

Progress

Annual Performance Goals		Achieved: 12		Delayed to 04-05: 2		Unachievable: 0
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The majority of the goals in this Theme have been achieved with excellent progress in each stream. A major achievement has been the launch of the new company PolyNovo Biomaterials which is based on our biodegradable polymer technology. The decision to spin-out the technology was taken in light of favourable investor engagement and has returned over \$5 million to the Organisation and 50 % equity in the new company.

Response

The launch of PolyNovo Biomaterials has delayed the development of polymers for the proposed cartilage spin-off company. This work will have priority during 2004-05.

Theme: Bioactive Molecule Discovery

Goals:

To design and synthesise novel molecules with specific application in the pharmaceutical, veterinary drug and crop care industries.

Progress

Annual Performance Goals		Achieved: 9		Delayed to 04-05: 2		Unachievable: 2
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Progress has generally been successful except where changed economic circumstances of our commercial partners have impacted our contractual arrangements. One company has curtailed its R&D activities due to economic circumstances whilst the other altered its R&D focus. Our work on the P-Health Flagship project has been delayed in response to delays experienced by one of the partners.

Response

In response to altered focus by our major customer we have shifted resources into a now very successful collaboration which seeks to identify parasiticides for companion animals. Our focus in 2004-05 will centre on the continued development of our relationship with this company whilst also seeking to develop new contacts with major pharmaceutical manufacturers.

Theme: Biocatalysis

Goals:

To develop new technologies using biological processes (e.g. novel microbes or enzymes) to efficiently produce high-value chemicals.

Progress

Annual Performance Goals		Achieved: 5		Delayed to 04-05: 0		Unachievable: 0
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The on-going development and resourcing of this area is a high priority for the Division. From October 2004 we will partner with Entomology and Plant Industry in the GDRC funded joint venture Crop Biofactories project and will be allocating significant resources to this venture over the next 3 years.

Response

The Division will partner with Entomology and Plant Industry in the GDRC funded joint venture Crop Biofactories project. We will be allocating significant resources to this venture over the next 3 years.

Theme: Polymeric Materials

Goals:

To design and make high-performance polymeric materials to perform specific functions, e.g. drug delivery, personal care products, coatings, inks, polymer electronics, composite aircraft parts, nanocomposites.

Progress

Annual Performance Goals		Achieved: 9		Delayed to 04-05: 0		Unachievable: 0
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All goals in this Theme were achieved through the year.

Response

We are in the process of realigning our strategic research directions in anticipation of the arrival of our Federation Fellows for 2004-05 who have interest and expertise in areas such as polymer photovoltaic and light emitting polymers.

Theme: Sensors & Diagnostics

Goals:

To develop products and processes for molecular recognition for use in applications such as disease prediction and detection and overt and covert security and authentication device development.

Progress

Annual Performance Goals		Achieved: 9		Delayed to 04-05: 2		Unachievable: 0
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Sensors: The goals in the Sensors & Security Devices area were met this year. The Division has taken leadership of the Secure Australia multidivisional project through the appointment of the Divisional Deputy Chief, Dr Greg Simpson as Coordinator.

Diagnostics: The majority of the goals in this area have been achieved or will be completed during 2004-05. We have not yet spun-out our OAdV gene delivery technology due to external circumstances, but plan that this will occur in 2004-05.

Response

A review of our diagnostic projects has led to the redeployment of some resources to the new Crop Biofactories multi-Divisional project – see Biocatalysis theme comments above. We expect that the OAdV technology spinout will proceed prior to the end of 2004. The resources involved with our sensor devices research will be focussed into the Security Theme during 2004-05.

Research Themes – 2004-05

Through the Division's project review process and following a major examination of our emerging science areas and directions, we have re-focused our research into four themes. The spin-out of technologies and accompanying staff and the introduction into the Division of two Federation Fellows also prompted a critical examination of our core capabilities and their utilisation. The new themes better utilize and focus our core capabilities and allow for the development of new research areas such as nano-biotechnology, new drug delivery mechanisms and enhanced security technologies.

The strategy of the Division is to grow new industries based around our core areas of biomaterials, industrial biotechnologies and highly modified materials and to sustain existing, and develop new, links with universities. Our reorganised themes will enable us to better focus our resources to implement this strategy.

Health Through Medical Devices (\$10.43m)

Goal: Improved human health and well-being through the development of new techniques for the prediction and diagnosis of diseases, primarily prostate and colorectal cancers, and advanced materials for medical devices in the areas of ophthalmic applications and damaged or aging tissue repair or replacement. Our P-Health Flagship interactions are an important component of this Theme.

Parasite Control (\$3.76m)

Goal: The eradication of parasites in crops and production and companion animals through discovery and optimization of biologically active molecules. Internal parasitism is the single most important disease problem confronting the sheep industry in Australia and it is estimated that control measures and production losses cost the industry approximately \$220 million annually. The application of our synthetic chemistry capabilities are focused on the screening of promising chemical candidates for the development of safer, greener agricultural crop products and external and internal animal parasites.

Security (\$1.36m)

Goal: Improved business and community confidence through better product protection and authentication. Our aim is to develop a range of innovative covert and overt security technologies for use in the related fields of anti-counterfeiting, item authentication, anti-diversion and supply chain tracking.

Elaborately Transformed Manufactures (\$16.65m)

Goal: To promote the formation and growth of high-technology manufacturing businesses in the key areas of smart materials and performance chemicals. Our polymer expertise will be directed towards the design and development of high-performance materials that can perform specific functions in areas as diverse as drug delivery, personal care products, coatings, inks, polymer electronics, composite aircraft parts and nanocomposites. Our biocatalysis capabilities will be utilised in the discovery of new

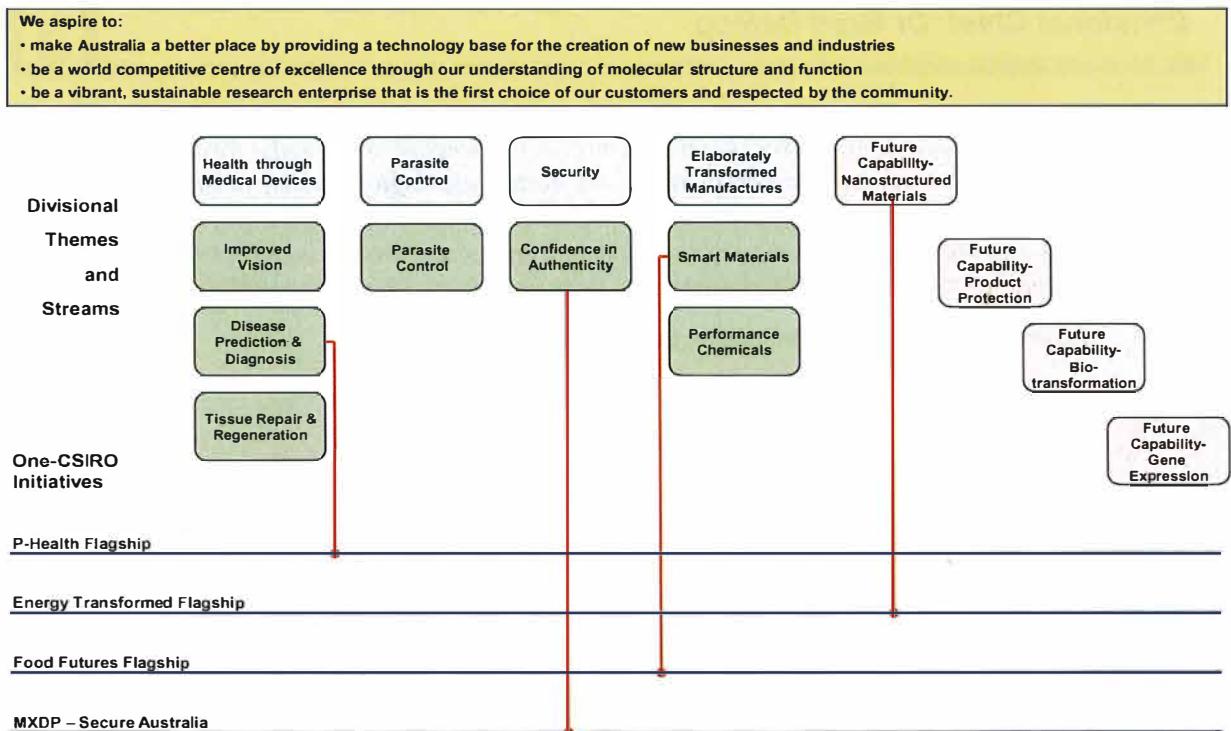
molecules with biological activity with specific application in the pharmaceutical, veterinary drug and crop care industries.

Other Initiatives

Future Capabilities (\$2.94m)

The Division is investing in a number of specific projects to develop capabilities in the following four areas: Nanostructured Materials, Product Protection, Bio-Transformation, and Gene Expression. The Federation Fellows appointed to the Division will lead these directions especially in the field of nanostructured materials for energy generation and storage and as drug delivery vehicles.

Divisional Alignment Diagram



Resourcing – Molecular Science

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
23,290	35,305	189.4

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	3,593
Major Cross Divisional Programs	109
Emerging Science	1,748
Core Divisional Research	29,677
Total Expenses	35,127

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	17,404
Strategic R&D [Co-Investment]	14,046
Consulting and Services	3,676
Licensing and Exploitation of IP	0
Total Expenses	35,127



8.7 Textile and Fibre Technology

Divisional Chief: Dr Brett Bateup

Textile and Fibre Technology delivers economic and social benefits to Australia through technological innovation which will ensure Australian wool and cotton are high demand, premium fibres in the global fibre market. Research themes focus on product and process developments for local and global corporations that lead to increased consumer demand, increased processing efficiencies and reduced environmental threats to the benefit of Australian fibre producers. Our core capabilities are:

- Advanced sensors, instrumentation and software {17.6 EFT}
- Machine prototype design and development {17.7 EFT}
- Fit for purpose textile machine engineering {40.6 EFT}
- Textile and fibre process engineering {13.5 EFT}

Theme performance and response – 2003-04

Theme: Increasing global consumer demand for Australian wool

Goals:

To provide long term benefit to the Australian wool industry through implementation of research, development and innovation of new products and sustainable processes

Progress

Annual Performance Goals	Achieved: 32	Delayed to 04-05: 18	Unachievable: 1
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Despite the large number of delayed APGs, progress has been good. Delays were mainly caused by contract delays with our major co-investing client, Australian Wool Innovation Ltd, (AWI). These delays have now been resolved which should allow APGs to be achieved in 04-05.

Response

AWI's positive response to projects in this Theme (despite contract delays) confirm the high quality of our research proposals. To better reflect customer needs in wool, cotton and synthetic products, a new Theme on market led consumer products has been created into which all new product-related projects will be transferred. Process related projects will transfer to a new Process Efficiency Theme.

Theme: Higher quality Australian cotton

Goals:

To improve the sustainability and quality image of Australian cotton in the international market place through fibre metrology and textile processing research.

Progress

Annual Performance Goals	Achieved: 17	Delayed to 04-05: 1	Unachievable: 0
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Progress on our cotton projects has been excellent.

Response

All product-related cotton projects will be transferred to the new Theme on market-led consumer products and process-related cotton projects will transfer to the new Process Efficiency Theme.

Theme: Advanced Textile Developments

Goals:

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

Progress

Annual Performance Goals		Achieved: 33		Delayed to 04-05: 8		Unachievable: 2
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Although research progress in this Theme has been good, it is now evident that significantly more R&D funds are required to bring these technologies to the market place.

Response

Most of these technologies are now being commercialised via a third party path to market supported with AWI funding. The projects will be transferred to the two new Themes of Market-led Consumer Products and Increased Processing Efficiency. Emerging Science Initiatives will be transferred to a new Other Initiative on Emergent Science.

Theme: Assisting Australian Small to Medium Size Enterprises

Goals:

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

Progress

Annual Performance Goals		Achieved: 17		Delayed to 04-05: 2		Unachievable: 0
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Progress towards goal has been excellent. Fee-for-service activities are now subsidy free.

Response

As a small (~\$2M) but important part of the Division's activities, these full fee paying projects have been transferred to a new Other Initiative on Fee-for-Service consulting to assist Australian SMEs.

Research Themes – 2004-05

The four themes from 03-04 have now been replaced by two new themes and two "Other Initiatives". This better reflects the level of investment across the Division's activities. Themes 1 and 2 are large and reflect the needs of our external customers whereas the two "Other Initiatives" contain the emerging science initiatives and full-fee-paying consulting activities. Both of these initiatives, whilst much smaller investments than the themes, are critical to the Division's future.

The two large themes focus on (i) developing consumer products and; (ii) increased processing efficiency of Australia's wool and cotton fibres. We are working closely with AWI in particular to identify and engage new and exciting global demand chain partners to bring new products and processes to the international market place through a series of well defined marketing platforms. These platforms will be used to launch products and processes in a short (next year), medium (two years) and longer (three to five years) timeframe in order to increase consumer demand for Australian wool.

Two other major activities to impact CTFT in 04-05 are the finalisation of a major restructuring program and an external Divisional review.

Develop Market Led Consumer Products Made from Australia's Natural Fibres (\$12.19m)

Goal: To provide long term benefit to the Australian wool and cotton industry through implementation of research, development and innovation of new commercially valuable products. In particular, develop one near to market product based on application of known technologies which will be launched by international partners in 2005-06 followed by two next generation products in 2006-07 based on application of emerging science (eg. nanotechnology) and finally three future generation products derived from exploitation of fundamental studies of the wool fibre.

Increase Efficiency of Processing and Trading Australia's Natural Fibres (\$8.77m)

Goal: To improve the sustainability and quality image of Australia's natural fibres in the international marketplace through fibre metrology and textile processing research. In particular, to develop and commercialise one novel sensor system for total plant management, two novel processing technologies for wool and cotton and one objective measurement technique to assist commercial trading of Australia's natural fibres.

Other Initiatives

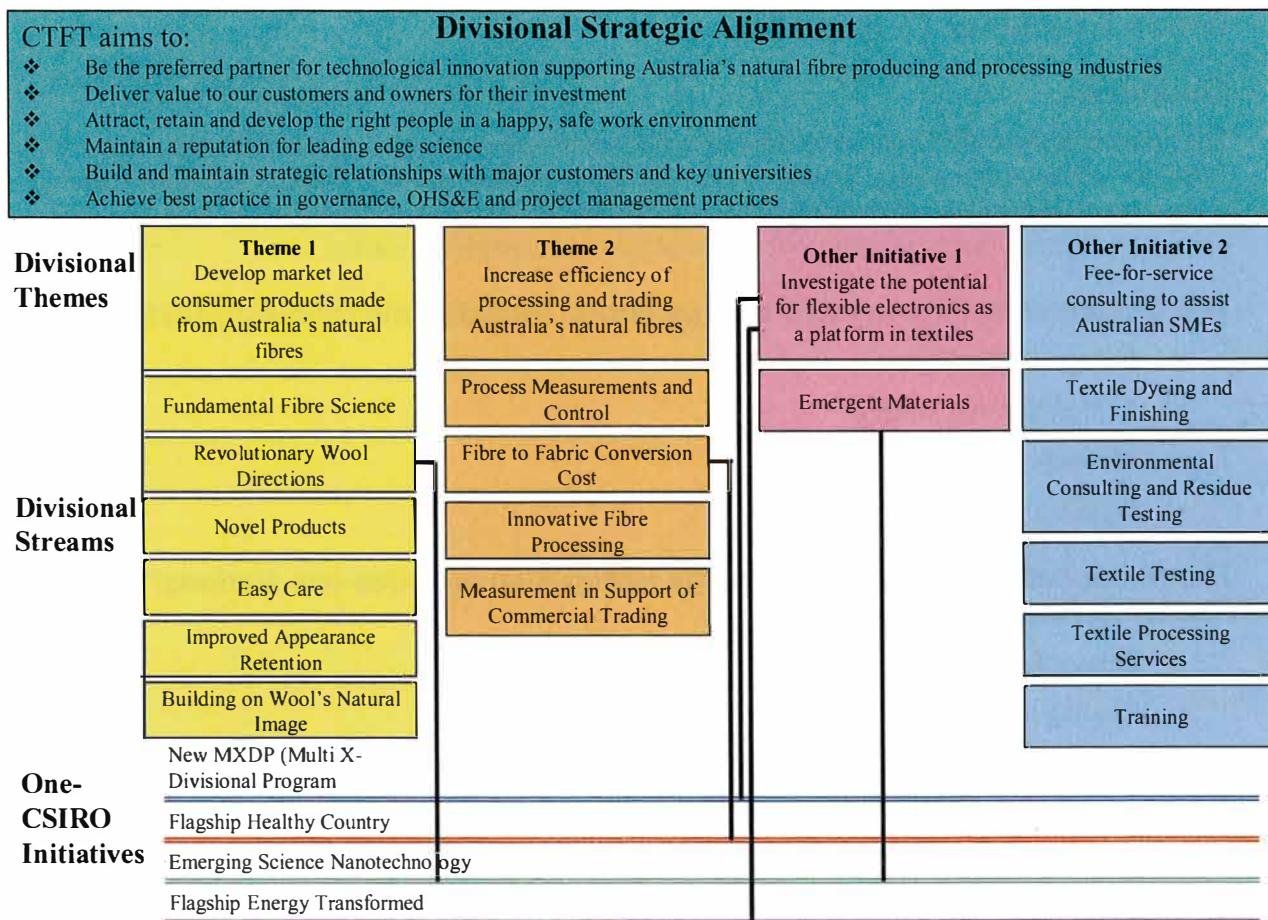
Investigate the Potential for Flexible Electronics as a Platform in Textiles (\$1.57)

Goal: To create new business activity in Australia through the development of high value added technological products for the local and global textile industry. In particular, to apply nanotechnology to fibres and textiles to develop intelligent textiles into one commercial products platform.

Assisting Australian Small to Medium Sized Enterprises (\$2.03m)

Goal: To enhance the export capabilities of Australian small to medium sized enterprises through the provision of unique fee-for-service activities. In particular, to provide textile dyeing and finishing, environmental consulting and testing, textile processing and education and training services to Australian SMEs.

Divisional Alignment Diagram



Resourcing – Textile and Fibre Technology

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
13,893	24,871	174.2

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	75
Major Cross Divisional Programs	0
Emerging Science	43
Core Divisional Research	24,446
Total Expenses	24,564

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	10,243
Strategic R&D [Co-Investment]	11,799
Consulting and Services	2,032
Licensing and Exploitation of IP	490
Total Expenses	24,564

Section 9: Sustainable Minerals and Energy Group

Group Executive: Dr Rod Hill

Overview

The mission of the SME Group is to stimulate and support the creation of sustainable value from Australia's mineral and energy resource base. The group will engage with industry and other research and commercial partners, where appropriate, for the delivery of clean and competitive ores, minerals, metals, energy and energy systems to the Australian and international market.

The Sustainable Minerals and Energy Group includes the following Divisions:

- Energy Technology
- Exploration and Mining
- Minerals
- Petroleum Resources

The Sustainable Minerals and Energy Group also includes two National Research Flagships:

- Energy Transformed
- Leading the Light Metals Age

Key Lessons Learnt in 2003-2004

The SME Group has capitalised on emerging opportunities to consolidate facilities into centres of critical mass associated with other research providers. These opportunities included collaboration between the Co-operative Research Centre for Coal in Sustainable Development and CET at QCAT, which facilitated the establishment of the Queensland Centre for Low Emissions Technology, and the collocation of the Minerals Division's activity in WA with Curtin University and Chemistry Centre WA at Waterford in Perth.

The location of the Chief of CPR in Perth and her strong engagement with the WA scientific and political community has led to a significant increase in the profile of CSIRO's Energy and Minerals Research in WA.

The external revenue for the SME Group has plateaued over the last 2 years, which will become a major limiting factor in the ability of the SME Divisions to grow in the future. This trend has led to a need to refocus and develop a new medium-long term strategy for the group that will identify new ideas and plans to allow further growth of science impact and research delivery.

The focus on the Strategic Goal of Serving as a Catalyst for Industry Innovation has highlighted the potential for the SME Group to engage more strongly and proactively with key international customers. Mechanisms such as Client Service Teams and industry alliances (Queensland Centre For Low Emissions Technology, the "R2D3" agreement with Woodside) allow better alignment of the research objectives to the real needs of industry.

The SME Group is delivering real value to the Australian minerals industry. Independent quantitative analysis of the returns on investment of a subset of hydrometallurgy projects indicated returns of at least \$295 million to the minerals-processing industry, with the prospect of future benefits of another \$250 million from a total investment of \$10 million over the last 15 years.

The CSIRO Performance Management Framework (PMF) is a valuable tool for managing our delivery against research and delivery targets. However, more attention needs to be paid to the more precise

definition of Annual Performance Goals (APGs). Some APGs need to be more specific and quantifiable to enable the Divisions to measure their true performance and operate more efficiently.

Significant Initiatives Planned for 2004-2005

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 2004-05. The Division of Exploration and Mining will be completing its restructure to consolidate its mining activities in Brisbane, exploration in Perth and geochemistry including synchrotron science in Melbourne.

CSIRO will be taking advantage of the Clayton site development plans to consolidate existing and future research support and collaboration across the site, and 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.

The Division of Petroleum Resources will be implementing the recommendations from the recently completed Divisional Review. The Division of Exploration and Mining will be completing Stage 1 of the Mining Science Review, focussing on identifying future industry needs and an assessment of the Division's current capabilities. The SME Group will complete their medium to long term Strategic Review. CSIRO will be conducting an audit and review of the instrumentation capabilities across CSIRO, to better capture the value from these activities.

The Division of Energy Technology will plan and implement the establishment of the National Solar Energy Technology Centre at the Newcastle Energy Centre, and the Division of Petroleum Resources will finalise implementation of the WA ERA and further develop the ERA Major Research Facility plan.

Alignment with CSIRO's Strategic Plan – SME Group

<i>Strategic Objective</i>	<i>Activity</i>
1.1 Play a significant role in delivering on Australia's National Research Priorities	SME Divisions are between 75% and 96% aligned with Australia's National Research Priorities, predominately with: A6 (Developing deep earth resources), A2 (Transforming existing industries), A4 (Reducing and capturing emissions in transport and energy generation), A1 (Water – a critical resource), C3 (Advanced Materials), and C2 (Frontier Technologies)
1.2 Build critical mass and ensure quality in our core research programs	Development of QCAT as One-CSIRO hub for Coal Research. Establishment of the National Solar Energy Technology Centre at the CSIRO Energy Centre in Newcastle. Substantial growth of the Queenslnd Centre for Low Emissions Technology Grow the ARRC/Waterford Minerals and Energy precinct in Perth, including co-locations with major WA Universities and State Government agencies.
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Major involvement in the two SME Group based Flagships - <i>Energy Transformed</i> and <i>Light Metals</i> - and also involvement in <i>Wealth from Oceans</i> and <i>Water For a Healthy Country</i> .
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	Proposal to create a new major cross divisional program based on synchrotron science, in order to position CSIRO to best contribute to, and benefit from, the commissioning of the Australian Synchrotron in

	Melbourne.
2.3 Build our global recognition for science leadership in our chosen science domains	<p>Increase adjunct professorships, Academy Fellowships, and international visitors.</p> <p>Hold one international oil and gas-related forum during 2004-5; organise the 2nd World Conference on Sampling and Blending in 2005; and take a lead role in organising the Iron Ore 2005 conference.</p>
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	<p>Major collaborations being developed, or bedded down, during 2004-05 include:</p> <p>The QLD Centre for Low Emissions Technology,</p> <p>The WA Energy Research Alliance,</p> <p>The Interactive Virtual Environments Centre,</p> <p>The case for a second extension for the Parker Centre CRC,</p> <p>The case for a second extension of the Clean Power from Lignite CRC, and</p> <p>The Waterford Minerals and Chemistry Precinct in WA.</p>
3.2 Service the needs of government for informed policy setting	<p>Contribute to the development of energy policy through the Energy Futures Forum of the <i>Energy Transformed Flagship</i>.</p> <p>Assist Government in devising policy to implement the Mineral Exploration Action Agenda, Mining Technology Services Agenda and Light metals Action Agenda.</p> <p>Establish close relationships with the Commonwealth Govt in the implementation of the Energy Policy</p>
4.2 Structure deeper and more meaningful relationships with large corporations	SME Group Customer Service Teams grow stronger business relationships with Woodside Petroleum, BHP Billiton, Chevron Texaco, Schlumberger, and Origin.
4.3 Accelerate the growth of promising technology-based SMEs	<p>Decide whether to form new commercial relationship with CapXX or new venture.</p> <p>Continue to work with Intellection Pty Ltd and ComEnergy to maximize success, and establish the Hyvista remote sensing Strategic Alliance.</p> <p>Continue to work with HydroDec to ensure success of the technology.</p>
5.2 Be among the best in governance, OHS&E and performance management processes	Review and refine OHSE systems, and maintain 100% compliance with the CSIRO Positive Performance Indicators.
6.2 Proactively manage patent and equity portfolios to multiply IP-based revenue streams	<p>Develop commercialisation strategy for the Air Cargo Scanner and Low Frequency Moisture Analyser.</p> <p>Finalise commercialisation strategy for ACARP Landmark automation technology.</p> <p>Progress the development of a coherent framework for the development and commercialisation of minerals industry related instrumentation.</p>



9.1 Energy Technology

Divisional Chief: Dr David Brockway

Energy Technology provides R&D contributing to the sustainability of Australia's energy industry, including its energy exports. Our core capabilities are:

- Chemistry process optimization and technology development {26 EFT}
- Renewable energy production, energy storage, and energy distribution and control systems {26 EFT}
- Integrated energy and economic systems modelling {3 EFT}
- Coal preparation and instrumentation {15 EFT}
- Remediation of air and water pollution from energy and mining {38 EFT}

Theme performance and response – 2003-04

Theme: Competitive Coal

Goals:

Optimise the use of a coal resource with regard to economic return and social acceptance, with a focus on coal preparation, dewatering and value added coal.

Progress

Annual Performance Goals	Achieved: 19	Delayed to 04-05: 5	Unachievable: 2
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Strong industry engagement in some coal preparation areas is balanced by declining interest in other areas where industry now feels it has implemented the research findings. Major causes of deferred APGs are delayed access to customer sites for field trials compared to schedule and complications related to commercial negotiations.

Response

Resources in some areas being shifted to other Themes to reflect change in demand and new approaches taken to commercialisation involving partners. For 2004-05, the number of streams will be reduced to keep the focus on successful areas.

Theme: Energy Storage

Goals:

- Develop affordable battery systems for low emission road transportation.
- Develop battery and control technologies for hybrid energy systems.
- Establish partnerships for development and production of high performance lithium and supercapacitor storage technologies.

Progress

Annual Performance Goals	Achieved: 38	Delayed to 04-05: 4	Unachievable: 5
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On time, on budget progress on research APGs and performance targets for Energy Transformed Flagship projects. In depth market analyses conducted with BD&C for commercialisation of existing and new IP. Decision to reduce focus on lead acid battery developments and move to higher

risk/return advanced energy storage technologies. Major causes of missed APGs were over ambitious (time and profitability) commercial engagement goals.

Response

Substantial new appropriation investment in new areas planned for 04-05. New business plan developed, one Stream eliminated and Theme combined with Distributed Generation for more synergy.

Theme: Low Emissions Electricity**Goals:**

Develop and implement in Australia, technologies for low emissions electricity.

Progress

Annual Performance Goals	Achieved: 19	Delayed to 04-05: 9	Unachievable: 1
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The core of this theme is the coal gasification program with the CRC for Coal in Sustainable Development and the establishment of projects with the Queensland Centre for Low Emission Technologies (cLET). Delays in the establishment of the cLET board and the mechanisms for project evaluation and approval severely affected this theme in 03-04. Towards the end of 03-04 it was apparent that most of these problems were solvable and that the original APGs or equivalent ones would be achievable in 04-05. The cLET is a major Energy Transformed Flagship work area.

Response

The expansion in the work program for the theme has lead to the recruitment of four post docs by June 04 with two to join in 04-05, in line with the Divisions' staffing plan for projects in cLET. This theme has also been merged (with the Competitive Coal theme of 03-4, reflecting the coal based focus and the stream structure simplified. The renewables stream from the theme has been shifted to the Renewables and Hydrogen Theme for 04-5 for better strategic alignment.

Theme: Distributed Energy**Goals:**

Develop distributed energy technology that cost-effectively reduces greenhouse gas emissions from electricity generation.

Progress

Annual Performance Goals	Achieved: 10	Delayed to 04-05: 4	Unachievable: 1
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This theme was formed in 03-04 to enable the Division to focus on new markets in distributed generation. As is characteristic of new initiatives, assumptions of the size and strength of the markets has varied throughout the year. We have learned a lot about the skill set required – internally and externally – to serve this market. The unachievable APG resulted from a combination of loss of key skill in specialist technical areas and a change of business direction (with BD&C coaching). Delayed but achievable APG's are due primarily to equipment delays from suppliers or delayed relocation to Newcastle.

Response

The broad "exploring" phase of this theme has now been curtailed and a limited number of streams chosen for focus based around the Flagship projects. Because there are links between distributed generation and energy storage for utilities, the two themes covering these areas will be combined into one theme for 04-05. There is extensive collaboration with other Divisions and the ICT Centre in the new theme although there are still issues of resources in specialist areas.

Theme: Energy Futures

Goals:

Assess alternative options for reducing or sequestering emissions in the Australian energy system on the basis of their physical feasibility and economic, environmental and social desirability.

Progress

Annual Performance Goals		Achieved: 7		Delayed to 04-05: 1		Unachievable: 0
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This theme has been spectacularly successful, given its small resource, in attracting industry and government interest in the long term economics of energy technology development and deployment to reduce GHG emissions. This Divisional theme is a substantial part of the Energy Transformed Flagship theme.

Response

The work will be continued in 04-05. Following Ministerial approval of the Energy Transformed Flagship Energy Futures Forum, a consortium of industry, government and community groups will develop scenarios and CSIRO and ABARE will conduct the economic modelling. Because the impact of economic research is ubiquitous, we show the Energy Futures Modelling as embracing all four of our themes in the Divisions thematic map, but for managerial simplicity it will be reported as part of the Low Emissions Electricity and Competitive Coal theme for 04-05.

Theme: Hydrogen Economy

Goals:

Provide scientific leadership in targeted areas of the national policy goals leading to a hydrogen economy. In 2003-04 we focused on connecting with appropriate internal and external partners for the creation of an appropriate vehicle eg CSIRO Hydrogen Centre or Hydrogen CRC or similar.

Progress

Annual Performance Goals		Achieved: 2		Delayed to 04-05: 0		Unachievable: 0
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This theme was embryonic in 03-04 as the Division evaluated the options for progressing work related to the hydrogen economy. The debate about the pathways that Australia could take, and its role as a technology developer or technology taker, were highlighted with the unsuccessful hydrogen CRC bid, where the lack of large industry investment and a flexible time to commercialisation counted against the bid. Nevertheless, interest in the pathways towards a cleaner energy future remain, particularly for government and community groups, especially if they can be linked to renewable energy.

Response

In 04-05 this theme will grow from new Divisional and Flagship investment, along with major DEST funding. The centre piece will be the establishment of the facilities for the National Solar Energy Technology Centre as part of CSIRO's Energy Centre in Newcastle.

Theme: Existing Infrastructures

Goals:

Develop a method of engaging with key owners and developers of infrastructure in the Energy and Transport Sector to identify areas of reducing the cost of infrastructure replacement contribution to CSIRO-wide Initiatives.

Progress

Annual Performance Goals		Achieved: 1		Delayed to 04-05: 0		Unachievable: 0
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This embryonic theme has been the subject of discussions with the Energy and Transport Sector Advisory Committee. They reaffirm the need for Australia to make the best economic use of its infrastructure and to be careful in the management of future capital investment. The role for CSIRO is still emerging.

Response

In 04-05, this theme will become a stream of the Low Emissions Electricity and Competitive Coal theme while we continue the dialogue with key industry figures on the research role CSIRO can play.

Theme: Clean Air, Water & Oceans

Goals:

To develop and apply advanced technologies for the assessment and management in air and water environments, of contaminants from minerals, energy and other urban and industrial activities.

Progress

Annual Performance Goals	Achieved: 36	Delayed to 04-05: 7	Unachievable: 0
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This is a large theme tackling a combination of complex technical and environmental issues with policy impacts. A characteristic of work in this area is that the science must be of an unimpeachable standard and this reputation has been maintained in 03-04. Industry and government engagement and support varies according to need and the Division has had to reprioritise areas of work within the theme away from services and towards strategic science investment.

Response

The refocussing of the theme and change of title to “Energy and Environment” continues a change begun 12 months ago to concentrate on the impact of the science in the energy domain and to increase the industry investment in strategic research.

Research Themes – 2004-05

In 03-04 CET completed the relocation of its headquarters to the CSIRO Energy Centre, Newcastle, revamped the Leadership Team under the Division’s new Chief and pushed ahead with four strategically important activities. These are based on partnership with the Energy Transformed Flagship, renewable energy (The National Solar Energy Technology Centre), the Centre for Low Emissions Technology based in the CSIRO coal hub of QCAT and a commitment to lifting the research effort committed to Emerging Science areas that are prospective for future energy systems and their environmental credentials. The portfolio of Themes and Streams experienced different business conditions throughout the year as exemplified by the APG reports taken as a whole and CET has responded to the fluctuations by replacement, reduction or ramping up of effort in response to the Government’s National Research Priorities and industry co-investment.

In 03-04 CET’s research was organised into 8 Themes and 23 Streams. For 04-05 the number of Themes and Streams has been reduced to 4 and 14 respectively. The reorganisation was undertaken to:

- provide greater focus for new areas of growth, particularly those related to renewables and hydrogen without any diminution in CET’s objectives to grow other areas as well;
- provide additional focus in the Emerging Science domain;
- streamline the management of the Division; and

- enable some of the previous Theme Leaders who have excellent relationships with external stakeholders to focus more strongly on developing our critically important external clients.

Theme and Stream Leaders have been appointed with the latter taking on greater leadership responsibility than previously.

Low Emissions Electricity and Competitive Coal (\$10.29m)

Goal: Assess and develop alternative options for reducing net emissions in the Australian energy system based on:

- modelling of the energy system options for assessment of their physical feasibility and economic, environmental and social desirability;
- develop and implement technologies for reducing greenhouse gas emissions in Australia by more efficient use of coal for electricity production; and
- optimising the use of a coal resource with regard to economic and social acceptance through improved coal preparation, dewatering and value added coal.

Renewables and Hydrogen (\$2.11m)

Goal: Provide scientific leadership and technology developments in targeted areas for renewables and hydrogen leading ultimately to a hydrogen economy. This goal is based on:

- reducing the cost of implementing solar thermal technology for large scale hydrogen production from methane;
- working with Government departments and industry groups to further develop the technical, economic, environmental and transition issues for an evolution towards a hydrogen economy in Australia; and,

developing emerging sciences that will contribute to technological breakthroughs in renewable energy generation.

Distributed Energy and Storage (\$7.49m)

Goal: To reduce greenhouse gas emissions through

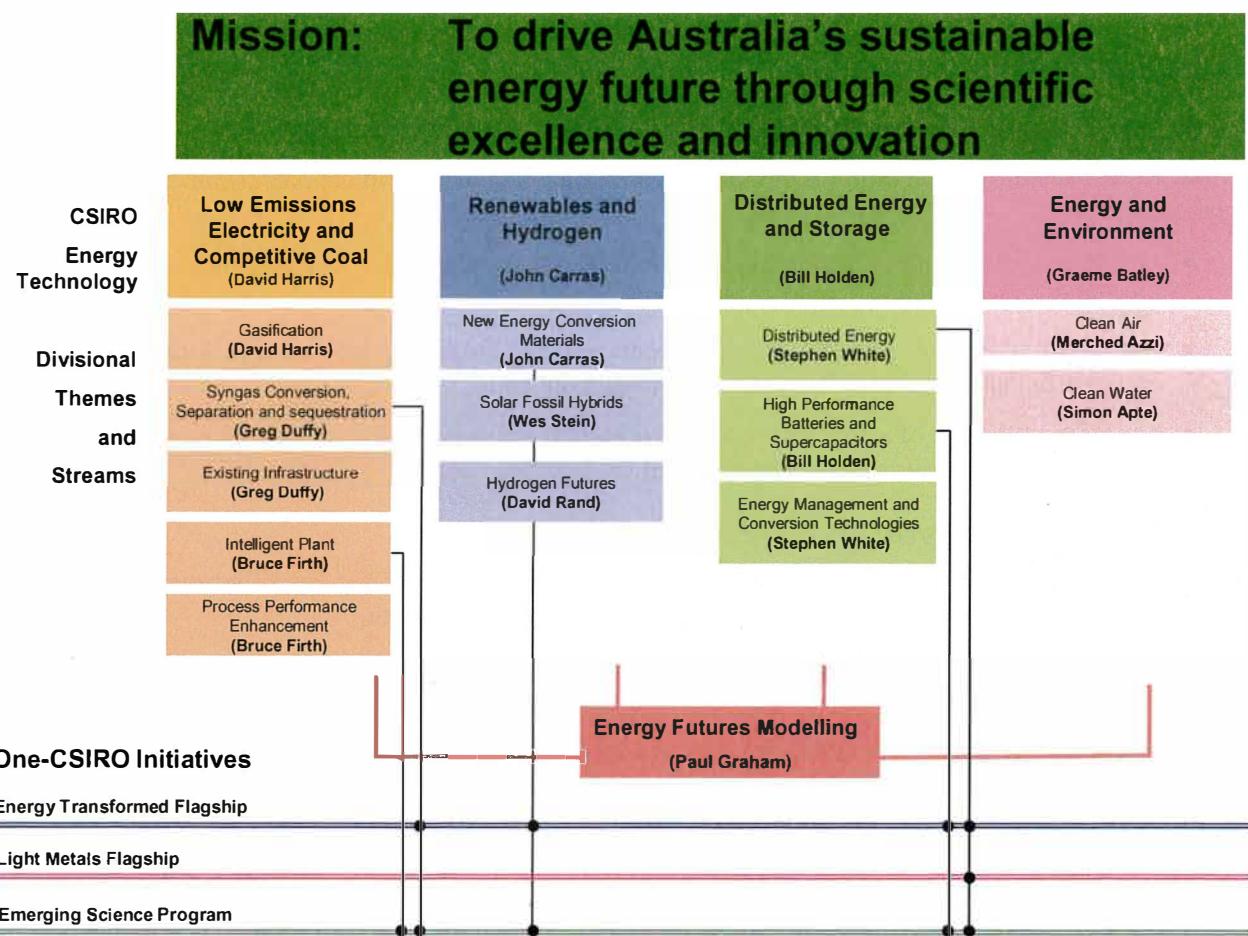
- widespread use of distributed generation for electricity production
- developing affordable battery systems and control technologies for low emission road transportation
- establishing partnerships for development and production of high performance lithium and supercapacitor storage technologies

Energy and Environment (\$8.79m)

Goal: To develop and apply advanced technologies for the assessment, management and remediation in air and water environments, of contaminants from energy, minerals and other urban and industrial activities. In 04-05 the focus will be on:

- increasing the impact of knowledge and research about the emissions to air from stationary and transport sources by partnering with organisations that can show health and environment outcomes so that policy makers have a new science basis for assessment; and,
- anticipating the impact of future energy scenarios on the stresses that the emissions to air and water will cause, based on the substantial science basis developed and applied for current industry and government partners.

Divisional Alignment Diagram



Resourcing – Energy Technology

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
20,979	29,329	160.3

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	9,310
Major Cross Divisional Programs	0
Emerging Science	1,425
Core Divisional Research	17,945
Total Expenses	28,680

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	8,599
Strategic R&D [Co-Investment]	18,000
Consulting and Services	1,931
Licensing and Exploitation of IP	150
Total Expenses	28,680



9.2 Exploration and Mining

Divisional Chief: Dr Neil Phillips

Exploration and Mining is helping to create sustainable value from Australia's mineral resources through research that leads to increased exploration success and a sustainable and vibrant mining industry. Our core capabilities are:

- *Earth Dynamics{61.4 EFT}*
- *Geoinformatics{46 EFT}*
- *Mechatronics{21 EFT}*

Theme performance and response – 2003-04

Theme: Where to Explore

Goals:

Provide data, interpretative tools and terrain scale geological information necessary for effective target area selection for key commodities in Australia.

Progress

Annual Performance Goals		Achieved: 16		Delayed to 04-05: 3		Unachievable: 0
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Good progress against the majority of APGs. The three amber APGs are on track for completion by the end of 2004 and the external parties involved are in agreement with this plan.

Response

No redirection required.

Theme: Recognising Ore Systems

Goals:

Provide tools, geological models and criteria to differentiate significant ore deposits from minor occurrences and complex background signatures.

Progress

Annual Performance Goals		Achieved: 19		Delayed to 04-05: 6		Unachievable: 0
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Numerical modelling activities are performing well and have been publicly acknowledged as delivering significant benefits to the exploration industry (eg MPI Stawell case history). Amber APGs resulted largely from overly optimistic assumptions about partner engagement.

Projects on the recognition of weathering ore bodies are on target. Publication of the two thematic volumes has been postponed to next financial year, with release of many case studies on the web.

Response

No redirection required.

Theme: Exploring Through Cover**Goals:**

Enable the discovery of weathered and/or covered ore deposits in Australia.

Progress

Annual Performance Goals		Achieved: 6		Delayed to 04-05: 4		Unachievable: 0
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Less than ideal progress made in progressing APGs in "Determining the depth to basement" Stream. AMIRA Project 618 has been successfully completed. Reduced emphasis on geophysical techniques than initially anticipated.

Response

Progress in initiating AMIRA Project 778 has been slowed by reassessment after initial release of draft proposal to AMIRA. In order to improve the chances of successful funding, and adverse reaction if unacceptable sites were found after initiating the project, it was decided to look for suitable sites as an internally funded exercise. Resources will need to be found to progress research into use of geophysics towards regolith mapping.

Theme: Knowing What to Mine (Resources to Reserves)**Goals:**

Cost-effective tools and strategies to convert Resources to minable Reserves. Develop enhanced tools for delineating and quantifying ore body quality and grade. Develop systems to quantify all geological uncertainties associated with the conversion of Resources into Reserves.

Progress

Annual Performance Goals		Achieved: 26		Delayed to 04-05: 5		Unachievable: 2
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A good year with positive outcomes achieved in nearly all projects in the rock mass characterisation area. Very good progress was achieved in the hyperspectral area, with some delays caused by Divisional restructuring and changing sponsor requirements.

Grain Research and Development Corporation project highly successful, with significant spin-off to core logging progress.

Response

Unachieved APGs have stemmed directly from changed priorities of external collaborators in one case, and a shift in strategic focus to Australian operations in the other.

Theme: Mine Productivity**Goals:**

Increase the total resources available for mining and treatment. Improve the consistency of output. Improve equipment availability from real time monitoring of mining systems.

Progress

Annual Performance Goals		Achieved: 39		Delayed to 04-05: 9		Unachievable: 1
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Significant progress has been achieved on all major projects. This has been a very successful year with substantial ongoing industry support.

Response

Unachieved APGs have stemmed from prioritisation in the Mining Geoscience group and technical issues for the Rapid Roadway Development (RRD) project. Significant progress has been made to solve the issues in the RRD project, with sufficient funds remaining to complete the project.

Theme: Mine Safety

Goals:

Reduce injuries and fatalities by removing mine workers from hazardous environments. Reduce downtime from work stoppages caused by injuries. Cut medical costs by reducing injuries and fatalities.

Progress

Annual Performance Goals	Achieved: 29	Delayed to 04-05: 3	Unachievable: 3
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An outstanding year with positive outcomes achieved in all projects and significant progress made on tools and technologies that will result in improved safety performance at mine sites.

Response

Minor delays in projects have all been due to change of timetables on subject sites.

Theme: Social and Economic Integration (shared with Minerals)

Goals:

Alignment of industry with community expectations (licence to operate). Understand and minimise the impacts of mineral and metal production on the environment. Strategies to maximise the social and economic benefits derived from mineral and metal production.

Progress

Annual Performance Goals	Achieved: 12	Delayed to 04-05: 1	Unachievable: 1
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Breakthrough research achieved in predicting and control of mine subsidence and hydrology. The theme is a new area for CSIRO and has been expanded to a Divisional "Initiative" in 04-05.

Response

Only one project was stopped due to a change in Divisional priorities.

Research Themes – 2004-05

The Division restructured its exploration activities to focus closer to its market in Perth (10% of world exploration is in WA). These changes included a staged departure from North Ryde in Sydney, a shift from owning analytical equipment to collaborating with Universities who have these facilities, and a building of geochemistry capability in Melbourne around the Synchrotron.

There has been a reduction from seven themes to two themes made during the year to better portray the exploration and the mining components of the division, and in line with the request for a smaller number of themes overall. A third theme was added recently to focus on commercial products and we will be reviewing the suitability of this subdivision.

New Deep Mineral Resources (\$14.42m)

Goal: Support an increase in Australia's mineral wealth through discovery and the opening up of new mineral districts by:

- Predicting the location of new orebodies at all scales by harnessing new technologies and a better understanding of earth processes.
- Providing tools and geological criteria to detect covered orebodies and differentiate major ore bodies from small deposits or uneconomic mineralization, particularly in the Australian regolith.

Commercial Products for Mineral Resource Characterisation (\$8.46m)

Goal: Develop and commercialise new technologies and systems that increase knowledge and confidence in the understanding of mineral resources by:

- Developing and commercialising new systems and technologies to improve the efficiency and cost of drilling and maximise the value of information collected from the drilling process.
- Providing new systems and technologies to characterise mineral resources and enhance the value of geo-sensing technologies through more effective data analysis, interpretation and integration.

Sustainable Mining of Mineral Resources (\$12.25m)

Goal: To deliver returns to Australia by developing new systems and technologies to support a strong mining sector by:

- Improving the feasibility of new mining projects through improved mining methods and development of new mining technologies to significantly increase access to mineral and energy resources.
- Developing technologies that will improve the capacity, safety record and/or cost of mine production in Australian mines. This can be based on incremental, technological breakthrough or system change.
- Reducing environmental impacts of mining such as subsidence, water pollution, waste dumps and greenhouse gas emissions by developing advanced methods and mine waste utilisation technologies, and optimise post mine land usage.

Other Initiatives

Minerals and Energy in Society (\$1.12m)

Goal: Encourage the sustainable management of resources:

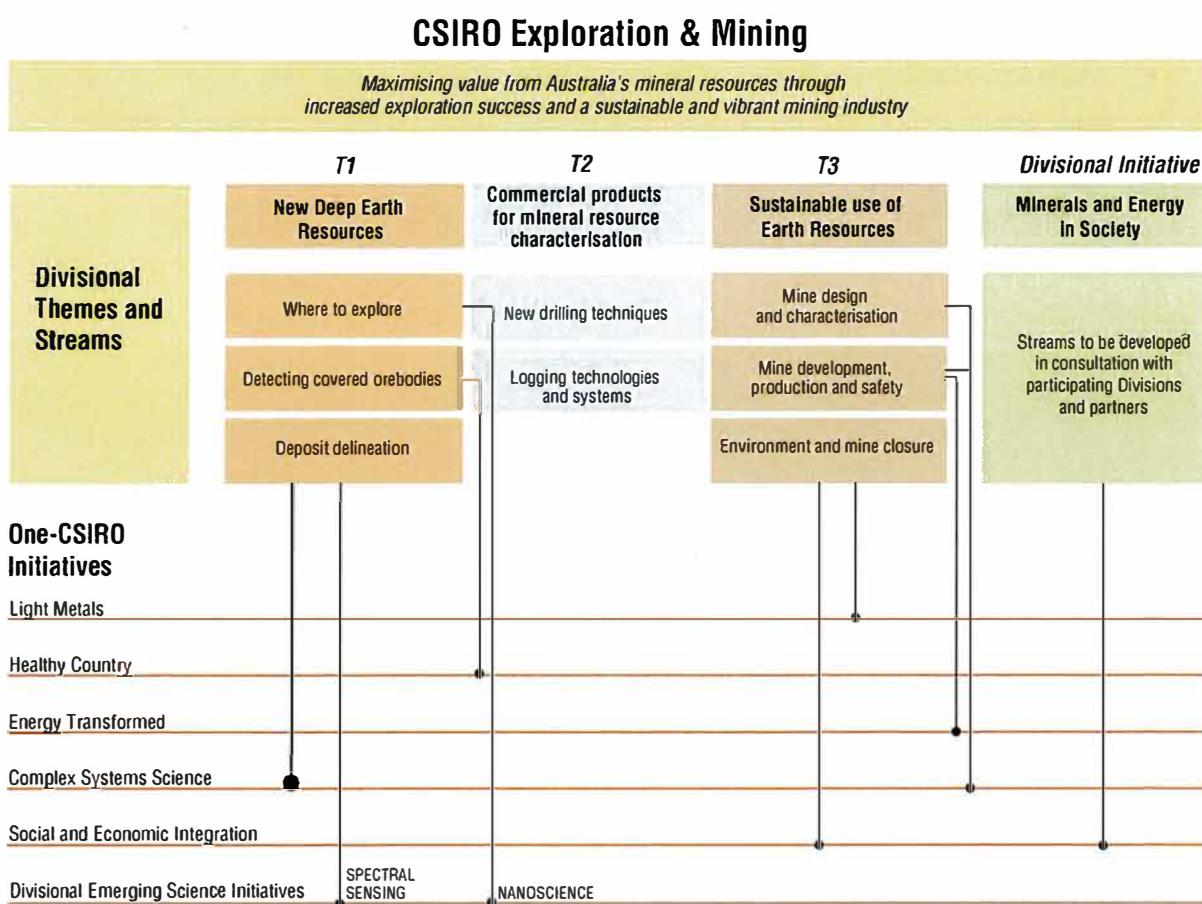
- from access to utilisation,
- consistent with global sustainability indicators,

- by the delivery of strategies and metrics that respond to the complex interactions between society, industry and policy in the minerals and energy sector.

Goals:

- Alignment of industry with community expectations (licence to operate).
- Understand and minimise the environmental impacts of mineral and metal production.
- Strategies to maximise the social and economic benefits derived from mineral and metal production

Divisional Alignment Diagram



Resourcing – Exploration and Mining

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
21,279	36,279	197.2

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	2,580
Major Cross Divisional Programs	767
Emerging Science	592
Core Divisional Research	32,210
Total Expenses	36,149

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	8,197
Strategic R&D [Co-Investment]	25,652
Consulting and Services	1,800
Licensing and Exploitation of IP	500
Total Expenses	36,149



9.3 Minerals

Divisional Chief: Dr John Rankin (Acting)

Minerals works strategically with stakeholders in the minerals processing and metal production industries. In partnership, it boosts productivity, enhances sustainability and adds significant value to Australia's minerals resources. Our core capabilities are:

- *Bayer processing technology {30 EFT}*
- *Hydrometallurgy {20 EFT}*
- *High temperature processing {32 EFT}*
- *Mineral beneficiation {25 EFT}*
- *Materials characterisation {7 EFT}*
- *Computational and physical modelling {15 EFT}*
- *On-line analysis {20 EFT}*

Theme performance and response – 2003-04

Theme: Adding Value to Ores

Goals:

- Improve the quality, grade and recovery of mineral commodities.
- Develop technologies to process difficult, complex and low grade mineral resources.
- Develop new products from mineral resources

Progress

Annual Performance Goals		Achieved: 52		Delayed to 04-05: 11		Unachievable: 5
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Good progress in achieving Goals across all Streams. In particular, the Division continues to build key knowledge, capabilities and IP to support the Iron Ore and Alumina industries. APGs were missed due to ambitious commercial goals, project cessation after market evaluation and resource constraints /ambitious work programs.

Response

Overall direction and goals remain appropriate. Alumina related Streams to be shifted to new Light Metals Theme in 04-05, but with predominantly the same emphasis. Industrial Minerals Stream to be scaled back in 04-05 to the most prospective areas and the resultant resources to be redirected to mainly projects relating to the Light Metals Flagship.

Theme: Clean, Efficient Processing

Goals:

- Develop cleaner, more efficient processes for transforming mineral resources into metals.
- Develop cleaner, more efficient processes for transforming wastes into benign or useful products.
- Develop cleaner, more efficient processes for recycling metals and other materials.

Progress

Annual Performance Goals	Achieved: 87	Delayed to 04-05: 28	Unachievable: 17
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Significant progress has been made in the relatively new Streams of Titanium Production and Aluminium Production. An independent assessment of two Streams (Solid-Liquid Handling and Solvent Extraction) during the year indicated CSIRO research has stimulated hundreds of millions of dollars of benefit for industry. Achievement of APGs in some areas has been affected by delays in CRC start-up, substantial rescoping of an AMIRA collaborative co-investment project, commercial decisions by clients not proceed with some projects, and fast-failure decisions (especially in some Light Metals Flagship related projects).

Response

Overall direction and goals remain appropriate, although the Theme name has been changed to reflect a stronger emphasis on sustainability issues. Streams that relate predominantly to light metals have been transferred to the new Light Metals Theme in 04-05. In some areas, APGs need to be more concise and reflect overall Stream objectives, not specific objectives of projects.

Theme: Process Design and Control**Goals:**

- Optimise design of reactors for cleaner, more efficient operation.
- Develop on-line sensing and control technologies for cleaner, more efficient operation of processing plants

Progress

Annual Performance Goals	Achieved: 68	Delayed to 04-05: 13	Unachievable: 7
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Good progress was made across almost all Streams. All areas have significant ongoing potential and demand, and some APGs were deferred because of competing priorities for critical expertise and resources. The Security Technologies Stream confirmed its high commercial potential during the year and substantial progress was made in demonstrating the technologies and developing commercialisation options. In the main, APGs were missed due to client or Flagship decisions not proceed with specific projects.

Response

Almost all Streams in this Theme have significant growth potential and will continue to be well supported in 04-05. However, the Theme name will change to reflect the strong focus on the development and application of advanced technologies. One commercial opportunity in this Theme (Contraband Scanner) has been formally designated a 'RIPPER' and Corporate BD&C will formally be involved in the commercialisation of the technology throughout 04-05. In some areas, APGs need to be more concise and reflect overall Stream objectives, not specific objectives of projects.

Theme: Social and Economic Integration (shared with Exploration and Mining)**Goals:**

- Alignment of industry with community expectations (licence to operate).
- Understand and minimise the environmental impacts of mineral and metal production.
- Strategies to maximise the social and economic benefits derived from mineral and metal production

Progress

Annual Performance Goals	Achieved: 11	Delayed to 04-05: 1	Unachievable: 0
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This small and well focused Theme has made good progress this year, particularly through strong involvement in Corporate SEI activities.

Response

This Theme is to be absorbed into the Sustainable Processing of Minerals Theme in 04-05 to more appropriately position it in the context of the Australian minerals industry.

Research Themes – 2004-05

The broad research areas remain the same as for 03-04 but three Themes have been renamed to better reflect their objectives - Adding Value to Ores is now Value-adding to Australia's Minerals; Clean, Efficient Processing is now Sustainable Processing of Minerals; and Process Design and Control is now Advanced Technologies for Mineral Process Design and Control. The Social and Economic Integration Theme for 03-04 has been absorbed into the Sustainable Processing of Minerals Theme to provide better integration and reflects the growing commitment to Sustainability. All light metals related Streams have been aggregated to create a new Theme "Australia Leading the Light Metals Age" to focus effort and grow the Light Metals Flagship contribution. Some resources in lower priority Streams have been redirected to enable this growth.

Value Adding to Australia's Minerals (\$6.79m)

Goal: Contribute to increasing the value of exports of the Australian minerals industry 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.

Sustainable Processing of Minerals (\$13.80m)

Goal: Contribute to improving the sustainability of Australian mineral processing by reducing unit processing cost, reducing environmental emissions and enhancing community dialogue through:

- the development of cleaner, more efficient processes for
 - transforming mineral resources into metals and mineral products
 - transforming wastes into benign or useful products
 - recycling metals and other materials, and
- the development of strategies and processes for more effective interaction between mineral processing companies and the communities in which they operate.

Advanced Technologies for Mineral Process Design and Control (\$9.36m)

Goal: Lead and accelerate the application of advanced modelling, measurement and analysis technologies to improve the efficiency and sustainability of the Australian minerals industry through:

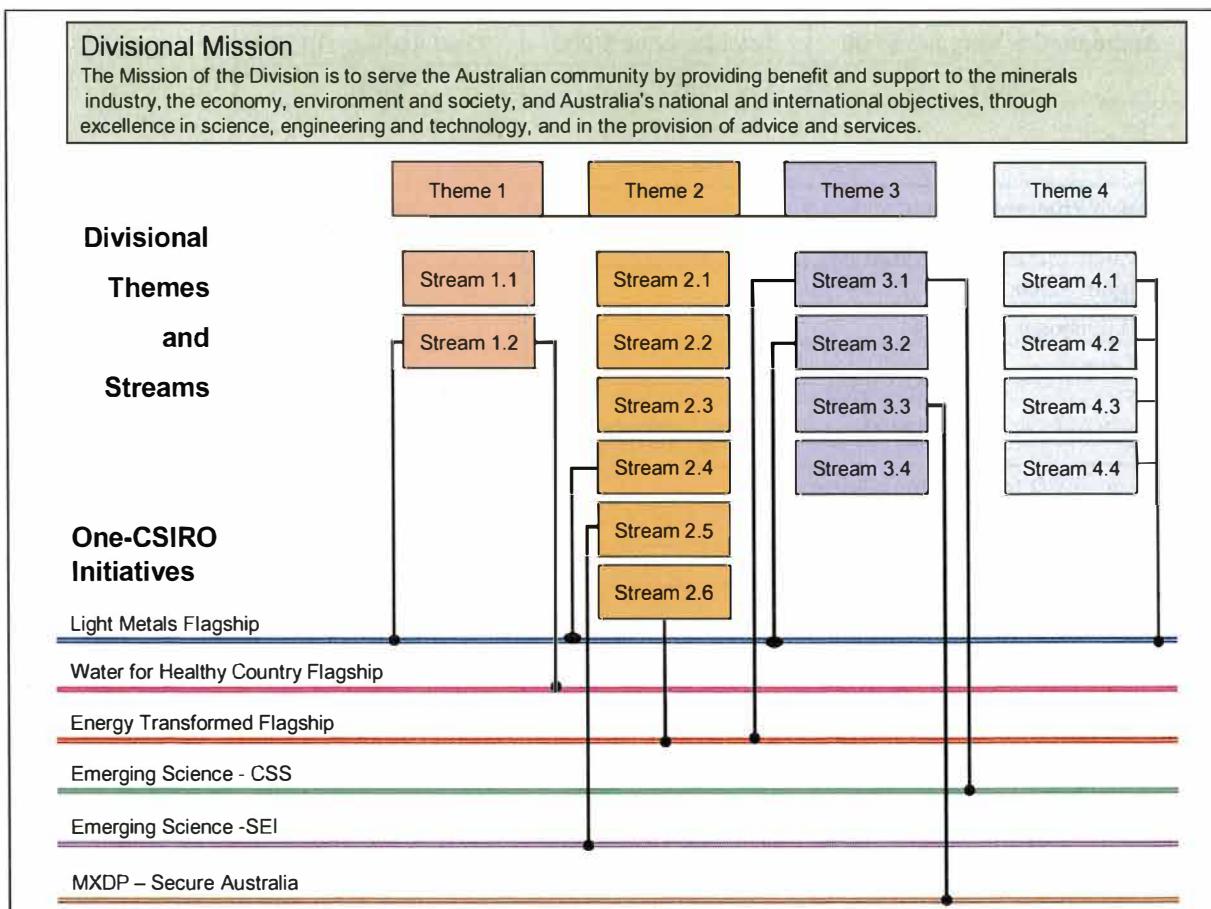
- development and validation of models at scales from molecular to whole-of-plant to inform design and optimisation decisions
- development of novel on-line sensing and analysis instruments and control strategies

Australia Leading the Light Metals Age (\$15.79m)

Goal: Create a world scale integrated light metals industry through:

- enhancing the value of Australian bauxite resources;
- developing new technologies for aluminium, magnesium and titanium production; and
- developing cleaner more efficient processes to reduce energy use, greenhouse emissions and environmental impact.

Divisional Alignment Diagram



Key to Themes and Streams

Themes	Streams
Value adding to Australia's minerals	Iron ore Industrial minerals
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
Advanced technologies for mineral process design and control	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
Australia leading the light metals age	4.1 Alumina 4.2 Aluminium 4.3 Titanium 4.4 Magnesium

Resourcing – Minerals

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
29,802	46,501	294

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	14,660
Major Cross Divisional Programs	2,297
Emerging Science	2,216
Core Divisional Research	28,734
Total Expenses	45,907

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	15,028
Strategic R&D [Co-Investment]	22,047
Consulting and Services	8,832
Licensing and Exploitation of IP	0
Total Expenses	45,907



9.4 Petroleum Resources

Divisional Chief: Dr Bev Ronalds

Petroleum Resources conducts research and delivers technology solutions to industry that improve petroleum exploration success, maximise reservoir recovery, and reduce field development and production costs. Production and conversion of natural gas is a growing priority in the Division - in line with the increasing importance of clean energy - assisting Australia to play a leading role in the emerging "Methane Economy". Our core capabilities are:

- Geoscience {44 EFT}
- Geo-engineering {42 EFT}
- Gas Conversion {4 EFT}

Theme performance and response – 2003-04

Theme: Reducing Exploration Risk

Goals:

- Improved exploration models through the development of new exploration technologies.
- Integration of geological modeling with petroleum systems analysis.

Progress

Annual Performance Goals	Achieved: 23	Delayed to 04-05: 8	Unachievable: 2
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Failure to achieve all goals was due primarily to reallocation of resources to Energy Transformed Flagship (ETF) that were not finalised until late 2003. Apart from inherent project risks and over ambition, other contributory factors included delays in securing industry support and the interruption due to relocating laboratory facilities from Sydney to Perth. Industry and university engagement is diverse and strong.

Response

In 04-05 exploration research has been refocused into 2 streams within a theme directed at maximising Australia's oil self sufficiency. Additional resourcing of Flagship research will lead to a decreased research effort directed at oil exploration in the immediate future until other funding opportunities can be fully realised. To build on the presently strong industry engagement, there will be greater efforts directed at establishing more strategic relationships with end users as opposed to the present situation with numerous, but relatively small contracts, often on a 'fee for service' basis.

Theme: Improved Field Development and Production Performance

Goals:

- New technologies to improve the quality of reservoir appraisal and the efficiency of field development.
- Development of new development and production technologies through improved operational performance and cost reduction.
- Decision making under conditions of uncertainty.

Progress

Annual Performance Goals		Achieved: 32		Delayed to 04-05: 8		Unachievable: 0
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Overall a very successful year with outstanding research matched with strong industry engagement and support. Minor delays with some goals are due to changes in the priorities of some sponsor companies together with difficulties in securing suitable sites for experimental studies.

Response

In 04-05, research in this theme will be split between two new themes (Maximising Australia's Oil Self Sufficiency, and Supporting Australia's Gas Future). Total resourcing is expected to remain at similar levels although with some redirection of effort with the completion of the pore pressure studies. Commercialisation options for the drilling advisory system and risk and uncertainty analysis will be explored in detail.

Theme: Gas to Liquids Conversions (complements work in CSIRO Energy Technology)

Goals:

Development of new gas processing technologies with a focus on:

- more efficient methods for the conversion of natural gas to liquids.

Progress

Annual Performance Goals		Achieved: 4		Delayed to 04-05: 1		Unachievable: 0
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Laboratory-scale studies are progressing well in high pressure partial oxidation, syngas to synfuels catalysis, methanol production and acetylene processing. Energy cogeneration work is progressing with promising results on materials coating work. Good links have been established with university collaborators.

Response

Reallocation of resources may be necessary once methanol and acetylene projects are fully established. Syngas to synfuel project will be reviewed in light of most recent results. A decision to continue or not will be made and staff currently employed on syngas to synfuel project will be reassigned if required. Establishing a patent position on the turbine/blade coating work would offer a platform for negotiations with collaborators to pilot the work. Resourcing is likely to increase with operations in Perth expected to grow. Pilot scale testing facilities are likely to be required in the near future.

Theme: Environmental Impacts

Goals:

- Develop environmentally sustainable drilling fluid and waste management technologies.
- Geological sequestration of CO₂.
- Decision making under conditions of uncertainty.

Progress

Annual Performance Goals		Achieved: 10		Delayed to 04-05: 4		Unachievable: 0
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A growing theme, particularly in the context of the CO₂ sequestration studies enhanced by ETF support. Delays in achieving some goals are related to the 'start up' phase of CO₂CRC and some

ambiguities surrounding the relationship between CO2CRC and ETF that are now being resolved. Other delays have been caused by protracted commercial negotiations.

Response

In 04-05, rather than existing as a separate theme, environmental research will be subsumed into 2 new themes (Maximising Australia's Oil Self Sufficiency, and Supporting Australia's Gas Future) reflecting the view that the environmental issues are an integral part of energy-related developments, not an optional extra. Total resourcing is likely to increase in the short term reflecting investment into CO2 sequestration research.

Research Themes – 2004-05

Following a major Divisional review, the four themes from 03-04 have been replaced with a new two theme research structure for 04-05 that has subsequently been endorsed by an external review committee. The new structure provides greater focus for Divisional research and will permit more efficient exploitation of synergies between the geoscientific and geo-engineering discipline groups. The parallel decision to align Divisional line management with the theme and stream structure as opposed to the pre-existing matrix management structure through discipline groups, is designed at least in part, so that research staff can more directly relate to and identify with theme and stream goals.

Maximising Australia's Oil Self Sufficiency (\$14.59m)

Goal: By scientific research and development contribute to the maintenance of at least the current level of Australia's oil self-sufficiency through:

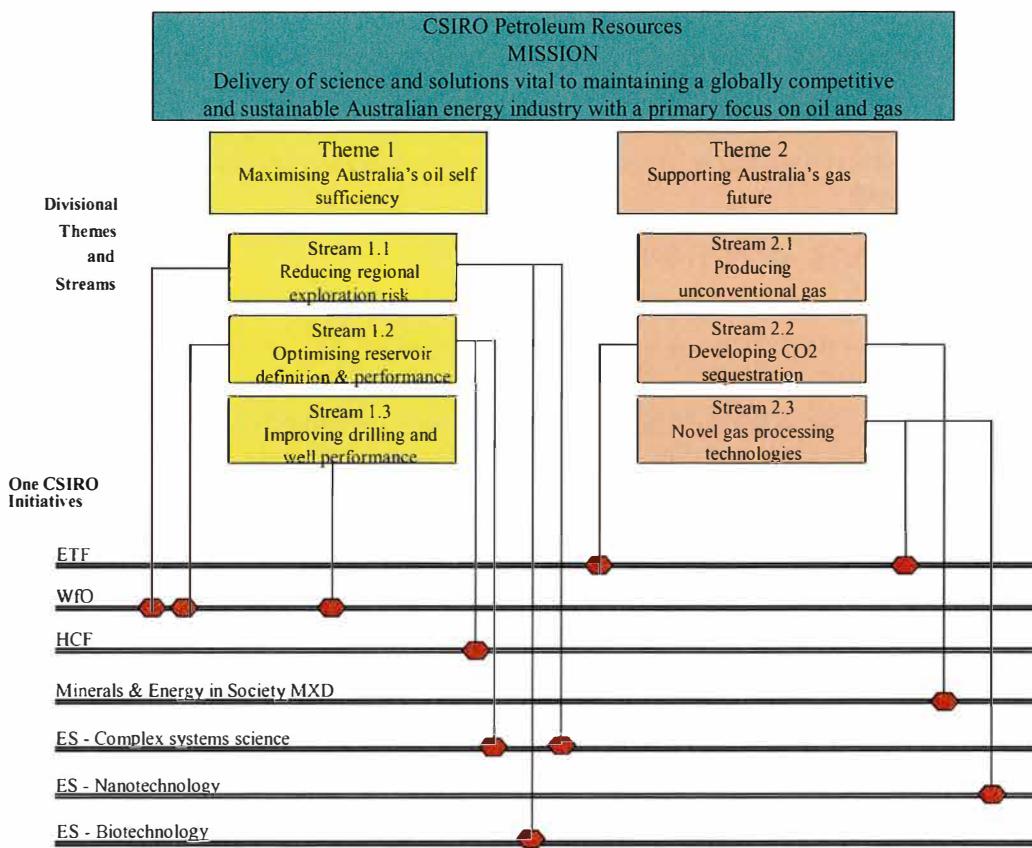
- integrated predictive geoscience to reduce exploration risk and optimise reservoir management
- technologies to model petroleum systems contributing to more robust models for exploration, appraisal and development
- development of cost-effective drilling, completions, and production technologies

Supporting Australia's Gas Future (\$7.86m)

Goal: To strengthen Australia's energy security and world environmental sustainability through:

- enhanced use of gas as an economically attractive transport fuel
- recovering gas from coal and low-permeability reservoirs
- reducing gas production, transportation and processing costs
- maximising recovery of already discovered gas
- minimising atmospheric CO₂ emissions

Divisional Alignment Diagram



Resourcing – Petroleum Resources

Revenue and Staff Resources

Appropriation Revenue \$,000	Total Revenue \$'000	Total Staffing (EFT)
13,659	21,809	135

Distribution of Total Expenses by Initiative, \$'000

Flagship Programs	3,884
Major Cross Divisional Programs	0
Emerging Science	213
Core Divisional Research	18,345
Total Expenses	22,442

Distribution of Total Expenses by CSIRO Investment Domain, \$'000

Strategic R&D [CSIRO Investment]	3,908
Strategic R&D [Co-Investment]	16,581
Consulting and Services	1,703
Licensing and Exploitation of IP	250
Total Expenses	22,442

Section 10: Corporate Groups

10.1 Office of the Chief Executive

Chief Executive: Dr Geoff Garrett and
Deputy Chief Executive: Dr Ron Sandland

Overview

The mission of the Office of the Chief Executive (OCE) is to provide an effective leadership, strategy and governance framework for the Organisation, and to ensure implementation against the objectives and deliverables defined in the Organisation's 2003-2007 Strategic Plan, and this 04-05 Operational Plan. Further, and specifically, the OCE provides effective implementation oversight and leadership for the Flagship initiative, through Dr Sandland as Chairman of the Flagship Oversight Committee.

Key stakeholder management is a prime responsibility of the organisation's senior leadership; substantial time investment is critical in interacting with senior industrial/commercial and public sector clients and stakeholders.

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, and financial), strategic developments, including progress against plan, and risk assessment and audit findings.

The OCE's activities are supported by wider organisational processes including: Planning; Policy development; Risk Assessment and Audit; and Performance Management and Reporting. The Board Office reports through the Deputy Chief Executive to the Chief Executive.

The broader management group of the organisation, the Executive Management Council (Chiefs of Divisions, Flagship Directors and some General Managers/functional Directors) meets six times a year. Each meeting has a specific focus related to the Organisation's performance and planning cycle.

Key Learnings from 03-04: and Significant Initiatives Being Undertaken in 04-05

The effective management of change is a key task of CSIRO's strategic leadership. As such, and to support this activity, a Strategic Implementation Program Office has been established, as part of the OCE. Deriving from our reflections on the management of change implementation during 03-04, the prime objectives here are to improve the overall level of coordination and integration of organisation development and change activities identified in the CSIRO Strategic Plan 2004-07, and to facilitate their implementation and adoption across the organisation. The Executive Director: People and Culture, Peter May, and the Executive Director: Corporate Operations/CFO, Mike Whelan, will also be actively involved in this critical assignment.

Much effort during 02-03 went into the development of the 03-07 Strategic Plan; and the 03-04 financial year focus centred around delivery and execution thereon – indeed, as indicated above, this will continue to the case. In addition, future strategy requires ongoing detail consideration and, as such, both the CEO and DCE are also actively engaged with the newly-created Enterprise Portfolio Strategy (EPS) Group (lead by Mehrdad Baghai, on part-time 'secondment' from his BD&C responsibilities). This group will lead two major initiatives in 2004-05 on the strategy front: "Future-C" is an initiative to articulate a detailed and compelling strategic intent for the evolution of CSIRO over the next decade; "C-Sharp" is a parallel initiative developing a more systematic and deliberate approach for managing CSIRO's investment decisions. (The group also serves an executive and advisory role on behalf of the Chief Executive and the Board on large and complex strategic transactions of the organisation).

Themes – 2004-05

Strategic Management

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.

Strategic Implementation

Goal: To oversee, coordinate, facilitate and monitor the implementation of CSIRO's strategic and operational development and change initiatives across the organisation.

Enterprise Portfolio Strategy

Goal: To play a lead role in shaping the future of our National Innovation System by striving for excellence in developing an enterprise portfolio strategy which defines a compelling set of roles for CSIRO, and to evolve CSIRO in that direction.

Alignment with CSIRO's Strategic Plan – Office of the Chief Executive

Strategic Objective	Activity
CSIRO's strategic goals	<p>Lead and monitor implementation performance against CSIRO's 2003-2007 Strategic Plan.</p> <p>Provide support and encouragement to Executive Team and EMC colleagues in the execution of their contributions against strategic objectives.</p>
1.2 Build critical mass and ensure quality in our core research programs	Explore joint ventures and alliances to establish scale and breadth of capabilities in science programs
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	<p>Implement strategies to engage staff and ensure organisation wide understanding of criticality of the successful implementation of Flagships.</p> <p>Ensure clarity and effectiveness of Flagship-related business processes, and quality delivery on Flagship Programs' commitments.</p> <p>Ensure external stakeholders are informed and enthused about the Flagship progress and achievements.</p>
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	<p>Create a work environment that encourages creativity and innovation, motivates staff to perform to the best of their ability, and is highly attractive to current and prospective employees.</p> <p>Focus particular attention on the development and performance of the leadership corps in order to ensure the successful execution of CSIRO's strategic and operational priorities.</p>
3.2 Service the needs of government for informed policy setting	Foster CSIRO links with federal and State governments, departments and agencies to provide effective scientific support for the development of policy and to influence science and innovation policy.
3.3 Enhance communication to raise public and stakeholder excitement and trust in science	Oversee (and lead/represent where appropriate) CSIRO's communication function, outputs and impact.
4.1/4.2/4.3.....engagement with RDCs, large corporations, SMEs (etc).....	Senior level stakeholder interaction, concerning relationship building and business development possibilities.
5.2 Be among the best in governance, OHS&E and performance management processes	<p>Foster a culture that enhances the safety and well-being of staff, good governance and effective project management.</p> <p>Champion the development and implementation of emerging</p>

CSIRO Operational Plan 2004-05

	governance and performance measurement systems and promote improved transparency and accountability.
6.1 Secure greater Federally funded support for CSIRO science investment	Provide effective leadership for CSIRO's interactions with ministers, government and parliament.

10.2 Science Planning

Executive Director: Dr Michael Barber

Overview

The science planning unit in CSIRO has two broad functions:

- To ensure CSIRO's core capabilities – its science base – are enhanced to achieve sustained high impact.
- To position CSIRO as an effective and respected contributor to the development of science and innovation policy in Australia

The Science Planning Group has primary strategic responsibility for this activity. It is a “lean” unit and works closely with the Executive Director Business Development and Commercialisation, the four Group Executives and the Government Relations team.

The Group provides support and leadership for the long term development of CSIRO's science base and for promoting and reporting on its excellence. The Executive Director has direct accountability for CSIRO's Emerging Science Initiative, science performance and assessment activities, CSIRO's involvement with the CRC Program, CSIRO's response to the National Research Priorities and corporate support for the Postgraduate and Postdoctoral programs and policy coordination.

The Executive Director also has executive level responsibility for CSIRO's High Performance Scientific Computing (HPSC), recognized as an essential ingredient to the pursuit of advanced science. CSIRO's HPSC group supports the High Performance Computing and Communication Centre with the Bureau of Meteorology and supports CSIRO's participation in the Australian Partnership for Advanced Computing (APAC).

The Science Planning Group has specialised policy and management capabilities that build on in-house expertise and the group's collaborative relations across CSIRO, the university sector, other research organizations, national and international industrial research associations, government agencies, membership and involvement with scientific academies, and detailed knowledge of the nature of international and national science policy and science for policy.

Key Lessons Learnt in 2003-2004

The Australian Government's science policy, particularly the Backing Australia's Ability program, is built upon three principles—excellence, collaboration and commercialisation. An important lesson from the successes of 2003-04 is that the more CSIRO understands the implications of this policy framework and effectively (and in a one-CSIRO way) aligns its internal policies and programs the more likely we are to succeed. For Science Planning addressing Governmental concerns and perceptions of quality and collaboration was an important driver in 2003-04 and continues to be so.

Given that Science Planning is a small but specialised unit, achieving almost all of its objectives relies on effective integration with the activities of others particularly Group Executives and Divisions. Ensuring such an effective integration was one of the major drivers in the reform of the Emerging Science Initiative. The new arrangements, particularly the requirement for Divisional Emerging Science Plans, are specifically designed to enhance the link between emerging science activities and longer-term capability building in Divisions.

With regard to collaboration, the success of the new Office of CRC Engagement in ensuring a more consistent “one-CSIRO” approach to Round 9 of the CRC Program testifies to the benefits to be gained by a strategic approach to collaboration. This approach is being extended to our engagement with other collaborative programs such as state Government schemes and the ARC Centres of Excellence.

Key objectives and significant initiatives for 2004-05 include:

- Ensure that the Divisional Emerging Science Plans accurately map our emerging science capability; and Implement the new corporate component of the Emerging Science Initiative
- Actively contribute to the OCE-led Future C and C Sharp projects
- Implement the new *Science Assessment Reviews* and completion of 6 Divisional reviews
- Monitor and report against CSIRO's involvement with the CRC Programme
- Monitor and report against NRP alignment and ensure high quality reporting to DEST
- Respond to and report on science policy issues.

The key strategic initiatives are increasing investments in appropriate areas of both emerging and nationally important science and technology, enhancing national and international awareness and collaboration, developing performance metrics and programs, and strengthening ties with Australian universities within the context of the National Innovation System and the postgraduate and postdoctoral award schemes.

Themes – 2004-05

Science and Innovation Policy

Goal: To influence and respond to critical issues pertaining to national science and innovation policy to enhance the relevance and impact of CSIRO's activities.

Building the Science Base

Goal: To develop policies and programs that build CSIRO's science base and enhance key collaborative programs to deliver greater national and international impact.

Science Priorities and Assessment

Goal: To improve the assessment and quality of CSIRO's scientific capabilities and outputs to meet sustained high impact; the requirement of government for transparent and accountable science assessment; and to influence CSIRO's strategic investment.

Alignment with CSIRO's Strategic Plan – Science Planning

<i>Strategic Objective</i>	<i>Activity</i>
1.1 Play a significant role in delivering on Australia's National Research Priorities	Monitor and report against NRP alignment and submit annual NRP progress report to government
1.2 Build critical mass and ensure quality in our core research programs	Coordinate and monitor the implementation of the <i>Science Assessment Reviews</i>
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	Oversee the Emerging Science Initiative; active input into the C Sharp project
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	Oversee and encourage participation in the CSIRO Postgraduate Program, Postdoctoral Fellowship Program and Federation Fellowships
2.3 Build our global recognition for science leadership in our chosen science domains	Oversee Emerging Science Initiative, monitor citation and patent data.
3.1 Focus and intensify collaboration with universities, CRCs and other	Develop and implement a process to monitor and report against CSIRO's involvement with CRCs.

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agencies	Respond to outcomes of research reviews and Budget announcements, enhance CSIRO Postgraduate and Fellowship programs
3.2 Service the needs of government for informed policy setting	Develop and coordinate plans to address critical capabilities in response to the outcomes of the research reviews, BAA2 and other Budget announcements. Contribute to the provision of scientific advice to government and gather performance information.
4.4 Reinvent our ICT capabilities to strengthen Australia's knowledge-based industries	Through the Emerging Science Initiative foster increased capability in emerging science and breakthrough technology in ICT
5.1 Stimulate breakthroughs by promoting cross-pollination, especially in frontier research	Coordinate and assist the development of CSIRO Divisional Emerging Science Plans and implement the new corporate component of the ESI
6.1 Secure greater Federally funded support for CSIRO science investment	Implement and address outcomes of the CSIRO Science Assessment Reviews and report to the Board and DEST, contribute to the development of appropriate economic indicators as part of the Quality and Accessibility Framework

10.3 People and Culture

Executive Director: Mr Peter May

Overview

The mission of the Corporate People Development (CPD) Group is to shape the organisation's culture in its transition to a Research Enterprise through the creation of a work environment in which employees' full potential is realised and directed to the achievement of CSIRO's objectives.

The Corporate PD Group works in collaboration with Divisional People Development staff to deliver enterprise wide PD initiatives. The PD Network (made up of Corporate and Divisional PD staff) is committed to the development and implementation of people strategies that advance the organisation's business goals. Using a project management approach, the network ensures integration and alignment of people strategies with organisational goals, as well as operational excellence across the organisation. The Corporate PD group ensures engagement of stakeholders, alignment of PD activities with the strategic initiatives of other corporate groups, and supports project teams to implement project outcomes consistently across the organisation.

In addition to the projects, there are centrally-delivered services covering payroll, learning and development, executive recruitment and remuneration, as well as specialist advice and support in relation to employee relations, PD policy and occupational health, safety and environment.

The key objectives for the 2004-05 are the continued advancement of initiatives on performance culture, talent management, enhanced leadership capability, OHS&E culture and operational efficiency. There is a renewed focus on organisational development, particularly the establishment of a Program Office to prioritise and coordinate change initiatives across all functional groups, guided by the priorities outlined in the Strategic Plan 2003-07.

Key objectives and significant initiatives for 2004-05 include:

As a group the PD Network has delivered some quality results and has been held up as a model of 'one-CSIRO' cooperation. Its successes have largely concerned PD initiatives designed to advance the Strategic Plan 2003-07. Increasingly, there is a demand for significant CPD support of change processes initiated by other functional groups. This presents a resourcing challenge as well as a need to refocus PD activities to ensure integration of its change agenda, with other initiatives being championed across the organisation.

In the past 12 months there has been some difficulty in gaining traction and consistent implementation of new PD initiatives, which as been magnified by the number of competing priorities and the limited resource availability. To overcome this escalating challenge, a Program Office is being established to coordinate and prioritise change initiatives of all functional groups. In addition the PD Delivery model will be revisited with a view to increasing its capacity to support broader corporate change programs.

A further challenge identified in the last 12 months is a perception that PD initiatives lack integration. That is, it is not clear to people how each relates to the others or their contribution to a common objective. In response to this concern, resources have been allocated to developing a comprehensive and integrated 'map', to highlight the common concepts and principles underpinning the various PD strategies, tools and systems and how they contribute to the desired outcome.

Themes – 2004-05

Theme 1 - Organisational Development

Goal: This is a new theme in the CPD Group signaling an increased role in facilitating the organisational change needed to achieve the intent of CSIRO's Strategic Plan 2003-2007. The theme goal is to support the change required to shape the Organisation's culture. (This goal may be refined based on stakeholder input gathered by the Executive Director, People and Culture during June through August 2004)

Theme 2 - People Development

Goal: Support CSIRO Managers to create a work environment in which employees' full potential is realised and directed towards the achievement of CSIRO's Strategic Plan 2003-07 objectives.

Alignment with CSIRO's Strategic Plan – People and Culture Group

CSIRO Strategic Objective	Key Objectives 04-05
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	Program Office Established Organisational change framework established Change initiatives mapped for all functional groups Change initiatives prioritised according to the Strategic Plan 2003-07 Workforce planning approach developed Senior leadership talent identified and development plans in place Completed Insight Poll 2005 Completed innovation research EA content under development in preparation for staff vote Commence IP Pilot Postdocs intake complete Leading the Research Enterprise 2 complete Foundation skill and project leader courseware complete Competencies and leadership attributes integrated and application mapped across PD foundation areas
5.2 Be among the best in governance, OHS&E and performance management processes	Improved assessment and control of risk reflected in OSHE statistics Conduct Awards and Medal Ceremony Extend performance coaching initiative
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Implement revised PD delivery model Procurement processes reviewed and providers streamlined Streamlined HR Policy available to PD staff E-learning business case submitted one-CSIRO induction process implemented Learning management system module 1 implemented OHS&E data management system business case submitted
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Centralise payroll processing and routine advice Select one-CSIRO EAP provider

10.4 Business Development and Commercialisation

Executive Director: Mr Mehrdad Baghai

Overview

Conducting excellent science on issues of national priority is fundamental to CSIRO's mission, but is not sufficient for delivering real impact and relevance. Generating value for the nation depends upon CSIRO developing strong relationships with potential users and beneficiaries – in both the public and private sectors - and on supporting these relationships with effective and efficient disciplines of technology transfer.

The Business Development and Commercialisation group focuses on the current and future engagement of CSIRO with our industry customers and stakeholders to align these with their needs in order to deliver enhanced commercial impact for Australian industry. During 2003-04, activities of the Business Development and Commercialisation group produced the following highlights which are indicative of early successes from these new approaches by CSIRO to both our business development engagement with clients and co-investors and to commercialisation activities:

Business Development: Good progress in establishing deeper and one-CSIRO strategic relationships with key customer segments.

- Intense collaborative work with the States of Queensland and Victoria to enhance the relationship with State government agencies, including through the appointment of State Relationship Managers to work closely with the respective Innovation Departments. Two examples of the strong potential of these relationships are the two new joint ventures with Queensland formed during 2003-04, the e-Health Research Centre and the Centre for Low Emission Technology.
- The forging of closer ties with CSIRO's key partners in the regional development field particularly the Rural R&D Corporations, including through OneCSIRO team approaches to these relationships. CSIRO's longstanding relationship with the Grains R&D Corporation has been strengthened through a strategic dialogue aimed at aligning our joint investment. We are pursuing similar strategic relationships with other Rural R&D Corporations in particular Fisheries R&D Corporation and Horticulture Australia.
- A more systematic approach for working with large corporations, including the establishment of cross-Divisional Client Service Teams to provide a seamless account management process and the close working with company executives to identify major “challenges” for the particular corporation. This “challenge question” approach has led to major licensing deals (eg, BOC) and a pipeline of new deals.
- Strong showing with large grant proposals through the Gates Foundation process (ie, two finalists remain) with more limited success in closing deals with sovereign nations.

Commercialisation: CSIRO earned the target IP licence and equity revenues of \$22.0M during 2003-04 (up 67% on the previous year) and worked up three RIPPERs for future income streams.

- Through the proactive management of CSIRO's intellectual property and equity estates, the formation of six spin-out companies having technology licences or assignments from CSIRO (across the fields of minerals and energy, instrumentation, environmental services, semiconductor devices, and biomaterials and therapeutics);
- Teams were formed against 3 identified RIPPERs and clear strategies and milestones developed for each opportunity in anticipation of a bigger investment in 2004-05;
- More streamlined and systematic Commercial Executive (ComEx) Committee activity and Board Commercial Committee approval process for transactions that are of higher value or

comprise complex structures. During 2003-04, ComEx held 18 meetings and considered 72 transactions.

Business Improvement: Exceptional performance in process re-engineering with rollout of contract simplification program and support of Flagships.

- The enhancement of CSIRO's commercialisation processes, including the introduction of the FastTrack simplified contract process for use with CSIRO's many contracts with clients for testing and similar professional services (which has had a very positive reception and compliance with clients);
- The group conducted business development planning work with four of the Flagships, which has led to clear identification of a requirement for dedicated business development resources for the Flagships (both to support engagement with clients and particularly for early stage business planning).

Legal: New policies and processes were implemented, clarifying and simplifying governance requirements:

- The simplified Business Development and Commercialisation Operational policies were approved and promulgated, and the Shareholding Policy implemented;
- Working together with Science Planning and the Executive Team, new criteria and processes for CSIRO's investment decisions with respect to CRCs were implemented and standard form agreements for Round 9 CRCs prepared;
- Additionally, a key intellectual property dispute was settled on very advantageous terms.

Strategic Transactions: During 2003-04, two joint venture transactions were completed and assistance provided in a number of other complex transactions.

Key Lessons Learnt in 2003-2004

- In the Business Development arena, the focus should be on States, RDCs and Commonwealth with the approach being to lift the relationship to a strategic level;
- For engagement with corporates, the "Challenge question" approach shows early promise for achieving engagement with the company;
- In Commercialisation activities, increasingly deal origination involves IP from across the CSIRO catchment: We need to work as a team to identify and capture these opportunities;
- Future IP and equity Revenues are strongly dependent on RIPPERS and equity transactions;
- Dedicated Business Development resources are urgently required for Flagships (both to support engagement with clients and particularly for early stage business planning);
- Managing Business Development and Commercialisation opportunities will require development of an integrated pipeline of these opportunities with earlier identification.

Key objectives and significant initiatives for 2004-05 include:

In 2004-05, consistent with the Strategic Plan, the focus of the BD&C group will continue to be on a single aspiration: "*Delivering serious impact and value to Australia through excellence in technology transfer.*" The BD&C Group intends to deliver on this aspiration over the four years of the Strategic Plan. Taking direction from experience and successes during 2003-04, the 2004-05 plan includes:

- A dedicated approach to business development activities to seek corporate partnerships for the Flagships;
- Focusing of our business development activities on the biggest strategic opportunities, particularly State Governments, Rural R&D Corporations, and Commonwealth Government clients, with international activities being narrowed to several developing countries;

- Commercialisation activities to continue at a very active level and additionally to include dedicated resources for the RIPPER opportunities;
- Business Improvement to continue the roll-out of FastTrack beyond the existing 11 to all remaining Divisions, with two new projects to commence in relation to identifying the pipeline of business development and commercialisation opportunities, and concerning early stage intellectual property identification and protection.
- The Strategic Transactions activity will continue, but has been transferred to become part of the Enterprise Portfolio Strategy Group of the Office of the Chief Executive.

Themes for 2004-05

The BD&C Group will focus on six themes that are described below:

Flagship Corporate Partnerships

Goal: The top-line goal for this theme is the completion of five or more corporate partnership deals with the Flagships, securing total forward co-investment revenues of \$25M.

Business Development

Goal: The top-line goal for this theme will revolve around delivering new deals securing total forward co-investment revenues of \$50M.

Commercialisation

Goal: To take a leadership role in reaching CSIRO's \$29M objective for IP and equity revenues.

Business Improvement

Goal: The top-line goals for this theme will be to complete rollout of FastTrack, and install tools and processes for an integrated BD&C pipeline at the Group level.

Legal

Goal: The top-line goals for this theme are to enhance the efficiency/effectiveness of the transaction approval process and of the legal function as a whole.

Office of the Executive Director

Goal: The top-line goal for this theme is the delivery of impact by the whole BD&C team across all the themes. In addition, another top-line goal is the implementation of the full range of governance systems and processes to the satisfaction of the Board and BCC chairman as well as the Chief Executive.

Alignment with CSIRO's Strategic Plan – BD&C Group

Strategic Objective	Activity
Activities for which BD&C are the Lead:	
3.4 Partner with other agencies to advance Australia's global development contributions	Pursue funding from global foundations and sign up one large foundation grant. (\$15M contract lifetime value target)
4.1 Intensify engagement with rural R&D corporations to grow regional and new industries	Grow CSIRO's engagement with top 3 RDCs (Contract lifetime value target of \$30M and contract lifetime value target for Commonwealth Government clients of \$10M)
4.2 Structure deeper and more meaningful relationships with large corporations	Grow CSIRO's collective engagement with large corporations and multi-national corporations. (Contract lifetime value target of \$5M)
4.3 Accelerate the growth of promising technology-based SMEs	Pursue AGP proposal with State Government(s)
5.3 Adopt a unified approach to dramatically improve service and grow top accounts	Maintain CST with selected corporates
6.2 Proactively manage patent portfolio to multiply IP-based revenue streams	Pursue royalties from RIPPERs and analysis of remaining IP assets; manage equity portfolio for value realization;
Activities for which BD&C are in a support role:	
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Deliver 5 large co-investment deals with external parties (primarily corporations) for five of the six Flagship programs (Contract lifetime values target of \$25M in aggregate)
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	Develop world-class BD&C talent in Divisions as well as in Corporate: Conduct reviews of BD&C function and of legal services across CSIRO.
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Contribute to AIC project to develop CRC Round 9 Model agreements
3.2 Service the needs of government for informed policy setting	Advance thinking about commercialisation and innovation policies in Australia.
5.2 Be among the best in governance, OHS&E and performance management processes	Implement new governance processes and with continuous improvement
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Implement Fast-track contract system.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Review value from consolidation of BD&C services within Groups; Review purchasing of legal services across CSIRO

10.5 Communications

Overview

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 on-site 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.*

Key Learnings from 03-04

- Organisational recognition of communications as a key strategic function (hence the appointment of the Executive Director as a member of the Executive Team)
- Recognition of the need for the communications function to be better aligned with the delivery of the Organisation's Strategy (hence the restructure of the Corporate Communications Group)
- The value of an organisational approach to key initiatives (eg the role played by the communication function in secure greater funding for CSIRO in the Federal Budget)
- Recognition of the need for brand and marketing expertise at the corporate level so as to ensure a OneCSIRO approach to all stakeholders based on organisational stakeholder research
- Recognition of the value of engaging with the L&D team (by facilitating learning around government engagement through the Government Relations workshop) and thus encouraging better service delivery to Government by the organisation
- Recognition of the need for a more coordinated approach to policy input to Government
- Recognition of the value of a one "voice" approach by the organisation, hence the roll out of an updated Public Comment policy
- Recognition of the need to fully integrate Flagship communications within the Communications function (hence the appointment of a Flagship Communication Manager)
- Recognition of the web as an essential communication channel (and not just as an IT tool)
- The role Enquiries can play in supporting divisional research and in reducing the lost call rate
- Opportunities for web casting as an all CSIRO communication channel (having the effect of improving IT services across the organisation)
- Provision of more focused services to assist internal and external stakeholders (eg through Enquiries providing 24/7 services)
- Opportunities for greater synergies with BD&C to assist CSIRO's marketing initiatives
- Recognition of the tension between achieving external earning targets and managing the reputational needs of the organisation
- Opportunities for sharing outcomes across the Communicators' Network to create greater synergies between the group

Significant initiatives being undertaken in 04-05

- Development and implementation of a enterprise service support model for the delivery and coordination of communication activities across CSIRO
- Development of an Executive Communication Strategy.

- Development of deeper and more strategic engagement with the media (including greater engagement with the broadcast media (eg relaunch of Australia Advances))
- Facilitation of deeper and broader engagement with Government (State, Federal and International)
- Development of the necessary tools to allow management and scientists to be more effective in contributing to development of government policy and communicating scientific and technological achievements to the broader community
- Commissioning of stakeholder research to inform CSIRO's overall brand positioning
- Development of a coordinated approach to event management across the organisation
- Greater promotion and use of CSIRO's Outreach capability (including Education and Discovery)
- Championing of Flagship Communications across the Organisation
- Development of a CSIRO's "Corporate Social Responsibility" strategy
- Development and launch of CSIRO.au website
- Launch of the Alumni programme.

Themes – 2004 -05

Further Refinement of the Communications Network

Goal: Develop and implement a service delivery model for the Communication function that supports and enhances an enterprise approach to CSIRO's delivery against the 2003-07 Strategic Plan.

Internal Communications

Goal: Communicate CSIRO's major priorities and objectives to promote and create an environment that assists staff in understanding CSIRO's strategic direction. Partner with major projects to provide a One-CSIRO Communication capability and strategy.

Government Relations:

Goal: Anticipate, inform and influence public policy to ensure CSIRO is positioned as a trusted, reliable and objective source of advice for Government.

Media

Goal: Position CSIRO as the first and most trusted source of scientific expertise by promoting public and political awareness of the importance of CSIRO through national and international media.

External Communications (Brand and Marketing)

Goal: Align all communication, brand and marketing activities to drive one-CSIRO positioning and corporate identity across its stakeholders. Utilise comprehensive stakeholder research to ensure CSIRO is positioned appropriately both internally and externally. Champion, deliver and support CSIRO's unified web presence. Institute an organisational approach to event management and raise the profile of the Discovery Centre to position it as CSIRO's leading science education facility and promote the Enquiries Centre as the first point of call.

Flagship Communication

Goal: Promote CSIRO scientific achievements and initiatives by supporting and extending CSIRO's profile and market position within the Flagship program.

Social Responsibility and Ethics

Goal: Develop a Corporate Social Responsibility strategy which will encompass the social, environmental and economic impacts of CSIRO's work and hence impact positively on its internal and external reputation.

Education

Goal: Improve the standing of CSIRO, its scientists and scientific research amongst school students, teachers and families as well as play a key role in influencing science and education policy.

CSIRO Publishing

Goal: Publish excellent products and deliver quality services that benefits science and meets the needs of Australians and international customers.

Alignment with CSIRO's Strategic Plan - Communications

Strategic Objective	Activity
1.1 Play a significant role in delivering on Australia's National Research Priorities	Enhance the capability of CSIRO scientists and management to strategically engage with and influence Government and cultivate championship of CSIRO and its positions across political parties and at all levels of Government.
1.3 Champion Flagships to improve the lives of Australians and advance Australia's key industries	Generate community awareness of Flagships and their relationship with the National Research Priorities.
2.1 Concentrate people processes on developing, attracting, exciting and retaining talent	Target specific internal audiences with relevant and timely information and assist the ET and EMC with executive communications.
2.2 Optimise delivery of all research activities by improving project management	Champion the implementation of effective systems and processes to support one-CSIRO communication activity
2.3 Build our global recognition for science leadership in our chosen science domains	Build the profile of CSIRO as a research organization of choice
3.1 Focus and intensify collaboration with universities, CRCs and other agencies	Understand and articulate the research directions of CSIRO, highlighting Flagships and support the science teaching profession including undertaking projects that link students, teachers and scientists.
3.2 Service the needs of government for informed policy setting	Develop an integrated approach to managing CSIRO's relationships with all levels of Government and cultivate championship of CSIRO and its positions across political parties.
3.3 Enhance communication to raise public and stakeholder excitement and trust in science	Promote CSIRO as Australia's premier research organization and as a trusted voice on science related issues; develop strong partnerships and advocacy relationships within the community and build the profile of CSIRO senior management and scientists within the community and celebrate science success stories.
3.4 Partner with other agencies to advance Australia's global development contributions	Build the profile of CSIRO as a research organization of choice.
4.1 Intensify engagement with RDCs to grow regional and new industries	Support the development of a more sophisticated one-CSIRO approach to business development opportunities in key market segments eg implementation of a one-CSIRO marketing/communication infrastructure and support the development of high level relationships between CSIRO and RDC's.

4.2 Structure deeper and more meaningful relationships with large corporations	Ensure CSIRO's value proposition and the "when, why and how to do business with CSIRO" is well understood in key target segments and support the development of high level relationships between CSIRO and industry and business leaders.
5.3 Adopt a unified approach to dramatically improve service and grow top accounts	Support customer segmentation strategy, marketing and the development of corporate collateral.
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Create efficiencies and message consistency across the organization by encouraging the uptake of one-CSIRO messages, tools and processes (eg a unified web presence).
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 interest, excitement and understanding of its work.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Development of a communication "community of practice" which facilitates the integration and rationalisation of communication services across CSIRO.

10.6 Corporate Operations

***Chief Finance Officer and
Executive Director Corporate Operations: Mike Whelan***

Overview

The Corporate Operations Group oversees a number of the key operational aspects of the organisation, including:

- Finance
- Information Technology
- Library Services and Records Management
- Property
- Operational Performance and Planning
- 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.

2003-04 saw the functions of the Corporate Operations Group brought together for the first time under a single management structure. This has seen improvements made in the coordination of many of the activities of these functions and a more aligned approach to organisational change through the development of a number of initiatives such as the support from the Finance and Operational Performance Units for the organisation's bid for renewal of Triennium funding and the Flagship new policy proposal bid, Finance and ITS initiation of the BETR review of enterprise business systems, and Operational Performance Unit and ITS support for the implementation of Project Workflow.

In addition to undertaking and substantially completing planned objectives for the last financial year COG also played a major role in facilitating the transfer of the National Measurement Laboratory to DITR. This required a substantial effort from the Property, Finance and ITS groups and extensive liaison with Divisional and Departmental stakeholders. Substantial progress was also made in the implementation of the Property Consolidation review with major task forces set up to examine consolidation opportunities at five major national sites.

Working with other areas of the organisations, COG assisted in the delivery of increased funding for CSIRO from a successful TFA bid as well as significant increase in funds for Flagships. Backing Australia's Ability II announced a \$305m funding package for Flagships, growing from \$30m in additional resources in 2004-05 to \$50m p.a. from 2007-08.

Key Learnings from 03-04

A retrospective assessment of COG activities for the 03-04 period reinforces our continued need to coordinate services provided corporately to research and business activities. This is particularly evident when COG is leading or supporting change initiatives which must be clearly articulated throughout every level of the organisation as helping create an environment which will optimise our potential to deliver impact from our excellent research and business activities. The need to balance a client focus whilst ensuring compliance with policy is a key learning from the 03-04 year, and has informed the internal COG planning process for the 04-05 period.

While there has been a move to adopting more of a coordinated COG approach to strategy and service delivery throughout the last financial year there was also significant emphasis placed on the delivery of functional strategy. In particular the rollout of the Program Performance Framework was also completed enabling the organisation to examine and report on research portfolio performance from the bench to the board. The increased transparency of research portfolio performance was also an

important part of improvements made to the organisation's governance framework over the course of 2003-04.

Significant Initiatives Being Undertaken in 04-05

Building on the start made in 2003-04, 2004-05 will see a more coordinated approach within the Corporate Operations group to a number of strategic change activities, including implementation of the One IT Initiative, reform of other research support service activities and continued implementation of procurement and property consolidation initiatives. COG will also continue to develop the planning and performance frameworks, further embedding measurement and reporting processes across the organisation. A program manager has also been appointed to add increased focus on the need to better manage change activities and to improve the coordination and communication of the portfolio of COG activities.

To further support the emphasis on good governance as detailed at Objective 5.2 in the Strategic Plan, a Principal Advisor Governance and Projects will operate in the Office of the Executive Director, Corporate Operations, with a mandate to further develop and maintain CSIRO's Governance Framework. The role will also oversee the development of CSIRO's Business Continuity Plan, ensuring the organisation has a robust operating framework in the event of critical situations.

Further savings opportunities have been identified through the procurement initiative, which once realised, will enable significant re-investment in science. Streamlined approaches to asset management should also make further funds available for research in the coming year.

Themes

Finance

Goal: To deliver best practice financial management services to internal stakeholders (Board, Executive, Divisions and corporate units) and external stakeholders (DoFA, DEST, and other government agencies).

CSIRO IT

Goal: To deliver effective and efficient IT services and projects that support CSIRO's strategic directions, science and business operations, specifically through the implementation of the One IT Initiative to build enterprise IT support and delivery capabilities, and enterprise information management capabilities that add strategic value to CSIRO.

Library Services & Records Management

Goal: To deliver Library Technical services and Records Management services through a One-CSIRO approach to support capabilities that enhance CSIRO's science and business operations.

Operational Performance and Planning

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.

Property

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.

Risk Assessment and Audit

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.

Alignment with CSIRO's Strategic Plan – Corporate Operations

Strategic Objective	Activity
1.1 Play a significant role in delivering on Australia's National Research Priorities	Contribute to the Enterprise Portfolio Strategy project being conducted within the Office of the Chief Executive and integrate the operational planning and budget processes with the outputs of that activity.
1.4 Increase the impact of major cross-Divisional activities through a focused strategic investment process	Continuing emphasis on One-CSIRO thrust through consolidation and rationalisation of property and facilities and rationalisation of research support services with an emphasis on the requirements for Flagship, Emerging Science and other major cross divisional initiatives.
2.2 Optimise delivery of all research activities by improving project management	Manage implementation of ANAO audit recommendation, and introduce performance indicators on project management practices to support management of this activity. Review project workflow in relation to the BETR project, and review project management policies and guidelines with a view to addressing the strategic need for fewer, larger projects.
5.2 Be among the best in governance, OHS&E and performance management processes	Continuously improve performance measurement framework based on feedback from ET and Board, and implement approved organisational health measures. Maintain an equitable allocation of Internal Leasing Scheme (ILS) costs to Divisions that reflects accommodation utilisation and condition; Develop and implement Facility Management operations and activities that maintain required safety, timeliness and quality standards as well as reduce research support overheads. Review and upgrade physical security, where necessary, at CSIRO sites. Measure CO2 outputs from CSIRO buildings and identify measures to minimise energy usage that includes reduction of greenhouse emissions that may be incorporated into individual CIP Projects. Rationalise research support service committee and advisory structures to simplify governance and increase functional accountability.
5.4 Implement standard processes and IT systems to enhance collaboration and efficiency	Review administrative process and enabling systems to ascertain whether there are more cost-effective and integrated solutions available, and implement a standardized costing methodology across CSIRO. Implement the One-IT Initiative across CSIRO and realise savings for reinvestment in priority IT areas and Science.
6.2 Proactively manage patent and equity portfolios to multiply IP-based revenue streams	Create and maintain a central register of IP licence and royalty agreements.
6.4 Reduce overhead and purchasing costs and manage balance sheet for reinvestment	Following review, implement the CSIRO-wide Procure-to-pay initiative, realize savings, and re-invest savings in science. Following review, implement reform of CSIRO library services and realise savings to enable the ongoing funding of increasing library infrastructure costs such as e-journals.

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	Develop and implement Facility Management operations and activities that maintain required safety, timeliness and quality standards as well as reduce research support overheads.
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Section 11: Resources Allocation and Risk Management

We are now well positioned to move in new and exciting directions. We have received strong support from the Government and the community, including additional funding in the 2004 Federal Budget, to play a central role in the nation's technological, environmental, economic and social well-being.

Having promulgated our Strategic Plan and received the necessary financial support, CSIRO must now deliver on the commitment and the expectations that we have created. The focus is now on the implementation of the Strategic Plan and our commitment to its key elements.

Throughout all of this, it is critical that CSIRO continues to deliver excellent science. Excellent science focused on delivering to identified needs is our core business. We must do this in collaboration with others to achieve the return on investment that is now so clearly expected of us.

During 2004-05, CSIRO will continue to undertake significant **resource redistributions**. The diversification of source funding for Flagships is ongoing; in addition to the 10% internal reallocation, extra government funding and external revenue will contribute to the program's growth. A greater proportion of resources will be shifted from Divisionally managed programs. In some cases this process will involve program closure, regeneration, or realignment. CSIRO's is committed to having 30-40% of the organisation's resources in Flagships within three to four years. 2004-05 will also see a shift in resources devoted to the Emerging Science Initiatives, and a better co-ordinated approach to the planning and evaluation of science activities across the organisation.

Other resource reallocations will be exercised through savings generated in procurement and other cost cutting initiatives, through which the organisation is anticipating \$34m in savings by 2006-07, enabling a further focus on our investment in science.

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, further detail is provided later in Section 11.2.

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.

An Enterprise Risk Management (ERM) Working Group has been established to facilitate the CSIRO Enterprise Risk Profile. The Board monitors strategic risks and the Audit Committee reviews operational risks.

In 2004-05 Divisions & Flagships will review their risk profiles, update for any new risks and review the actions and strategies for managing their specific risks. Assistance will be provided by the Risk Assessment & Audit Unit to facilitate this process.

Procedures for Project Leaders & Managers to monitor risks have been incorporated into Project Management Improvement guidelines. Work will take place over the course of 2004-05 to review how these procedures may be better integrated with the risk assessments associated with contracts and OHSE.

Risk management is now reinforced as a discipline through all areas of CSIRO's business.

11.1 Financial Overview

CSIRO's projected financial performance for 2004-05 is summarised in the following tables. 2003-04 figures are provided for comparative purposes.

The Statement of Financial Performance for 2004-05 also includes information on Strategic Plan targets for 2004-05 and CSIRO Group performance in 2004-05. 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.

Tables:

1. Statement of Financial Performance for 2004-05.
2. Statement of Financial Performance for 2004-05 – Analysis of Expenses.
3. Statement of Financial Performance for 2004-05 – Analysis of Other Expenses.
4. Statement of Financial Position as at 30 June 2005.
5. Cash Flow Statement 2004-05.
6. Financial Summary by Division 2004-05.
7. Corporate Support Services 2004-05.
8. Capital Expenditure 2004-05.
9. Intellectual Property 2004-05.
10. National Research Flagships 2004-05.

CSIRO Operational Plan 2004-05

Statement of Financial Performance 2004-05

Total CSIRO	2003-04	2004-05	Variance to 2003-04 Actual	2004-05	2004-05	Variance CSIRO Group to Strategic Plan
	Actual	Internal Budget	%	CSIRO Group Budget ¹	Strategic Plan	
	\$k	\$k		\$k	\$k	%
REVENUE:						
Co-investment	194,014	208,653	7.5	236,239		
Consulting & Services	78,690	75,872	-3.6	75,872		
Co-investment, Consulting & Services	272,704	284,525	4.3	312,111	318,000	-1.9
IP, Royalties etc	22,026	28,235	28.2	28,368	29,000	-2.2
Work in Progress Adjustment	3,494	622	-82.2	622		
Deferred Revenue Adjustment	-2,073	2,261	209.1	2,261		
Research and Services	296,151	315,643	6.6	343,361	347,000	-1.0
Other External	16,288	9,542	-41.4	10,081	2,343	330.3
Interest	7,498	3,932	-47.6	3,952	6,657	-40.6
Total External	319,937	329,117	2.9	357,395	356,000	0.4
Direct Appropriation	568,646	576,528	1.4	576,528	591,000 ²	-2.4
TOTAL REVENUE	888,583	905,645	1.9	933,923	947,000	-1.4
EXPENSES:						
Salaries	523,463	533,634	1.9	548,987		
Travel	33,685	33,360	-1.0	33,582		
Other Operating	262,053	264,796	1.0	275,872		
Depreciation & Amortisation	79,485	82,876	4.3	83,996		
Doubtful Debt Expense	172	85	-50.6	85		
TOTAL EXPENSES	898,858	914,751	1.8	942,522	947,000 ³	-0.5
Profit(Loss)on Sale of Assets	4,949	9,106	84.0	9,106		
Operating result	-5,326	0		507	0	

Notes

1. Includes \$28.3m in external revenue budgeted as CSIRO's share of external revenues derived from the Food Science Australia (\$15.9m) and Forestry (\$12.4m) joint ventures.
2. \$591m comprises \$563m in baseline appropriation, \$9m in new appropriation and \$30m potential appropriation (as per Strategic Plan Target Financial Summary). Subsequent adjustments have reduced this amount to \$576.5m (transfer of National Measurement Laboratory appropriation from CSIRO amounting to \$11.9m, and lower than anticipated indexation).
3. The Strategic Plan records total expenses of \$962m minus \$15m in overhead savings = \$947m.

Statement of Financial Performance 2004-05 – Analysis of Expense

Total CSIRO

	2003-04 Actual \$k	2004-05 Internal Budget \$k	Variance %
ANALYSIS OF EXPENSES			
Salaries	523,463	533,634	1.9
Travel	33,685	33,360	-1.0
Laboratory & Workshop Supplies ¹	36,699	52,104	42.0
Contract R&D	17,928	15,701	-12.4
Communications			-
Telecommunications	11,966	8,565	-28.4
Postage & Freight	3,398	2,802	-17.5
Computing/IT Costs	21,392	16,298	-23.8
Repairs and Maintenance	19,695	22,318	13.3
Property	24,093	25,846	7.3
Library	9,209	7,658	-16.8
Joint Venture Contributions ²	18,777	28,319	50.8
Depreciation & Amortisation	79,485	82,876	4.3
Doubtful Debt Expense	172	86	-50.0
Other Expenses (details below)	98,896	85,184	-13.9
TOTAL EXPENSES	898,858	914,751	1.8

Notes

- Prior to 2004-05 many expense categories were budgeted under the general category of Laboratory and Workshop Supplies. From 2004-05, this general category has been broken down into its component parts for budgeting purposes in order to provide more detailed expenditure reporting. This is the first year of the new arrangement, and budget figures are best available estimates only.
- Joint Venture contributions increase as the result of the addition of \$8.5m for the Forestry and Forest Products Joint Venture from 2004-05.

Statement of Financial Performance 2004-05 – Analysis of Other

Total CSIRO

	2003-04 Actual \$k	2004-05 Budget \$k	Variance %
Analysis of Other Expenses			
Recruitment & Relocation	4,708	3,680	-21.8
Advertising & Promotion	1,611	1,484	-7.9
Cleaning	4,715	4,208	-10.8
Security	1,609	1,241	-22.9
Consultants ¹	15,482	8,568	-44.7
Grants & Contributions	9,759	7,374	-24.4
Legal	5,665	4,030	-28.9
Motor Vehicles	5,864	4,813	-17.9
Operating Leases	4,118	1,196	-71.0
Office Supplies & Printing	7,532	5,839	-22.5
Utilities	16,306	15,281	-6.3
Entertainment	1,462	980	-33.0
Training	7,918	7,978	0.8
Patents	4,353	4,396	1.0
Insurance	3,603	3,148	-12.6
Investment Writedown	5,468	529	-90.3
Bad Debts	206	52	-74.8
Internal Lease	0	-4,952	-
	-1,483	15,339	1,134.3
Total Other Expenses	98,896	85,184	-13.9

Note

1. The recorded expenditure on consultants in 2003-04 includes other contracted services. Subsequent examination has revealed that actual consultancy expenditure was approximately \$1.5m (using the Government definition of a consultancy) with the remainder being contracted services that are not of a management consultancy nature. The budget estimate of \$8.6m in 2004-05 is also likely to include contract services not of a management consultancy nature. Actual consultancy costs in 2004-05 are not likely to be greater than the \$1.5m recorded in 2003-04.

Statement of Financial Position 2004-05

Total CSIRO

	2003-04 Actual \$k	2004-05 Internal Budget \$k	Variance %
CURRENT ASSETS:			
Westpac Current Account	28,916	23,483	-18.8
Divisional Imprests	70	70	0.0
Other Cash on Deposit	150,012	159,086	6.0
Cash	178,998	182,639	2.0
Trade Debtors	40,959	42,544	3.9
Work in Progress	26,958	26,990	0.1
Other Receivables	17,654	17,839	1.0
Inventory	797	797	0.0
Total Current Assets	265,366	270,809	2.1
NON CURRENT ASSETS:			
Other Investments	12,585	12,056	-4.2
Plant Equipment & Intangibles	236,425	235,357	-0.5
Land & Buildings	833,931	821,252	-1.5
Total Non Current Assets	1,082,941	1,068,665	-1.3
TOTAL ASSETS	1,348,307	1,339,474	-0.7
CURRENT LIABILITIES:			
Trade Creditors	71	271	281.7
Accrued Expenditure	21,366	19,320	-9.6
Deferred Revenue	45,627	43,366	-5.0
Provision for Rec Leave	55,183	57,604	4.4
Trust Funds	18,429	16,382	-11.1
Other Payables	53,069	44,422	-16.3
Total Current Liabilities	193,745	181,365	-6.4
NON CURRENT LIABILITIES:			
Loans	0	0	-
Finance Leases	85,032	83,010	-2.4
LSL & Severance Provision	124,596	130,165	4.5
Total Non Current Liabilities	209,628	213,175	1.7
TOTAL LIABILITIES	403,373	394,540	-2.2
NET ASSETS	944,934	944,934	0.0
EQUITY			
Accumulated Res Operations	463,683	463,683	0.0
Asset Reserves	481,251	481,251	0.0
TOTAL EQUITY	944,934	944,934	0.0

Cash Flow Statement 2004-05

Total CSIRO

	2003-04 Actual \$k	2004-05 Internal Budget \$k	Variance %
OPERATING ACTIVITIES			
CASH RECEIVED			
Appropriation receipts (Dept & C'wealth Authorities)	568,646	576,528	1.4
Sales of goods and services	311,542	332,511	6.7
Interest	7,413	3,847	-48.1
Other (funds held in trust)	-19,268	-2,045	89.4
Net GST received from/paid to ATO	11,212	17,979	60.4
Total cash received	879,545	928,820	5.6
CASH USED			
Employees	529,283	524,882	-0.8
Suppliers	287,551	334,829	16.4
Interest and other financing costs	3,047	4,094	34.4
Other			
Total cash used	819,881	863,805	5.4
Net cash from operating activities	59,664	65,015	9.0
INVESTING ACTIVITIES			
CASH RECEIVED			
Proceeds from sales of property, plant & equip & intangibles	35,530	15,477	-56.4
Proceeds of equity instruments	10,390	0	-100.0
Total cash received	45,920	15,477	-66.3
CASH USED			
Purchase of property, plant and equipment	67,325	75,502	12.1
Purchase of equity investment	11,980	-528	-104.4
Other investments	0	0	-
Loan to external body	2,436	-145	-106.0
Total cash used	81,741	74,829	-8.5
Net cash from investing activities	-35,821	-59,352	-65.7
FINANCING ACTIVITIES			
CASH RECEIVED			
Proceeds from debt	0	0	-
Total cash received	0	0	-
CASH USED			
Cash used for other financing activities	2,993	2,022	-32.4
Dividend to Government	0	0	-
Total cash used	2,993	2,022	-32.4
Net cash from financing activities	-2,993	-2,022	32.4
Net Increase/Decrease in Cash Held	20,850	3,641	-82.5
Add Cash at 1 July	158,148	178,998	13.2
Cash at 30 June	178,998	182,639	2.0

CSIRO Operational Plan 2004-05

Financial Summary by Division 2004-05

Notes	Appropriation Revenue			External Revenue			External Revenue % Total Revenue			Operating Result		
	Actual 03/04	Budget 04/05	change %	Actual 03/04	Budget 04/05	change %	Actual 03/04	Budget 04/05	change %	Actual 03/04	Budget 04/05	change %
	\$k	\$k		\$k	\$k		\$k	\$k		\$k	\$k	
Livestock - AAHL	18,206	18,269	0.3	12,018	12,270	2.1	40%	40%	0%	-1,096	349	131.8
Livestock excl AAHL	1 32,548	33,675	3.5	15,223	14,600	-4.1	32%	30%	-2%	-443	84	119.0
Health Science & Nutrition	1 18,776	21,612	15.1	9,377	6,088	-35.1	33%	22%	-11%	444	284	-36.0
Plant Industry	44,765	47,332	5.7	35,884	38,610	7.6	44%	45%	0%	-875	478	154.6
Forestry & Forest Products	2 18,140	18,944	4.4	13,306	9,149	-31.2	42%	33%	-10%	-1,984	-440	77.8
Food Science JV	3 17,643	20,741	17.6	628	0	-100.0	3%	0%	-3%	607	10	-98.4
Agribusiness & Health	150,077	160,573	7.0	86,436	80,717	-6.6	37%	33%	-3%	-3,347	765	122.8
Entomology	18,303	19,864	8.5	14,487	16,278	12.4	44%	45%	1%	593	96	-83.9
Sustainable Ecosystems	28,361	30,337	7.0	13,390	14,531	8.5	32%	32%	0%	-1,264	-304	75.9
Marine Research	27,725	31,356	13.1	16,290	16,607	1.9	37%	35%	-2%	1,153	-794	-168.8
Atmospheric Research	14,858	15,761	6.1	9,131	8,524	-6.6	38%	35%	-3%	935	-1,314	-240.6
Land & Water	35,971	39,080	8.6	22,281	23,295	4.6	38%	37%	-1%	-1,272	256	120.2
Murray-Darling	4 0	0	-	0	0	-	-	-	-	502	-50	-110.0
Oceanographic Research Vessel	6,095	6,046	-0.8	2,689	3,814	41.8	31%	39%	8%	-156	239	253.1
Environment & Natural Resources	131,312	142,445	8.5	78,268	83,050	6.1	37%	37%	-1%	491	-1,871	-481.4
CSIRO Industrial Physics	16,165	17,793	10.1	8,908	9,362	5.1	36%	34%	-1%	-857	172	120.1
Textile & Fibre Technology	12,474	13,893	11.4	9,670	10,978	13.5	44%	44%	0%	-3,594	308	108.6
Mathematics & Information Sciences	14,651	16,761	14.4	6,620	7,321	10.6	31%	30%	-1%	1,156	130	-88.7
Information & Communication Technology	5 31,112	32,193	3.5	8,635	10,153	17.6	22%	24%	2%	2,747	673	-75.5
High Performance Super Computer	6 3,783	4,039	6.8	347	175	-49.5	8%	4%	-4%	-2,935	-97	96.7
Manufacturing & Infrastructure Technology	1 52,942	54,560	3.1	24,084	24,995	3.8	31%	31%	0%	-3,245	730	122.5
Molecular Science	1 21,561	23,290	8.0	14,067	12,015	-14.6	39%	34%	-5%	5,479	211	-96.2
Aust Telescope National Facility	20,348	21,228	4.3	10,348	10,832	4.7	34%	34%	0%	2,818	3,231	14.7
IT Manufacturing & Services	173,038	183,756	6.2	82,679	85,831	3.8	32%	32%	0%	1,568	5,357	241.6
Energy Technology	17,935	20,979	17.0	6,148	8,350	35.8	26%	28%	3%	326	669	105.0
Petroleum Resources	12,002	13,659	13.8	8,241	8,150	-1.1	41%	37%	-3%	-725	-608	16.2
Minerals	25,992	29,082	11.9	18,779	17,732	-5.6	42%	38%	-4%	74	913	1129.4
Exploration & Mining	19,618	21,279	8.5	16,811	15,000	-10.8	46%	41%	-5%	-4,847	100	102.1
Sustainable Minerals & Energy	75,547	84,998	12.5	49,978	49,232	-1.5	40%	37%	-3%	-5,172	1,074	120.8
Total Four Groups	529,974	571,772	7.9	297,361	298,830	0.5	36%	34%	-2%	-6,460	5,325	182.4
Capital Program	12,608	12,502	-0.8	7,584	4,962	-34.6	38%	28%	-9%	11,338	9,661	-14.8
Discovery Centre	7 651	1,195	83.6	343	210	-38.7	34%	15%	-20%	-311	-543	-74.6
Publishing	7 1,277	2,061	61.4	7,883	7,922	0.5	86%	79%	-7%	745	536	-28.0
Education Programs	7 1,018	2,426	138.3	3,200	2,690	-15.9	76%	53%	-23%	0	38	-
Corporate Support costs	77,830	86,195	10.7	575	231	-59.8	1%	0%	0%	-915	0	100.0
Less: Recovery of Corporate Costs from Divisions	8 -52,981	-65,088	-22.8	-	-	-	-	-	-	-	-	-
Total Other	40,402	39,292	-2.7	19,585	16,016	-18.2	33%	29%	-4%	10,857	9,692	-10.7
Sub-total	570,376	611,064	7.1	316,946	314,846	-0.7	36%	34%	-2%	4,397	15,017	241.6
Revenue/Expenses not included in above	9 -14,271	-34,536	-142.0	413	14,272	3352.5	-3%	-70%	-67%	-9,612	-15,017	-56.2
CSIRO	556,105	576,528	3.7	317,360	329,118	3.7	36%	36%	0%	-5,216	0	100.0
Adjustments												-
National Measurement Laboratory	10 12,541	0	-100.0	2,578	0	-100.0	17%	-	-	-110	0	100.0
Total CSIRO	568,646	576,528	1.4	319,937	329,118	2.9	36%	36%	0%	-5,326	0	100.0

CSIRO Operational Plan 2004-05

Notes

1. Intellectual Property revenue for 2003-04 included proceeds from one-off sale of shares of \$10.4m that had not been budgeted by the following Divisions - Livestock Industries (\$0.7m), Health Science and Nutrition (\$4.0m), Molecular Science (\$5.1m) and Manufacturing and Infrastructure Technology (\$0.6m). As a consequence, external revenues for these Divisions are lower in 2004-05 because of inflated 2003-04 figures.
2. On 1 July 2004, part of the Forestry & Forest Products Division became a party to a 50:50 Joint Venture between the Division and New Zealand Forestry Research Pty Ltd. For accounting reasons, CSIRO's share of revenues received through the Joint Venture (\$12.4m for 2004-05) 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 (estimated at \$507k). The Joint Venture external revenue will be included in CSIRO "Group" revenue.
3. CSIRO is a party to the Food Science Australia (FSA) Joint Venture with the Victorian Government. In 2003-04, CSIRO contributed 50% to the Joint Venture, while in 2004-05 CSIRO will make an 85% contribution. For accounting reasons, CSIRO's share of revenues received through the Joint Venture (\$15.9m for 2004-05) is accounted for within the Joint Venture, with CSIRO recording its share of Joint Venture profit in the form of equity (estimated to be \$Nil in 2004-05). The Joint Venture external revenue will be included in CSIRO "Group" revenue.
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 \$502k surplus recorded in 2003-04 represents the initial recognition of CSIRO equity in the Joint Venture. CSIRO's share of the operating deficit for 2004-05 is \$50k.
5. The ICT Centre was launched in September 2003 and consolidates some staff and other resources from the Divisions of Industrial Physics, Mathematics & Information Sciences and Manufacturing and Infrastructure Technology.
6. The High Performance Supercomputer provides all CSIRO divisions with managed access to supercomputing facilities. The supercomputer was jointly owned by CSIRO and the Bureau of Meteorology until May 2004, when CSIRO entered into an arrangement to lease computer time from the Bureau. This new arrangement has altered the external revenue received by CSIRO from the supercomputer.
7. As a result of recommendations from ANAO, CSIRO changed its corporate cost allocation methodology in 2004-05. This involved moving from the use of one cost driver to multiple cost drivers in order to more accurately reflect the consumption of corporate services. This change led to higher amounts of corporate overhead in the form of appropriation being applied to the Discovery Centre, Publishing and Education Programs.
8. Corporate costs are distributed to Divisions based on their usage of corporate facilities and services. Corporate cost distributions occur at various times during the budget year on the basis of planned initiatives. The \$21m not yet allocated to Divisions is comprised of \$15m towards CSIRO IT (pending finalisation of costs to Divisions) and the contingency fund.
9. Corporately budgeted revenues and expenses including adjustments for operating surplus/deficit, and a provision for \$14.2m revenue from Intellectual Property in 2004-05 not attributable to Divisions (including sale of shares).
10. The National Measurement Laboratory was transferred to the Department of Industry, Tourism and Resources on 1 July 2004 together with appropriation funding of \$11.9m

Corporate Services 2004-05

		2003-04 Actual \$k	2004-05 Budget \$k	Variance %
Corporate Support Services				
Chief Executive Office	Geoff Garrett	2,418	2,483	2.7
DCE Office	Ron Sandland	1,224	1,092	-10.8
Board/Corporate Executive	Ron Sandland	1,006	853	-15.2
Executive Management Council	Ron Sandland	207	300	44.9
New Initiatives-Enterprise Portfolio Strategy Group	Geoff Garrett	0	750	n/a
Agribusiness & Health	Michael Eyles	1,196	1,178	-1.5
Environment & Natural Resources	Steve Morton	1,103	701	-36.4
IT Manufacturing & Services	Warren King	1,083	975	-10.0
Sustainable Minerals & Energy	Rod Hill	998	830	-16.8
Science Planning	Michael Barber	1,238	1,113	-10.1
Business Development & Commercialisation ²	Mehrdad Baghai	13,812	16,625	20.4
Corporate Operations Group	Mike Whelan	37,615	38,194	1.5
Communications	Donna Stauton	3,727	4,227	13.4
People Development (incl. OHS&E)	Peter May	5,843	6,271	7.3
Learning & Development	Peter May	927	946	2.0
Flagship/ESA Directors ³	Ron Sandland/M Barber	5,434	9,238	70.0
Not allocated ⁴		419		-
Total Corporate Support Services		77,831	86,195	10.7

Notes

1. BD&C costs include allocation of \$4.2m for legal costs associated with Rippers (similar costs in 2003-04 were \$0.5m for Wireless Lan & \$1m for Gene silencing). Ongoing BD&C costs are therefore stable between years.
2. Management costs of the Flagships and Emerging Science Areas represent 5.8% of total allocated costs.
3. Pending allocation to specific Corporate Groups.

CSIRO Operational Plan 2004-05

CSIRO Capital Expenditure 2004 -05

	Land and Buildings			Plant and Equipment			Capital Expenditure Total		
	Actual 03/04 \$k	Budget 04/05 \$k	Variance %	Actual 03/04 \$k	Budget 04/05 \$k	Variance %	Actual 02/03 \$k	Budget 04/05 \$k	Variance %
Livestock - AAHL	1,591.5	0.0	-100.0	1,334.0	300.0	-77.5	2,925.5	300.0	-89.7
Livestock exc AAHL	0.0	0.0	-	1,473.4	600.0	-59.3	1,473.4	600.0	-59.3
Health S&N	0.0	0.0	-	1,255.6	1,100.0	-12.4	1,255.6	1,100.0	-12.4
Plant Industry	237.7	300.0	26.2	3,239.7	1,922.5	-40.7	3,477.4	2,222.5	-36.1
Forestry & F Prod	0.0	0.0	-	1,145.1	800.0	-30.1	1,145.1	800.0	-30.1
Forestry JV	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
Food Science JV	0.0	0.0	-	507.2	748.0	47.5	507.2	748.0	47.5
Agribus & Health	1,829.2	300.0	-83.6	8,955.1	5,470.5	-38.9	10,784.3	5,770.5	-46.5
Entomology	0.0	40.0	-	1,719.8	1,200.0	-30.2	1,719.8	1,240.0	-27.9
Sust Eco	0.0	0.0	-	1,451.3	1,900.0	30.9	1,451.3	1,900.0	30.9
Marine	22.0	12.0	-45.4	3,705.6	3,345.0	-9.7	3,727.6	3,357.0	-9.9
Atmospheric	0.0	0.0	-	360.6	819.0	127.1	360.6	819.0	127.1
Land & Water	50.3	500.0	894.0	2,036.5	2,020.0	-0.8	2,086.8	2,520.0	20.8
Murray-Darling	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
ORV	0.0	0.0	-	2,447.3	160.0	-93.5	2,447.3	160.0	-93.5
Env & Nat Res	72.3	552.0	663.8	11,721.1	9,444.0	-19.4	11,793.4	9,996.0	-15.2
CIP	0.0	0.0	-	366.9	750.0	104.4	366.9	750.0	104.4
Nat Meas Lab	0.0	0.0	-	629.8	0.0	-100.0	629.8	0.0	-100.0
Textile & Fibre	0.0	0.0	-	1,064.6	1,000.0	-6.1	1,064.6	1,000.0	-6.1
Math & Info	0.0	0.0	-	210.4	500.0	137.7	210.4	500.0	137.7
ICT	0.0	0.0	-	411.9	1,476.0	258.4	411.9	1,476.0	258.4
HPSC	0.0	0.0	-	1,093.8	1,000.0	-8.6	1,093.8	1,000.0	-8.6
Mfg & Infst.	0.0	0.0	-	4,528.7	3,960.0	-12.6	4,528.7	3,960.0	-12.6
Mol Science	0.0	0.0	-	1,781.9	3,000.0	68.4	1,781.9	3,000.0	68.4
Aust T-scope NF	0.0	0.0	-	2,984.4	3,584.0	20.1	2,984.4	3,584.0	20.1
IT Mfr & Serv	0.0	0.0	-	13,072.4	15,270.0	16.8	13,072.4	15,270.0	16.8
Energy Tech	0.0	0.0	-	534.0	2,100.0	293.3	534.0	2,100.0	293.3
Petroleum	0.0	0.0	-	920.5	400.0	-56.5	920.5	400.0	-56.5
Minerals	39.0	0.0	-100.0	1,811.7	3,700.0	104.2	1,850.7	3,700.0	99.9
Exp & Mining	0.0	0.0	-	858.1	750.0	-12.6	858.1	750.0	-12.6
Sus Min & En	39.0	0.0	-100.0	4,124.3	6,950.0	68.5	4,163.3	6,950.0	66.9
Total Four Groups	1,940.5	852.0	-56.1	37,872.9	37,134.5	-1.9	39,813.3	37,986.5	-4.6
Capital Program	20,939.6	29,125.0	39.1	0.0	0.0	-	20,939.6	29,125.0	39.1
Discovery Centre	0.0	0.0	-	17.8	150.0	742.7	17.8	150.0	742.7
Publishing	0.0	0.0	-	12.1	51.1	320.9	12.1	51.1	320.9
Education Programs	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
ITS	1,148.2	2,000.0	74.2	1,822.1	5,689.0	212.2	2,970.2	7,689.0	158.9
Corporate Activities	0.0	0.0	-	0.0	500.0	-	0.0	500.0	-
Other exc CC94	22,087.8	31,125.0	40.9	1,852.0	6,390.1	245.0	23,939.8	37,515.1	56.7
Sub-total	24,028.2	31,977.0	33.1	39,724.9	43,524.6	9.6	63,753.1	75,501.6	18.4
Corp Funds	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-
CSIRO	24,028.2	31,977.0	33.1	39,724.9	43,524.6	9.6	63,753.1	75,501.6	18.4

Note

Capital expenditure budgets for 2004-05 are currently budget proposals and will be subject to review by the CSIRO Capital Management Committee, on behalf of the Executive Committee. Variances between years will be assessed as part of this process.

CSIRO Intellectual Property Revenue 2004-05

Total CSIRO

	2003-04	2004-05	
	Actual \$k	Internal Budget \$k	Variance %
Livestock - AAHL	369.3	600.0	62.4
Livestock exc AAHL	1,238.4	150.0	-87.9
Health S&N	4,135.1	350.0	-91.5
Plant Industry	3,676.1	6,947.0	89.0
Forestry & F Prod	45.3	46.5	2.5
Forestry JV	0.0	0.0	-
Food Science JV	0.0	0.0	-
AgriBus & Health	9,464.4	8,093.5	-14.5
Entomology	349.5	400.0	14.4
Sust Eco	30.0	60.0	100.1
Marine	7.4	0.0	-100.0
Atmospheric	440.1	209.7	-52.4
Land & Water	18.9	150.0	693.4
Murray-Darling	0.0	0.0	-
ORV	0.0	0.0	-
Env & Nat Res	845.9	819.7	-3.1
TIP	43.8	100.0	128.1
Nat Meas Lab	0.0	0.0	-
Textile & Fibre	633.1	500.0	-21.0
Math & Info	202.6	219.0	8.1
ICT	462.1	745.0	61.2
HPSC	0.0	0.0	-
Mfg & Infst.	1,350.3	1,208.0	-10.5
Mol Science	5,693.7	235.0	-95.9
Aust T'scope NF	0.0	50.0	-
IT Mfr & Serv	8,385.7	3,057.0	-63.5
Energy Tech	328.8	440.0	33.8
Petroleum	0.0	200.0	-
Minerals	2,338.2	425.0	-81.8
Exp & Mining	573.1	1,000.0	74.5
Sus Min & En	3,240.0	2,065.0	-36.3
Total Four Groups	21,936.1	14,035.1	-36.0
Capital Program	0.0	0.0	-
Discovery Centre	0.0	0.0	-
Publishing	65.6	0.0	-100.0
Education Programs	0.0	0.0	-
ITS	0.0	0.0	-
Corporate Activities	24.7	0.0	-100.0
Other exc CC94	90.3	0.0	-100.0
Sub-total	22,026.4	14,035.1	-36.3
Corporate Funds ¹	0.0	14,200.0	-
CSIRO	22,026.4	28,235.1	28.2

Note

- \$14.2m in external revenue is held Corporately for transactions concerning spin-off companies and shares. These revenues will be attributed to appropriate Divisions on receipt.

CSIRO Operational Plan 2004-05

Flagships Program Resourcing Summary

New Appropriation Revenue (BAA2)			Redirect Appropriation			External Leverage				Total				
Actual 03/04 \$k	Budget 04/05 \$k	change %	Actual 03/04 \$k	Budget 04/05 \$k	change %	Actual 03/04 \$k	(% Leverage)	Budget 04/05 \$k	(% Leverage)	change %	Actual 03/04 \$k	Budget 04/05 \$k	change %	
Food Futures	4,100	6,150	50.0	12,354	16,879	36.6	2,352	(14.3%)	5,149	(22.4%)	118.9	18,806	28,178	49.8
Energy Transformed	3,300	5,300	60.6	6,375	15,300	140.0	1,066	(11.0%)	5,160	(25.0%)	384.1	10,741	25,760	139.8
Water for Healthy Country	4,100	4,800	17.1	13,910	14,490	4.2	1,505	(8.4%)	6,770	(35.1%)	349.8	19,515	26,060	33.5
Light Metals	3,100	4,800	54.8	5,835	13,750	135.6	327	(3.7%)	4,380	(23.6%)	1239.4	9,262	22,930	147.6
Preventative Health	3,600	4,800	33.3	9,757	12,255	25.6	833	(6.2%)	4,225	(24.8%)	407.2	14,190	21,280	50.0
Wealth from Oceans	1,300	3,500	169.2	5,466	10,900	99.4	2,591	(38.3%)	4,880	(33.9%)	88.3	9,357	19,280	106.0
Flagship Office & Other	500	650	30.0	100	700	600.0	-	-	-	-	-	600	1,350	125.0
Total CSIRO	20,000	30,000	50.0	53,797	84,274	56.7	8,674	(11.8%)	30,564	(26.7%)	252.4	82,471	144,838	75.6

Flagships appropriation % of CSIRO appropriation
(30-40% target by 2006-07)

2003-04 13%	2004-05 20%
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11.2 Organisational Risk Profile June 2004

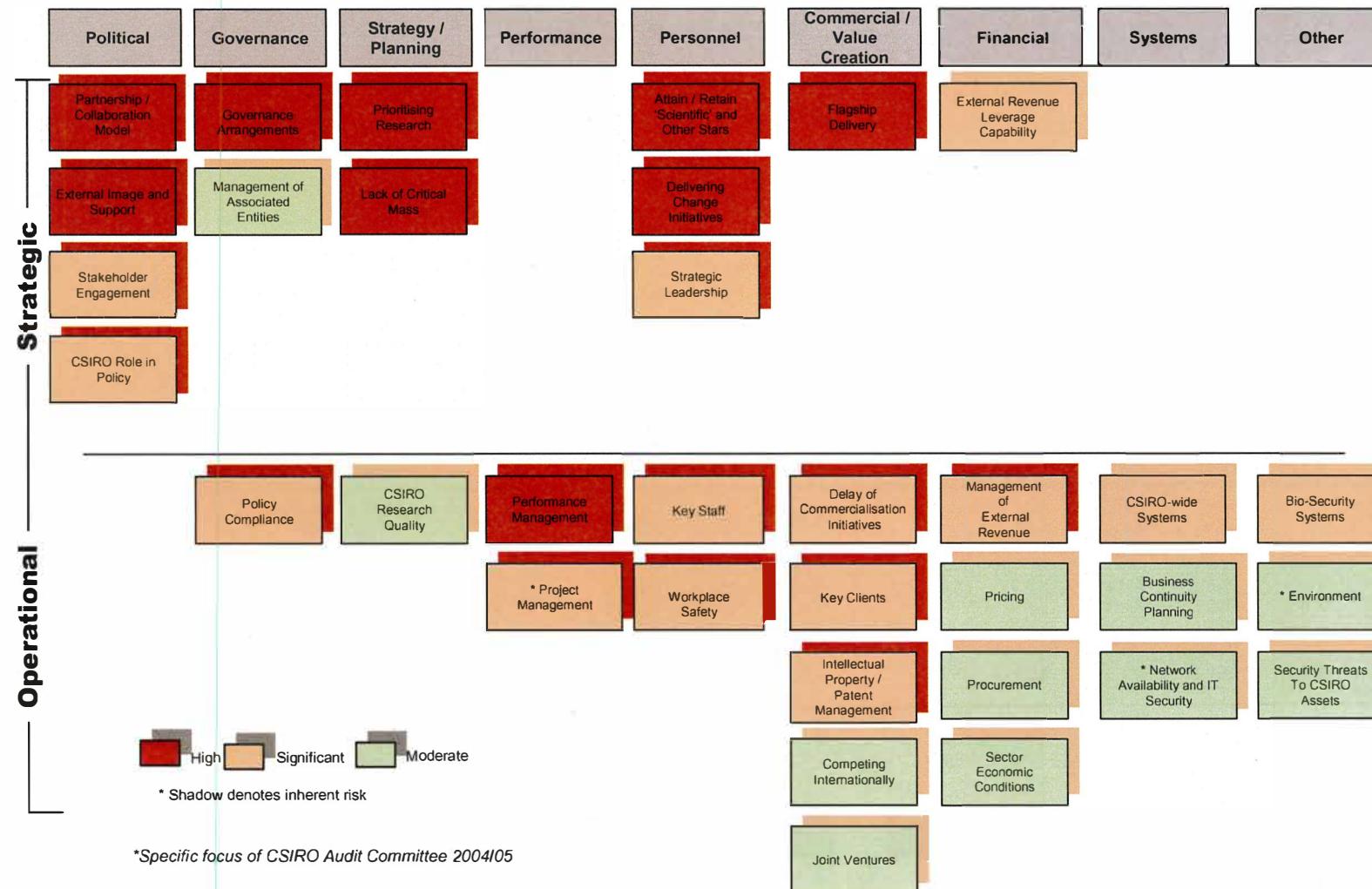


Figure 12: CSIRO Organisational Risk Profile June 2004

Risk Assessment Methodology

The risk assessment methodology, adapted from the Australian Risk Management Standard AS/NZS 4360:1999, involves identifying the risk and analysing each risk in terms of how likely it is to happen (Likelihood) and the possible impacts (Consequence). The final 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 **assessed risk** grading takes into account management's perception of the effectiveness of current controls. These controls provide the mitigating effects that have the potential to or actually do reduce, the level of risk.

Risk Scoring Matrix

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

Appendix 1

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:

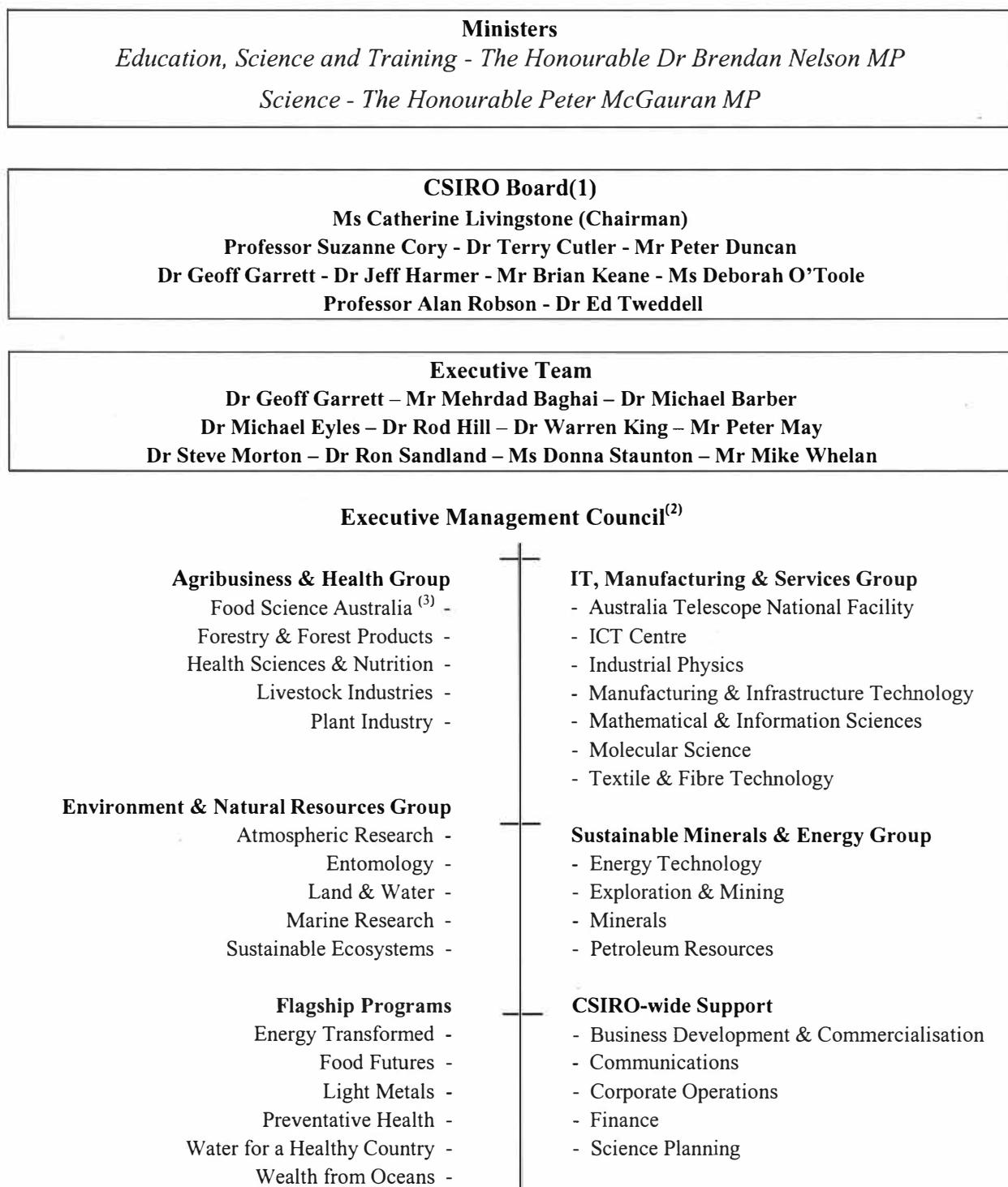
- Liaison with other countries in matters connected with scientific research
- Training of research workers
- Establishing research fellowships and studentships
- Co-operation with associations of persons engaged in industry for the purpose of carrying out industrial scientific research
- Establishing, 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

Appendix 2

Organisational Chart



(1) Board membership as at 30 June 2004

(2) The Executive Management Council comprises members of the Executive Team, Divisional Chiefs, Flagship Directors and some Corporate Officers - see following page.

(3) Joint venture with the Victorian Government

Executive Management Council (June 2004)

Executive Team

Chief Executive	Dr Geoff Garrett	02 6276 6132
Deputy Chief Executive	Dr Ron Sandland	02 6276 6127
Executive Director: Business Development and Commercialisation	Mr Mehrdad Baghai	02 9490 8400
Executive Director: Science Planning	Dr Michael Barber	02 6276 6388
Group Executive: Agribusiness & Health	Dr Michael Eyles	02 9490 8341
Group Executive: Sustainable Minerals & Energy	Dr Rod Hill	03 9545 8600
Group Executive: IT, Manufacturing & Services	Dr Warren King	02 9490 8204
Executive Director, People and Culture	Mr Peter May	02 9490 8877
Group Executive: Environment & Natural Resources	Dr Steve Morton	02 6246 4552
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 & Health Group

Food Science Australia *	Dr Alistair Robertson	02 9490 8341
Forestry & Forest Products	Dr Paul Cotterill	02 6281 8314
Health Sciences & Nutrition	Dr Graeme Woodrow	03 9662 7135
Livestock Industries	Mr Shaun Coffey	07 3214 2999
Plant Industry	Dr Jeremy Burdon	02 6246 5546

Environment & Natural Resources Group

Atmospheric Research	Dr Greg Ayers	03 9239 4687
Entomology	Dr Joanne Daly	02 6246 4025
Land & Water	Dr Rob Vertessy	02 6246 5940
Marine Research	Dr Tony Haymet	03 6232 5212
Sustainable Ecosystems	Dr Andrew Johnson	07 3214 2383

IT, Manufacturing & Services Group

Australia Telescope National Facility	Dr Brian Boyle	02 9372 4300
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
Molecular Science	Dr Annabelle Duncan	03 9545 2470
Textile & Fibre Technology	Dr Brett Bateup	03 5246 4777

Sustainable Minerals & Energy Group

Energy Technology	Dr David Brockway	02 4960 6046
Exploration & Mining	Dr Neil Phillips	03 9545 8202
Minerals	Dr John Rankin (Acting)	03 9545 8601
Petroleum Resources	Dr Bev Ronalds	08 6436 8650

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: IT Services	Ms Roze Frost	02 6276 6601
General Manager: Operational Performance	Mr Bob Garrett	02 6276 6423
Director: Business Development	Ms Mara Bun	02 9490 8203
Director: People Development	Mr Peter O'Keefe	02 6276 6418
Director: Commercialisation	Mr Nigel Poole	02 9490 8138
General Manager: Corporate Finance	Mr David Toll	02 6276 6170

*joint venture with the Victorian Government

Appendix 3

Organisational Health Measures

Health Measures Performance Report 2003/2004

	(\$000)	Total Revenue	Research, Services & IP	Other External	Total External Revenue	Total Aprop	Operating Result	Cash	Capex
Financials	CSIRO Group Actual 03/04 ¹	897,883	305,451	23,786	329,237	568,646	-5,326	180,737	67,326
	CSIRO Actual 03/04 ²	888,583	296,151	23,786	319,937	568,646	-5,864	178,999	67,326
	Internal Budget 03/04 ³	894,868	313,070	13,152	326,222	568,646	-28,523	133,779	80,103
	CSIRO Actual 02/03 ⁴	829,482	275,442	21,984	297,426	532,056	85,191	158,149	115,002
	Strategic Plan Target 03/04 ⁵	890,000	313,000	9,000	322,000	568,000	-30,000	-	-
People	FTE Equivalents in CSIRO (at 30 June)	Year	Research Staff	Total Staff	Sponsored Post Grads	Supervised Post Grads	Post Docs		
		2004	3,934	5,966	235	566	259		
		2003	3,988	5,999	194	535	207		
	Insight Scores	Insight Category						2003	2004
		Engagement ⁶ PLUS Staff Commitment ⁷ :						156	154
		Working Relationships ⁸ PLUS Work Organisation & Efficiency ⁹ :						127	124
	OHSE Scores	2003/04	ATLR: Average Time Lost rate	2.1 3.9	LTIFR: Lost Time Injury Freq. Rate	5.9 6.0	MTFR: Medical Treatment Freq. Rate	24 20	
Products, Customers, Services & Delivery	Patents (at 30 June)	Year	Number of Inventions	Total Granted Patents	Total Live Patent Cases	Annual Performance Goals (Aggregate of Divisional APGs)	Green	2,144	80%
		2004	754	2,079	3,961		Amber	426	16%
		2003	779	2,002	3,965		Red	115	4%
		2002	733	1,801	3,537		Total	2,685	100%
	Publications	Calendar Year	Books & Chapters	Journal Articles	Conference Papers	Technical Reports	Client Reports		
		2003	240	1,836	1,428	442	8,451		
		2002	223	1,686	1,142	240	10,486		
		2001	128	1,631	1,096	153	9,324		
	Customer Value Survey				Subsidisation in CSIRO Services & Consulting (S&C)				
	Period: April - March	2003	2004		[+ve = subsidy]	2003	2004		
	Comparative Value Rating:	108	109		Level of Subsidy (\$000):	24,497	8,869		
	Average Score:	7.0	7.0		% of S&C Expenditure	29%	13%		
	Revenue By Industry Category (\$000)				Top Five Customers (Invoiced Revenue \$000)				
	Coinvest, S&C Revenue	2003	2004	Customer		2003	2004		
	Australian Private Sector	77,798	79,567	Grains Research & Development Corporation (0203 ranking: 1)		13,576	13,328		
	Commonwealth, State & Local Govt	76,847	86,964	Department of Agriculture Fisheries and Forestry (0203 ranking: 2)		7,406	7,997		
	Cooperative Research Centres	31,954	33,140	Australian Wool Innovation Limited (0203 ranking: 5)		6,019	7,475		
	Overseas Entities	34,292	33,065	National Aeronautics & Space Agency (0203 ranking: 10)		4,217	6,522		
	Rural Industry R&D Corporations	42,648	39,968	Australian Greenhouse Office (0203 ranking: 8)		4,731	6,210		
	Subtotal	263,539	272,704						
	IP Revenue	13,789	22,026						
	WIP / Deferred Revenue	-1,886	1,421						
	Research & Services Revenue	275,442	296,151						

1. The actual results of the CSIRO "Group" which includes CSIRO and the CSIRO share of the Food Science Australia Joint Venture.
2. The actual results as recorded by CSIRO as an entity.
3. CSIRO internal budget was derived by aggregating divisional/corporate budget estimates.
4. Figures for 02/03 Total Revenue & Total Aprop exclude Capital Usage Charge of \$107m.
5. Strategic Plan targets have been obtained from the Strategic Plan for 2003-2007.

A detailed explanation of data definitions and terms is available in Appendix 5

CSIRO Performance Measures for Strategic Goals and Objectives

Note: This list of measures has been modified from that which appears in the CSIRO Performance Report 2003-04 (pg 24-35), with some measures having been modified, added or removed, as this document deals with 2004-05 target performance.

Goal 1: Focusing Our Science Investment

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin *
1.1 Play a Significant Role in Delivering on Australia's National Research Priorities	Share of science investment on NRPs	>66%	80%	-	73% (2002-03)	>66%	Barber	SP 03/4 OP TFA
	Evidence of impact on NRPs				See Annual Report "Outputs and Outcomes"		Barber	SP
	Government acceptance of CSIRO's NRP plan	2004-05 NRP implementation plan accepted	2003-04 Plan well received	-	n/a	n/a	Barber	03/4 OP

* 'Origin' refers to other documents in which this measure/target appears. SP = Strategic Plan 2003-2007; OP = Operational Plan 2003-2004; TFA = Triennium Funding Agreement

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
1.2 Build Critical Mass and Ensure Quality in our Research Programs	Share of programs with critical mass	Monitor through science reviews	Partially achieved	1	n/a	Not stated	Barber GEs	SP 03/4 OP
	Implement Program Performance Framework (PPF) for core research	Further integrate PPF in Divisional research management, including link to APAs	Good Progress	2	n/a	n/a	GEs PM	03/4 OP
	New science assessment process	Reviews completed in at least six Divisions	Process piloted in CPR	-	n/a	n/a	Barber	TFA
	Reviews of CPR and other Divisions, and of Hydrogen-related R&D across CMIT, CET and CIP.	Recommendations implemented as appropriate	n/a	-	n/a	n/a	Barber GEs	TFA

CSIRO Operational Plan 2004-05

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
1.3 Champion Flagships to improve the lives of Australian's and Advance Australia's Key Industries	<u>Headline 1a</u> Per cent of Flagship Annual Performance Goals achieved	70%	71%	-	n/a	70%	Sandland	SP 03/4 OP TFA
	<u>Headline 1b</u> Share of CSIRO science budget in Flagships (Flagship Approp / CSIRO Approp)	19.8%	13.0% (Target 10.4%)	-	n/a	30% - 40%	Sandland	SP TFA
	Flagship Programs operating successfully	Productive engagement with Divisions. Collaboration fund established.	Six Flagship Programs fully operational.	3	Two (2002-03) P-Health & Light Metals	Five to six by 2006-07	Sandland	SP 03/4 OP TFA
	Adoption and impact of Flagship Program outputs	See Annual Report "Outputs and Outcomes"					Sandland	SP
	Total external revenue for Flagships	\$30.6m	\$8.7m (Target \$12.8m)	4	n/a	n/a	Sandland	TFA
	Active Flagship partnerships	Evidence of new and developing partnerships with external parties.	n/a		n/a	n/a	Sandland	04/05 OP

CSIRO Operational Plan 2004-05

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
1.4 Increase the Impact of Major Cross-Divisional Activities through a focused Strategic Investment Process	Major Cross-Divisional programs (MXDPs) operating successfully	Each MXDP operating to an approved Plan consistent with the PPF	Partial implementation	5	Four (2003-04)	Three to four by 2006-07	Morton King Hill	SP 03/4 OP TFA
	Adoption and impact of MXDP outputs	See Annual Report "Outputs and Outcomes"					GEs	SP
	Tender to become operator/manager of the Australian Synchrotron	Tender successful	n/a	-	n/a	n/a	Hill	04/5 OP
	Prepare a case for a new MXDP in "Instrumentation"	Case prepared	n/a	-	n/a	n/a	Hill	04/5 OP

Notes (Goal 1)

1. The 2003-04 target was to establish a 'critical mass' baseline. This has not been established. However, two complementary initiatives have commenced to help ensure that critical mass is developed and actively managed. A program of external reviews will assess Divisional research capability, performance and outputs, while the "C-Sharp" initiative will develop a systematic approach to investment decisions including consideration of critical mass.
2. Themes, Streams & Annual Performance Goals identified in Divisional Plans. APG-based progress monitored by ET/Board.
3. Six Flagships operating with strong Government support. All Flagships have an FOC-approved Business Plan and a permanent Director.
4. In response to the shortfall in Flagship external revenue in 2003-04 we have focused additional dedicated business development expertise on the flagships in 2004-05. Flagship external revenue targets for out years are: \$61.8m (05-06), \$81.1m (06-07)
5. Four MXDPs were identified in the Operational Plan for 2003-04: ICT Centre, Secure Australia, Climate Program, SKA/LoFAR. New Coordinators have been appointed to the Secure Australia & Climate Programs. The new ICT Centre (see Objective 4.4) and SKA/LoFAR (see Objective 2.4 below) are no longer MXDPs. The specific target for 2003-04 was to implement the PPF for MXDPs to establish baseline annual performance goals. Themes/Streams were identified in the CSIRO 2003-04 Operational Plan for four MXDPs, but APG-based PPF reporting was done for the ICT Centre only.

Goal 2: Delivering World Class Science

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
2.1 Concentrate People Processes on Developing, Attracting, Exciting and Retaining Talent	<u>Headline 7</u> Staff Satisfaction Index (Insight Survey)	Exceed Global R&D norm	Norm = 63 CSIRO = 66 (2003)	-	Norm = 66 CSIRO = 68 (2002)	Exceed Global R&D norm	Sandland (03/4) May (04/5)	SP
	Number of Post-docs	300	259	-	207 (2002-03)	Increasing	GEs Barber	SP
	Number of postgraduate students supervised	Maintain or increase	566	-	535 (2002-03)	Not stated	Sandland (03/4) May Barber (04/5)	SP TFA
	Staff Commitment and Engagement (Combined Insight Survey Results)	>=156	154 (Target 156)	-	156 (2002 poll)	Not stated	Sandland (03/4) May (04/5)	03/4 OP
	New Federation Fellows in CSIRO	Four	None	-	n/a	n/a	GEs	New

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
2.2 Optimise Delivery of all Research Activities by Improving Project Management	External/Internal audit findings on project management practice	Favourable internal audit findings	Partial	1	ANAO and Einhorn findings (2001)	Favourable audit findings	Whelan	SP 03/4 OP TFA
	Customer Value Survey results for 'Process & People' (CSIRO score & Comparative score)	Improve on 2003-04 results	CSIRO 7.5, Comparative 109 (Year to March 2004)	2	CSIRO 7.1, Comparative 109 (Year to March 2003)	Not stated	GEs Baghai	SP TFA
	Proportion of projects completed on time, on brief, and on budget	Develop measure and monitor	n/a	3	n/a	n/a	GEs	TFA
	Number and proportion of projects discontinued	Monitor	n/a	3	n/a	n/a	GEs	TFA

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
2.3 Build our Global Recognition for Science Leadership in our Chosen Science Domains	<u>Headline 2a</u> Citations of publications	Improve average citation rate	Slight decline	4	See note	Improve position in ISI rankings	Barber	SP 03/4 OP TFA
	<u>Headline 2b</u> Citations of patents	Patent impact index =0.65	0.56 (2003) 0.59 (to March 04)	-	0.49 (2000) 0.60 (2001)	Index approaches 1.0	Barber	SP 03/4 OP TFA
	Number of publications by type		See table published in Annual Report				Barber	TFA
	No. of publications, excluding client reports, per Research Scientist/Engineer	Monitor	2.48	-	2.08 (2002-03)	n/a	Barber	TFA

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
2.4 Help Australia Play a Leadership Role in Major International Science Facilities such as the SKA	Initiatives to establish international science facilities	Monitor progress of Synchrotron proposal	Synchrotron proposal being developed	-	n/a	Active participation by Australia	Hill	SP TFA
	Australia's engagement in the Square Kilometre Array (SKA)	Establish sources of funding and develop a resourced project plan for siting of a new technology demonstrator site for the SKA in WA	Australia and CSIRO are playing a leading role in the SKA international consortium.	5	ATNF playing a major role in technical and site discussions regarding SKA	Australia is the internationally recognised forerunner for hosting the SKA	King	SP 03/4 OP TFA

Notes (Goal 2)

- Internal PMI and ANAO follow-up audits completed. ANAO notes significant progress made but with room for further improvement in the use of project selection criteria, risk assessments and across-the-board compliance with project management policy.
- The 'Process and People' score from the Customer Value Survey provides an external assessment of attributes relevant to project management from the perspective of customers (for example: Negotiating and administering the contract, Being responsive through the course of the work, Keeping to schedule, Managing issues and complaints). CSIRO's score is given on a ten point scale [1 = very poor; 10 = excellent]. The comparative score is calculated as CSIRO's score divided by our competitor's score times 100. For example, $7.81 / 7.65 \times 100 = 102$.
- The TFA notes: "Quantitative measurement is not currently cost-effective. CSIRO will develop a reliable measurement approach over the triennium."
- Baselines as at May 2003: Institutional Ranking by Total Citations = 168; Citations per Paper ISI = 7.59, CSIRO = 9.23
Results as at June 2004: Institutional Ranking by Total Citations = 170; Citations per Paper ISI = 7.94, CSIRO = 9.18
As at June 2004, CSIRO was ranked by ISI in the top 1% of institutions in 12 out of 22 disciplines (11 of 22 in May 2003).
All rankings referred to here are based on total citations over a rolling ten year period.
- CSIRO, through ATNF and CMIT, continue to play a leading role in the international SKA consortium.

Goal 3: Partnering for Community Impact

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
3.1 Focus and Intensify Collaboration with Universities, CRCs and Other Agencies	Partnerships focused on clear strategic goals	Flagship collaboration fund established and operational	Significant progress	1	n/a	Strong portfolio of active partnerships	Barber Staunton	SP 03/4 OP TFA
	Partner feedback on collaboration	Develop formal measurement process and establish baseline	See note	2	n/a	Positive feedback and support	Staunton	SP 03/4 OP TFA
	Co-location of new facilities	Analysis of co-location options presented to CSIRO Board when approval sought for new facilities	Major initiatives underway	3	n/a	n/a	Whelan GEs	TFA
	Quality of CRC commercial engagement	90% of Round 9 CRCs adopt standard contract model	Standard contract model up and running	-	n/a	n/a	Baghai	New

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
3.2 Service the Needs of Government for Informed Policy Setting	Government satisfaction with CSIRO	Undertake a formal qualitative and quantitative survey across key government stakeholders,	See note	5	na	Surveys show high levels of satisfaction	Barber (03/04) Staunton (04/05)	SP
	Engagement with federal & state/territory governments (including parliament and administration)	Map CSIRO activity and develop formal measurement process and establish baseline measures MLO statistics as a measure of Ministerial engagement	Engagement well established	4	na	Active, effective programs	Barber (03/04) Staunton (04/05) Baghai (04/05)	SP TFA

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
3.3 Enhance Communication to Raise Public and Stakeholder Excitement and Trust in Science	<u>Headline 3a</u> 'Importance of 'CSIRO name' (CVS score)	CSIRO > 6.8 Comparative > 125 (year to March 2005)	CSIRO = 6.6 Comparative = 118 (year to March 2004)	6	CSIRO = 6.8 Comparative = 128 (year to March 2003)	Improve over baseline	Staunton	SP 03/04 OP
	Recognition of CSIRO's brand.	Establish a base line measure for capturing CSIRO's Brand recognition across a range of stakeholders	Progressed activities around 'look and feel'	-	na	Surveys show that CSIRO is a trusted voice on science matters	Staunton (04/05)	SP
	Raise trust and excitement in science amongst target audiences	Expansion of CSIRO's outreach activities (CSIROSEC's, Magazine subscriptions, Science by email) Increased awareness of science through participation in national science expo's	See note	7	na	Survey results show increasing trust and excitement	Staunton (04/05)	SP
	Establish benchmarks of brand acceptance and strength	Undertake a formal qualitative and quantitative survey across media and the Australian communities	n/a	-	n/a	n/a	Staunton (04/05)	New

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
3.4 Partner with Other Agencies to Advance Australia's Global Development Contributions	Partnerships with other agencies to advance global development	Growth of \$15m in lifetime value of consulting contracts with sovereign nations and major national foundations	Active relationships with Global Research Alliance, World Bank, Gates Foundation, UNICEF, AUSAid.	8	Case by case opportunistic interactions	Evidence of partnerships	Baghai GEs	SP 03/4 OP
	More focused and effective international effort: Number and value of projects and spread across countries	Monitor	Activity now focused on Vietnam, Taiwan. Activity in several other countries wound back.	9	Case by case opportunistic interactions	Fewer small / more larger programs	GEs Baghai	SP TFA
Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
3.4 Continued	Evidence of impacts on global development (triple bottom line)	See Annual Report "Outputs and Outcomes"					GEs Baghai	SP
	Level of global aid funding (including from Australia)	Monitor (part of the \$15m above)	See note	10	Case by case opportunistic interactions	n/a	◆ Baghai	03/4 OP

Notes (Goal 3)

1. The target for 2003-04 was constructive engagement in responding to government reviews. This has been achieved with the CRC Review, Collaboration Review and Infrastructure Taskforce. The new CRC Engagement Office has been established. Significant progress towards implementing responses to Government announcements eg CSIRO's new Science Quality Assessment Program. New approach taken to ensure that Flagships and Round 9 CRC programs involving CSIRO are strategically aligned and complementary. CSIRO has approved the high level principles for CRC governance models and template agreements for commercialising IP developed in CRCs. Significant progress made toward development of a Flagship Collaboration Fund. The CSIRO Postgraduate and Postdoctoral rounds for 2003/04 attracted 31 top up scholarships (16 aligned with Flagships) and 22 post-doc fellows.
2. The target for 2003-04 - to establish a CVS-like collaboration baseline measure – was not pursued. Less formal feedback was instead sought through existing mechanisms including high level meetings with agencies, stakeholder briefings, and working groups for the purpose of developing processes (such as for CRC involvement and science quality assessment) or maintaining relations. In planning the new Flagship Collaboration Fund we have mapped collaboration with universities and other agencies.
3. Planning task forces were created for five major property consolidation initiatives (Waterford in Perth, Clayton in Melbourne, North Ryde in Sydney, Boggo Road in Brisbane and on the campus of James Cook University in Townsville) and major financial provisions made in the 2003-2008 Capital Investment Program for their development.
4. CSIRO engages with Federal, State and Territory governments through, invitations to provide briefings and seminars, requests for submissions to enquiries and hundreds of project level connections. Federal and State relationship managers facilitate parliamentary and bureaucratic briefings and introduce Scientists to government officials responsible for innovation policy and program management. We are represented in many advisory mechanisms to government, and are frequently consulted in relation to industry development clusters and collaboration with other R&D providers. CSIRO helps to shape government policy settings through the outcomes of its research projects in areas such as sustainability, broadband connectivity, and biotechnology. Increasingly, Flagships are vehicles for government interaction around key challenges such as water, energy, and preventative health policy. Engagement with the Federal Government has focused around responses to government reviews (see 3.1) and the triennium funding agreement, championship of Flagships and budget process, and membership of high level Committees (including PMSEIC, CCST, COAG working groups, Interdepartmental Committees).
5. The target for 2003-04 was to establish a CVS-like collaboration baseline measure. While this baseline measure has not been established, Government satisfaction and engagement with CSIRO has been judged by a range of measures, which include:
 - The demand for advice from government including membership of high level Committees (including PMSEIC, CCST, COAG working groups), invitations to provide briefings and seminars and requests for submissions to enquiries. CSIRO provided more than 20 submissions to a range of government and Parliamentary reviews during 2003/04.

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- The degree to which CSIRO advice is reflected in policy development.
 - Both formal and informal engagement with Ministers, Departmental Secretaries, other agency heads, Ministerial and departmental staff.
- Ultimately, Australian Government satisfaction is evidenced by its recent decision to invest \$305 million in the Flagship Initiative and \$1.7 billion for three year baseline funding. A formal survey of government and parliamentary stakeholders' satisfaction with CSIRO will be developed and implemented in the 2004/05 financial year. It is expected that this will provide quantitative and qualitative baseline measures for progress monitoring going forward.
6. CSIRO's score is given on a ten point scale [1 = very poor; 10 = excellent]. The comparative score is calculated as CSIRO's score divided by our competitor's score times 100. For example, $7.81 / 7.65 \times 100 = 102$.
 7. No surveys of stakeholder trust or excitement were conducted in 2003-04. However, over 99% of 12,000 media mentions of CSIRO were favourable or neutral, and CSIRO Education programs continued to expand their reach amongst students, teachers and the public. CSIRO Education further increased its reach with 219,263 students participating in educational sessions through the national network of CSIRO Science Education Centres, and an average audience of 400,000 was achieved for the Totally Wild national weekly television science program, jointly produced by Network Ten and CSIRO Education. Our Science by Email weekly e-newsletter grew to achieve 7,960 subscribers. A trial collaboration with the Queensland government in a project called Science on Saturdays has seen 1,853 students as well as many parents taking part. To help facilitate parliamentarians' understanding of science issues, CSIRO was a Gold Sponsor of FASTS Science Meets Parliament, which also involved almost 40 CSIRO scientists, and was a silver sponsor of the inaugural Humanities, Arts & Social Sciences on the Hill event.
 8. The target for 2003-04 was to progress CRA water project and obtain funding.
 9. CSIRO's Annual Report 2002-03 (p8) reported over 900 current or recently completed international activities.
 10. The target for 03-04 was for the level of global aid funding secured by Australia to trend upwards. Two full Gates Foundation Health Initiative proposals submitted (\$US 20m and \$US 17m respectively); Seven Wellcome Trust "Animal Health in the Developing World" applications. Early stage AusAid funding (\$50k) received.

Goal 4: Serving as a Catalyst for Industry Innovation

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
4.1 Intensify Engagement with RDCs to Grow Regional and New industries	<u>Headline 4a</u> Value of significant commercial relationships with RDCs and States (\$10m threshold)	Growth (new deals) of \$30m in contract lifetime value	Three RDCs and Four States	1	One RDC one State (2001-02)	Increase over baseline	Baghai	SP 03/4 OP TFA
	CVS results for RDCs	Monitor	CSIRO = 6.8, Comparative = 103 (Year to March 2004)		CSIRO = 6.6, Comparative = 103 (Year to March 2003)	Not stated	Baghai	SP TFA
	Growth of targeted regional industries	Evidence (examples) of successful CSIRO interaction with regional industries	Advanced analysis of clustering of CSIRO capabilities for regional industries		CSIRO resources are geographically distributed with many complementary activities not co-located	Not stated	Baghai	SP
	Impact of research cofunded with RDCs	See Annual Report "Outputs and Outcomes"					Baghai GEs	SP
	Revenue from RDCs	See 6.3: External Revenue by Source					Baghai GEs	SP 03/4 OP TFA

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
4.2 Structure Deeper and More Meaningful Relationships with Large Corporations	<u>Headline 4b</u> Value of significant commercial relationships with Large Corporations (\$2m threshold)	Growth (new deals) of \$5m in contract lifetime value	See note	2	One (2001-02)	Increase over baseline	Baghai	SP 03/4 OP TFA
	CVS results for Large Companies	Monitor	CSIRO = 7.3, Comparative = 107 (Yr to Mar 04)		CSIRO = 7.1, Comparative = 106 (Yr to Mar 03)	Not stated	Baghai GEs	SP
	Impact of research for large companies	See Annual Report "Outputs and Outcomes"					Baghai GEs	SP
	Revenue from Large Companies	See 6.3: External Revenue by Source					Baghai GEs	SP 03/04 OP TFA
	Lifetime value for contracts with large corporations	Growth (new deals) of \$5m in contract lifetime value	n/a	-	TBA	n/a	Baghai	04/5 OP
	Review/overhaul CVS instrument and its application in CSIRO	Review completed. Appropriate action undertaken	n/a	-	n/a	n/a	Baghai	04/5 OP

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
4.3 Accelerate the Growth of promising Technology-based SMEs	Number of significant commercial relationships with SME growth stars (\$0.1m threshold)	Three	AGP proposal not included in BAA2; Being discussed with State Governments	-	n/a	Increase over baseline	Baghai	SP 03/4 OP TFA
	Revenue from SMEs		See 6.3: External Revenue by Source				Baghai GEs	SP 03/4OP TFA
	Impact of research for SMEs		See Annual Report "Outputs and Outcomes"				Baghai GEs	SP
	CVS results - SMEs - Small Enterprises	Monitor	CSIRO = 7.4, Comparative = 111 (Yr to Mar 04)	-	CSIRO = 6.9, Comparative = 106 (Yr to Mar 03)	Not stated	Baghai GEs	SP TFA
	CVS results - SMEs - Medium Enterprises	Monitor	CSIRO = 7.3, Comparative = 104 (Yr to Mar 04)	-	CSIRO = 7.8, Comparative = 113 (Yr to Mar 03)	Not stated	Baghai GEs	SP TFA
	Australian Growth Partnerships	Find pathway for AGP proposal to be funded through States or fast-fail program.	AGP not included in BAA2; Being discussed with State Govts	-	n/a	n/a	Baghai	New
	Fast-track contract simplification process	Ensure Fast-track is universally applied in CSIRO by January 2005	Fast-track developed and piloted successfully	-	n/a	n/a	Baghai	New

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
4.4 Reinvent our ICT Capabilities to Strengthen Australia's Knowledge-based Industries	Demonstrated Impact in ICT research	See note	Significant progress in establishing ICT Centre	3	n/a	Australian Companies acknowledge CSIRO as an ICT research leader	King	SP 03/4 OP
	ICT Centre collaboration across CSIRO	Identify Divisional collaborators for maximum impact of ICT in their application space, and partner with at least one in a major collaborative ICT project	n/a		n/a	n/a	King	New

Notes (Goal 4)

1. The three RDCs are: Fisheries, Cotton and Grains. Australian Wool Innovation and the Meat and Livestock Australia – both relationships above the \$10m threshold - are classified as private sector (rather than RDCs) in the CSIRO financial system. In relation to States the baseline was 2001-02 with one State Vic (FSA), and the 2003-04 achievement is Four State relationships above the threshold for 2003-04 Vic (FSA); NSW (Newcastle); WA (IVEC); Qld (2 centres)
2. No accounts over \$2m for dollars received in 03/04, but two IP licensing deals with expected royalties in excess of \$2M pa were settled during 2003-04.
3. Targets for 2004-05 are: Play a leading role in the ICT Forum. Build the staff at the Queensland e-Health Research Centre (QEHR) and trial two CSIRO technologies in the next 12 months. Develop CeNTIE II into a major network platform. Demonstrate peer and industry recognition of research excellence and impact.
Targets for 2003-04 were: Recruit Director ICT, develop ICT Research Centre plan and increase investment by \$6m. Alex Zelinsky was appointed as Centre Director (commencing July 2004); the Centre strategy was developed and well received by CSIRO Board and stakeholders; \$6m new funding was allocated to the Centre (including \$2m for emerging science and new resources).

Goal 5: Building One-CSIRO Capabilities and Commitment

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
5.1 Stimulate Future Breakthroughs by Promoting Cross-Pollination, especially in Frontier Research	Establish ESI program including implementation of the PPF across all streams of activity	New emerging science plans established and effectively implemented. Achievements monitored through science reviews.	See note	1	n/a	CSIRO acknowledged as research leader in targeted areas	Barber	SP 03/4 OP

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
5.2 Be among the best in Governance, OHS&E and Performance Management Processes	OHS injury indicators (LTIFR, MTFR, ATLR)	Improve over baselines	LTIFR 5.9 MTIR 24, ATLR 2.1 (June 2004)	2	LTIFR 6, MTFR 20, ATLR 3.9 (June 2003)	Improve over baselines	May	SP 03/4 OP
	OHS positive performance indicators (Induction etc)	Monitor	Four Positive Performance Indicators: 97% (June 2004)		Four Positive Performance Indicators: 90% (June 2003)	Improve over baselines	May	SP 03/4 OP TFA
	Safety culture	Improve over 2003-04 baseline	Corrective action 90% Safety Procedures followed 83% (Sept 2003)		Corrective action 87%, Safety Procedures followed 80% (Sept 2002)	Improve over baselines	May	SP 03/4 OP

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
5.2 continued Be among the best in Governance, OHS&E and Performance Management Processes	Management of performance (Insight Survey results)	>55	55 (2003)		52 (2002)	Improve over baseline scores	May	SP
	Implementation of Performance Measurement Framework	Develop and roll-out Guide to Performance Measures and continuously improve PPF based on feedback	Good Progress	4	PPF adopted for Flagships (2002-03)	n/a	Whelan	03/4 OP
	Governance framework	Develop and roll-out Corporate Governance Guide	See Note 4	5	n/a	n/a	Whelan	03/4 OP
	Business continuity plan	Plan developed and implemented	n/a	-	n/a	n/a	Whelan	04/5 OP
	APA completion rates	TBA	n/a	-	n/a	n/a	May	04/5 OP
	Improve governance processes in commercial area	Monitor	COMEX and BCC processes enhanced. BD&C policy developed and rolled out	-	n/a	n/a	Baghai	04/5 OP

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
5.3 Adopt a unified Approach to Improve Service Dramatically and Grow Top Accounts	Increased amount and share of research and services revenue from top five accounts	\$TBA 14%	\$41.531m 14.0%	6	\$40.433m 14.7% (2002-03)	increase over baseline	Baghai	SP
	Number of active customer service teams (CSTs)	10-15 CSTs in deep engagement with senior executives of large corporates, RDCs and States	Target met: Twelve CSTs operating effectively	-	n/a	n/a	Baghai	03/4 OP

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
5.4 Implement Standard processes and IT Systems to Enhance Collaboration and Efficiency	<u>Headline 5</u> Aggregated Insight Score for Working Relationships and Work Organisation & Efficiency	127	129 (2003)	-	127 (2002)	increase over baseline	Whelan	SP 03/4 OP TFA
	Inter-Divisional collaboration in CSIRO-wide support	Decision on BETR project; Successful implementation of "One IT" and "CSIRO.au" web channel strategy.	Strong initiatives taken See note	7	n/a	Evidence of stronger collaboration	Whelan Staunton	SP TFA

Notes (Goal 5)

1. The Emerging Science Oversight Committee has made significant progress implementing a restructured Emerging Science Initiative. Divisional Emerging Science Plans encompassing all emerging science in each Division are a key component of the Initiative. The Plans enable monitoring of emerging science across CSIRO. The availability of supplementary funds which are released upon approval of these Plans encourages high impact emerging science. It was decided that the PPF outcome-oriented theme-stream structure did not need to be used for these Emerging Science Plans as they are considered in conjunction with the Division's broader Plan, particularly the capabilities section of that Plan which is linked to the PPF outcome-oriented theme-stream structure.
2. There has been a slight improvement in the Lost time injury Frequency Rate (LTIFR) and a slight rise in the Medical treatment Frequency Rate (MTFR) since June 2003. The highlight has been the improvement in the Average Time Lost Rate (ATLR) which is likely to be the result of effective return to work plans and fewer severe injuries. This will translate into reduced rehabilitation and compensation costs.
3. Themes/Streams in all 2003-04 Operational Plans. Annual Performance Goals used for performance reporting. Scope exists to further develop/refine PPF and to achieve greater integration with IT and soft systems.
4. Governance framework not completed but significant progress made. Mapping of primary processes completed. Roles/responsibilities of Flagship Directors and Chiefs clarified. Policy review process commenced. Board and sub-committee charters reviewed and finalised.
5. Share of revenue is calculated as revenue from the top five customers (\$40.433m in 02/3 and \$41.531m in 03/4) divided by total Research and Services Revenue (\$275.4m in 02/3 and \$296.2m in 03/4).
6. "One-IT" strategy developed for implementation from 1 July 2004. "One-Library" strategy well advanced. Good progress toward property rationalisation in Victoria, NSW and Qld. "BETR" project initiated with broad CSIRO representation to review business processes and enabling IT applications.

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Goal 6: Securing a Financial Foundation for Growth

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
6.1 Secure Greater Federally Funded Support for CSIRO Science Investment	Appropriation Revenue	n/a (targets for the triennium were achieved in 2003-04)	\$576.5m (appropriation for 04-05)	1	\$532m (2002-03)	\$632m	Garrett	SP 03/4 OP

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
6.2 Proactively Manage Patent and Equity Portfolios to Multiply IP-based Revenue Streams	<u>Headline 6a</u> IP revenue	\$29m	\$22.0m	2	\$18.5m (2001-02) \$13.8m (2002-03)	\$73m	Baghai	SP 03/4 OP TFA
	Performance of "Rippers"	See note 3	Dispute over IP rights to one RIPPER settled; Two RIPPERS currently in active licensing activities	3	No RIPPERS identified; No commercialisation plans prepared	At least two "Rippers" across the line	Baghai	SP

Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
6.3 Deliver Customer Value for Money and Eliminate Subsidisation in Consulting Services	<u>Headline 8</u> Aggregate CSIRO Customer Value Score	CSIRO = 8.0, Comparative = 110 (world benchmark)	CSIRO = 7.0, Comparative = 109 (Year to March 2004)		CSIRO = 7.0, Comparative = 108 (Year to March 03)	CSIRO = 8.0, Comparative = 110 (world benchmark)	GEs	SP 03/4 OP TFA
	Subsidy in consulting services activity (excluding National Facilities)	Subsidy reduced to less than 10% overall	\$8.9m (63% reduction)		\$24.5m (2002-03)	zero subsidy	GEs	SP 03/4 OP TFA
	External revenue and total expenditure by investment domain: results consistent with investment decisions	See 2004-05 budget	See 2003-04 financial results	4	n/a	n/a	GEs Baghai	TFA
	External revenue (by source / market segment) increase in targeted areas.	See 2004-05 budget	See 2003-04 financial results	5	n/a	n/a	GEs Baghai	TFA

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Strategic Objective	Success Measures	2004-05 Target	2003-04 Achievement	Note	Baseline (date)	Strategic Plan Target (2006-07)	Executive Team Owner	Origin
6.4 Reduce Overhead and Purchasing Costs and Manage Balance Sheet for Reinvestment	<u>Headline 6b</u> Overhead and support costs (overhead ratio)	33 %	34 %	-6	33% (2001-02)	Reducing	Whelan	SP 03/4 OP TFA
	Overall financial result	Balanced operating result	\$5.3m deficit Target: \$30m deficit	-	na	Balanced operating result	Whelan	SP 03/4 OP TFA
	Purchasing costs	reducing	See note	7	n/a	reducing	Whelan	SP

Notes (Goal 6)

1. Over the four year strategic planning period, appropriation revenue is targeted to increase by an aggregate of \$174m, based on the forward estimates (as at 2002-03) for each year. The 2004-05 target of \$591m represented a \$30m increase in appropriation revenue over the forward estimates for 2004-05 (as at 2002-03). Adding \$11.87m transferred to DITR for NML to \$576.5m brings the comparative actual appropriation figure for 2004-05 to \$588.4m. This represents an increase of \$27m over the baseline forward estimates - just \$3m short of target.
2. Intellectual Property Revenue Target for 2003-04 was \$22m. Over the four year strategic planning period, IP revenue is targeted to increase by an aggregate of \$114m compared with the continuation of the baseline level of revenue.
3. 802:11 - Additional IP based income of \$5m annual run rate. Litigation underway.
RNAi - negotiating licenses for plants and animals; one collaborative R&D agreement; IP based income of \$1m run rate.
Air Cargo Scanner - commercial venture framed and in place.
4. The Investment domains attracting external revenue are: Co-investment; Consulting and services; Exploitation of IP.
5. Total external revenue for 2003-04 was \$320m against a target of \$322m. External revenue from research and services was \$296m against a budget of \$313m. External revenue by source is shown in the CSIRO Annual Report (and see also Strategic Objectives 4.1, 4.2, 4.3 and 6.2). Identified market segments for research and services revenue are: Australian Private Sector, RDCs, CRCs, Overseas entities, Large Corporations, SMEs. Total External revenue forward estimates as per Portfolio Budget Statement 2004-05 (p252): \$319.8m (04-05), \$355.5m (05-06), \$403.0m (06-07).
6. Over the four year strategic planning period, overhead and support costs are targeted to decrease by an aggregate of \$73m compared with continuation of the baseline level of costs. Baseline was \$308m (2001-02 survey) however a recalculation of PSS data, data taking into account balances for Food Science Australia, Capital Program, Publishing and Corporate Funds shows a baseline of \$306m, or 33% for 2001/02.
7. New Expense Management System implemented. Decision taken to implement e-procurement. Corporate procurement unit established to generate savings through reduction in processing, managed procurement and one-CSIRO bulk purchasing. Target for 2003-04 was to undertake a research support process review and generate initial savings of \$4m.

Appendix 5

Glossary of Terms

Outputs and Outcomes

Outputs are products or services provided to individuals or organisations external to CSIRO.
Outcomes are the impacts that outputs have on individuals or organisations external to CSIRO.
Outcomes encompass economic, social and environmental benefits and may include evidence of changes in awareness, adoption and behaviour that have led (or clearly will lead) to such benefits.

Strategic Goals and Objectives

Six strategic goals and 24 underpinning objectives articulated in CSIRO's Strategic Plan for 2003-2007.

Program Performance Framework (PPF)

The PPF incorporates a set of tools developed to promote robust business planning, good target setting and strong accountability in the implementation and performance of major programs of work. These tools include the Strategic Alignment Diagrams and the Program–Theme–Stream–Project hierarchy evident in this Operational Plan. (See Section 3.1 for an explanation of these terms).

Third Horizon

Activity at the leading-edge of science which will underpin future technological development.

Capabilities

Skills, relationships and assets are the three components of capabilities. A capability is an integration of these components that results in some particularly useful functionality - a capability is more than the simple sum of the underpinning scientific / technical and other skills.

A **core capability** provides differential competitive advantage and will be an area of strength. The extent to which the capability is distinctive and receives recognition for leadership is a measure of its strength.

Data Definitions & Notes

	Data Item	Measure Definition	Source & Qualifying Information
Financials	Research & Services Revenue	Revenue from research & related service as defined in the triennium funding agreement for the purposes of calculating the external earnings KPI (eg excludes interest, sale of produce etc)	All figures in the financials section are sourced from Corporate Finance 30 June reports. CSIRO totals match Annual Report Financial Statements.
	Other External Revenue	Total Revenue minus Research & Services Revenue and Appropriation	
	Corporate Writeback	Contribution for CSIRO-wide services (Corporate overheads)	Financials for Food Science Australia (FSA) represent an estimate of CSIRO's operational activities in the joint venture. They do not represent the whole of FSA nor CSIRO's legal interest.
	Cash	Cash on hand as at 30 June.	
	Capex	Capital Expenditure	
People	Research Staff	Includes the Research Scientist/Engineer, Research Projects and Research Management functional classifications.	CSIRO HR Information System. Data are for full time equivalents (FTEs) including indefinite and term CSIRO Officers as at 30 June.
	Total Staff	Includes all functional classifications	
	Supervised Post Grads	-	Annual Survey of Divisions by Corporate PD (aggregate data published in Annual Report)
	Sponsored Post Grads	-	
	Post Docs	Number of staff at CSOF4 in functional area 'research scientist' as at 30 June.	Corporate PD
	OHSE		
	ATLR	Average Time Lost Rate is the average time lost for the number of incidents during the period.	Corporate PD - OHSE
	LTIFR	Lost Time Injury Frequency Rate is the number of incidents involving lost time from work greater than or equal to one full day or shift per million hours worked.	
	MTFR	Medical Treatment Frequency Rate is the number of compensation claims per million hours worked.	
	Insight Scores		
	Engagement plus Staff Commitment	Sum of the scores for category 20 'Engagement' and category 14 'Staff Commitment'	CSIRO Staff Insight Survey
	Working Relationships plus Work Organisation & Efficiency	Sum of the scores from category 6 'Working Relationships' and category 5 'Work Organisation & Efficiency'	

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Products, Customers, Services & Delivery	Revenue Sources		
	Revenue by Industry Category	Customers are assigned to an industry segment best representative of their business.	Invoiced Revenue (unadjusted for WIP/DR) from the Project Support System / CSIRO Client List
	Top 5 Customers	-	
	Publications	Journal article or other item published as part of a journal eg editorial, book review.	CSPUBLIST (Data entered by Divisions, collated by ITS and reviewed/amended by Divisions to account for confidential reports not captured on CSPUBLIST)
	Journal Articles		
	Conference Papers	Published conference paper, abstract or edited proceedings.	
	Technical Reports	Includes individually authored chapters as well as whole reports. Usually publicly released.	
	Books or Chapters	Monograph, complete or a chapter, usually published by a commercial publisher.	
	Client Reports	Report produced under collaborative or contractual arrangements. Includes individually authored chapters as well as whole reports. Often not publicly released.	
	Patents		CSIRO's IP Managers
	Number of Inventions	This is the number of inventions where one or more patent/applications are current. Accordingly an invention might include a granted patent that is near the end of its life (e.g. 20 years), or it might include a provisional patent application that has only recently been filed. Further, one invention might relate to a patent application in one country only, or it might relate to over 20 patents/applications in different countries covering the one invention	
	Total Granted Patents	Once a patent application has been examined and satisfies various patentability criteria it becomes a granted patent. It remains a granted patent until the end of the patent period (normally 20 years) provided renewal fees are paid.	
	Live Patent Cases	A live patent case is where either a patent application or a granted patent exists. It does not include cases that have lapsed, expired or been withdrawn. Applications may include provisional applications, PCT applications, and applications pending in Australia or foreign jurisdictions.	
	Subsidy In Services & Consulting (S&C)	Services and consulting business domain (of the Investment Model) External Revenue adjusted for WIP/DR minus Expenditure.	Project Support System
	Customer Value Survey		Customer Value Survey results for 12 months to March 2003 and 2004. To be classified as 'world class' requires a rating of 8 (out of 10) or higher and a Comparative Ratio of 110 or higher for overall value.
	Overall Comparative Value Rating	CSIRO Score divided by the score given to our main competitor, multiplied by 100.	
	Average Score for Overall Value	How do you rate CSIRO overall on value? 1 = very poor; 10 = excellent.	

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>.