

**Successful 2005 *Discovery Projects*  
Grants by State/Institution**

| <b>State/Institution</b>                          | <b>No. of Grants</b> |
|---|----------------------|
| <b>New South Wales</b>                            |                      |
| Charles Sturt University                          | 1                    |
| Macquarie University                              | 38                   |
| The University of New England                     | 8                    |
| The University of New South Wales                 | 104                  |
| The University of Newcastle                       | 39                   |
| The University of Sydney                          | 111                  |
| University of Technology, Sydney                  | 27                   |
| University of Western Sydney                      | 15                   |
| University of Wollongong                          | 37                   |
| <b>TOTAL NUMBER OF GRANTS</b>                     | <b>380</b>           |
| <b>Victoria</b>                                   |                      |
| Deakin University                                 | 9                    |
| La Trobe University                               | 21                   |
| Monash University                                 | 69                   |
| RMIT University                                   | 8                    |
| Swinburne University of Technology                | 7                    |
| The University of Melbourne                       | 135                  |
| Victoria University of Technology                 | 1                    |
| Walter & Eliza Hall Institute of Medical Research | 3                    |
| <b>TOTAL NUMBER OF GRANTS</b>                     | <b>253</b>           |
| <b>Queensland</b>                                 |                      |
| Bond University                                   | 1                    |
| Central Queensland University                     | 1                    |
| Griffith University                               | 20                   |
| James Cook University                             | 9                    |
| Queensland University of Technology               | 20                   |
| The University of Queensland                      | 88                   |
| University of Southern Queensland                 | 3                    |
| University of the Sunshine Coast                  | 1                    |
| <b>TOTAL NUMBER OF GRANTS</b>                     | <b>143</b>           |

## **South Australia**

|   |           |
|---|-----------|
| <b>The Flinders University of South Australia</b> | <b>11</b> |
| <b>The University of Adelaide</b>                 | <b>48</b> |
| <b>University of South Australia</b>              | <b>10</b> |
| <b>TOTAL NUMBER OF GRANTS</b>                     | <b>69</b> |

## **Western Australia**

|  |           |
|--|-----------|
| <b>Curtin University of Technology</b>     | <b>20</b> |
| <b>Edith Cowan University</b>              | <b>3</b>  |
| <b>Murdoch University</b>                  | <b>9</b>  |
| <b>The University of Western Australia</b> | <b>38</b> |
| <b>TOTAL NUMBER OF GRANTS</b>              | <b>70</b> |

## **Tasmania**

|                               |           |
|-------------------------------|-----------|
| <b>University of Tasmania</b> | <b>19</b> |
| <b>TOTAL NUMBER OF GRANTS</b> | <b>19</b> |

## **Northern Territory**

|                                  |          |
|----------------------------------|----------|
| <b>Charles Darwin University</b> | <b>2</b> |
| <b>TOTAL NUMBER OF GRANTS</b>    | <b>2</b> |

## **Australian Capital Territory**

|   |            |
|---|------------|
| <b>The Australian National University</b> | <b>117</b> |
| <b>University of Canberra</b>             | <b>2</b>   |
| <b>TOTAL NUMBER OF GRANTS</b>             | <b>119</b> |

# Summary of Applications *Discovery Projects* to Commence in 2005

## New South Wales

### Charles Sturt University

DP0558267 Prof DA Lupton

**Title:** Women's concepts, beliefs and practices related to the health of their infants and young children: a sociological study

**2005 :** \$27,221

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** Charles Sturt University

#### Summary:

It has been frequently argued that parents should take responsibility for promoting optimal health and development in their children. Little is known, however, about how parents of infants and young children conceptualise 'good health' in relation to their children, what steps they take to promote optimal health and development, how they make decisions about these steps, what sources of information they use, what difficulties they may encounter and what help they need. Insights into these phenomena derived from the proposed project have the potential to inform policy and programs directed at promoting and maintaining good health in the early years of life.

### Macquarie University

DP0558372 Dr MA Batanin

**Title:** Foundations of higher dimensional homological algebra

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** Macquarie University

#### Summary:

Recent discoveries in physics and mathematics led to the understanding that classical mathematics is only 'the tip of the iceberg' of the higher-dimensional structures that are ultimately behind the laws of Nature. Australia has always been in the forefront of research in Category Theory, and due to that position, has a unique opportunity to participate in the early stages of developments of Higher Category Theory and Higher Dimensional Homological Algebra. This will allow Australia to be in the forefront of the subsequent technological development and to reap the economical, social and intellectual benefits related to it.

DP0556496 Dr LB Beheregaray

**Title:** Comparative phylogeography and patterns of diversification in Amazonian fishes

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Macquarie University

#### Summary:

I anticipate that this project will increase the research profile of Australia in the international scientific community by answering fundamental questions about the origin of biodiversity in the world's most diverse ecosystem, the lowland forests of central Amazonia. This will be achieved by analysing what will be the most comprehensive phylogeographic data set ever generated for Amazonian organisms. The project will provide information for comparing with patterns seen in the Australian wet tropics and will be inspirational for studies on population diversification of Australian fishes.

DP0556694 Prof PL Bergquist; Prof DA Veal; Dr BC Ferrari; Dr DJ Saul; Prof HW Morgan; Dr J Aislabie

**Title:** Quantum Dot Nanocrystals: Smart Materials for Microbiology

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** Macquarie University

#### Summary:

Quantum dots were originally developed for computers but have many advantages over fluorescent dyes currently in use. They can be coupled to larger structures and a excitation with a laser allows simultaneous multiple analyses ('multiplexing'). We propose to adapt these structures for use in microbial ecology because this field is one of the least understood areas in biology. The technology we will develop will have far broader uses, and will create new diagnostic tools for monitoring and understanding microbial ecosystems would be invaluable in a number of fields. Examples are medical diagnostics, waste-water treatment, bioremediation, food and agriculture, bioprotection and biodiscovery.

**DP0558958** A/Prof K Bussey

**Title:** Understanding Promises: Legal and Everyday Implications

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Macquarie University

**Summary:**

This research will lead to a better understanding of the effects of keeping and breaking promises in different contexts. It will examine their potential beneficial function in peer relationships and their propensity to increase the quality of children's testimony. Keeping promises may be appropriate for fostering friendships but may have serious consequences when the information that is kept secret involves child abuse, for example. Information from this research is expected to contribute to more positive peer relationships and to children's honest disclosures of adult's (e.g. child abuse) and peer's (e.g. bullying transgressive conduct.

**DP0556391** Dr KS Butcher; Prof TL Tansley; Dr M Kuball; Dr B Gil

**Title:** Towards Photonic and Electronic Devices for High Indium Content Nitride Semiconductors

**2005 :** \$131,000

**2006 :** \$116,000

**2007 :** \$121,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** Macquarie University

**Summary:**

Nitride semiconductors are widely used in mobile phone and lighting applications. The Low Temperature Nitride Semiconductor Group at Macquarie University have specialized in improving the quality of these materials using growth techniques that will allow gallium nitride to become commercially viable for room lighting. In collaboration with researchers in Europe we intend to develop and exploit the next generation of nitride materials for high-speed mobile communications and photonic applications. The team assembled for this project have excellent credentials in the development of these materials and, importantly, an excellent ability to probe and understand material phenomena.

**DP0556359** Dr NR Daczko

**Title:** A new approach to understanding the mechanisms and deep crustal controls of continental rifting.

**2005 :** \$50,000

**2006 :** \$35,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** Macquarie University

**Summary:**

This research will directly examine the northern plate boundary of Australia, providing analogues for rift-related crustal processes that occurred throughout ancient Australia, consistent with Priority Goal 6 (Developing Deep Earth Resources) in the Designated National Research Priority Area: 'An Environmentally Sustainable Australia'. The scientific innovation represented by this project will help to maintain the leading position of Australian scientists in examining these issues. This project will be of direct relevance to energy exploration along Australia's passive margins (oil and gas) and will provide better constraints on the rifting process that will aid in our understanding of rift-related metallogenesis.

**DP0557854** Prof EM Deane; Prof MS Baker; Prof NA Jacques

**Title:** Antimicrobial peptides and immunological protection in a developing mammal

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 3005 - VETERINARY SCIENCES

**Administering Institution:** Macquarie University

**Summary:**

This project offers the opportunity to deliver both economic and scientific benefits, both in the isolation of novel antimicrobials and in positioning Australia's native fauna as important, unique biomedical research models. Antimicrobial peptides offer a solution to the current pressing problem of microbial resistance to antibiotics. This project seeks to isolate such compounds from a previously uninvestigated source, unique to Australia. This project will provide a new perspective on the role of innate protection in a developing mammal, with possible human applications.

**DP0556111** Dr U Eickelkamp

**Title:** Playing for Life: A Case Study in Childhood, Culture and Transition

**2005 :** \$88,000

**2006 :** \$67,494

**2007 :** \$67,494

**Category:** 3703 - ANTHROPOLOGY

APD Dr U Eickelkamp

**Administering Institution:** Macquarie University

**Summary:**

This study will advance Australian research on identity formation in postcolonial societies; develop child-focused research in academic anthropology; align Australian Aboriginal Studies with recent international progress in the field of children's social imagination; innovate the analysis of transforming Indigenous worldviews; create a perspective for in-depth psychological research with Aboriginal Australians; build a rich resource for comparative research and for teaching. It also offers distinct social benefits: fostering the understanding of Aboriginal children's social and mental needs in processes of cultural transformation; enhancing equality by identifying the positive potentials in children and Aboriginal society.

**DP0557025** A/Prof KP Esselle; Dr TS Bird

**Title:** **Broadband and Multiband Antenna Systems**

**2005 :** \$71,000

**2006 :** \$61,000

**2007 :** \$61,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** Macquarie University

**Summary:**

Wireless communication has become essential in the modern information society and this has created a rapidly growing, multi-billion dollar market for innovative wireless products. Australia has a strong potential to gain from this market, as demonstrated by world-leading products, e.g. wireless computer microchips. By developing innovative antenna systems with new capabilities, the proposed research will create opportunities for Australian industry to compete in the global wireless market with advanced, low-cost, high-performance, and universal products. The Australian research community will benefit from new theoretical techniques and trained researchers, while wireless users will benefit from improved quality and low cost of services.

**DP0557439** Dr PC Fanning; Dr SJ Holdaway; Dr EJ Rhodes

**Title:** **Predicting the Past: Time, Landscape and Indigenous Australian History**

**2005 :** \$125,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** Macquarie University

**Summary:**

Three major benefits accrue from our study of the distribution of Australian Aboriginal archaeology. Because we emphasise changes in the nature of this record through time and across space, we allow for the development of a richer Aboriginal history. Our concern with studying not only why the record is preserved in some places but also why it is absent from others allows for an improved assessment of archaeological significance and hence better management of Aboriginal material culture. Finally, we emphasise the dynamic nature of human-environment interactions demonstrating that in the past as in the present neither culture nor nature can be seen as predominant.

**DP0556895** Dr A Fuerbach

**Title:** **High precision material processing using ultrashort laser pulses at MHz repetition rates**

**2005 :** \$110,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2903 - MANUFACTURING ENGINEERING

APD Dr A Fuerbach

**Administering Institution:** Macquarie University

**Summary:**

The continual miniaturisation of mechanical and electronic components for biomedical, aerospace and industrial products is driving the demand for advanced fabrication techniques. Femtosecond laser micromachining in particular is emerging as a critical manufacturing process for these components and other new and unprecedented applications. The project will build up strong links between the Photonics Institute in Vienna, Austria, which is noted for their achievements in the development of femtosecond light sources, and the CLA, which has an excellent reputation for its expert knowledge in laser material processing. It is therefore believed to be beneficial for research in both countries.

**DP0557951** Dr Y Ge

**Title:** **Microwave Antennas based on Metamaterials**

**2005 :** \$76,000

**2006 :** \$71,000

**2007 :** \$76,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

APD Dr Y Ge

**Administering Institution:** Macquarie University

**Summary:**

This project concerns one of the most exciting and dynamic areas of research at present. Metamaterials have tremendous potential, with the promise of multitudinous applications in microwave, optical and optoelectronic fields. This project will contribute towards the ARC priority goal on advanced materials and frontier technologies by (a) developing new synthesized materials which have special properties not found in nature, and (b) developing new technologies to deliver practical benefits for communication systems users by exploiting these materials. Other benefits for Australia include intellectual property and patent outcomes, which may help Australia to become a leader in metamaterial-based technologies.

**DP0559334** Prof M Goot

**Title:** **Creating Public Opinion: Polls, the Press and Australian Politics since the 1940s**

**2005 :** \$90,000  
**2006 :** \$60,000  
**2007 :** \$95,000  
**2008 :** \$50,000

**Category:** 3601 - POLITICAL SCIENCE  
TR Prof M Goot

**Administering Institution:** Macquarie University

**Summary:**

Opinion polls, commissioned regularly by the press since the 1940s and by political parties since the 1960s, have altered our understandings of public opinion, affected the way politics is reported, and transformed the ways in which political leaders act and the parties campaign. Until now, none of this has been properly documented or effectively analysed. This project will help those involved in public opinion research, political journalism, and parliamentary politics to reflect on the strength and weaknesses of their practices. It will allow others in the community to understand what has changed, how it has changed, and why.

**DP0556728** Dr DB Gore; Prof J Anderson; Dr D Fink; Prof MJ Siegert; Dr J Stone

**Title:** **The Antarctic ice sheet through the Last Glacial Cycle - numerical modelling constrained by field evidence**

**2005 :** \$65,000  
**2006 :** \$89,000  
**2007 :** \$75,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** Macquarie University

**Summary:**

The response of the world's largest ice mass to climate change is important because melting leads to a rise in sea level. Our ability to predict changes in ice volume and sea level under a warming climate, will be enhanced by better understanding of past ice sheet responses to changes in atmospheric carbon dioxide. Improved numerical models now exist that allow realistic simulations of Antarctic ice. These models will be developed further and constrained against existing and new field evidence for the Last Glacial Cycle (last 125,000 years), the period for which we can best define past ice sheet behaviour.

**DP0557779** Dr SE Jackson; Dr BW Mountain

**Title:** **Isotopic fractionation in ore metals (Cu, Fe and Zn): A new window on ore-forming processes**

**2005 :** \$100,000  
**2006 :** \$60,000  
**2007 :** \$60,000

**Category:** 2603 - GEOCHEMISTRY

**Administering Institution:** Macquarie University

**Summary:**

Stable isotopes of common ore metals (e.g. copper and iron) are new tools for investigating ore deposits. Our data suggest that metal isotopic variations can provide new insights into mechanisms operative during formation of ore deposits. Stable metal isotopes also show promise as a new exploration tool for identifying the location of economic mineralisation within large prospective terrains; e.g., weakly vs. strongly mineralised zones in a volcanic belt. This project will provide fundamental baseline data that will help elucidate the processes that cause metal isotope variations. This will allow stable metal isotopes to be used much more effectively by the mining and exploration industries.

**DP0556271** Prof N Kanawati; Dr EC Kohler; Dr BG Ockinga

**Title:** **Enduring is the Perfection: State Formation and Socio-Cultural Change in the First Capital of Ancient Egypt (c.3200 to 1069 BCE)**

**2005 :** \$140,000  
**2006 :** \$150,000  
**2007 :** \$150,000  
**2008 :** \$100,000  
**2009 :** \$120,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Macquarie University

**Summary:**

This is an unprecedented and systematic investigation of the Egyptian state and its extraordinarily rich society and culture over 2,000 years. It will impact profoundly on the disciplines of World History and Egyptology, confirm Australia as a world leader in ancient Mediterranean studies, and provide exciting new opportunities for academic and cultural exchanges between our country and the Middle East. By making a major contribution to preserving, interpreting and explaining Egypt's magnificent but imperilled heritage, it will significantly enhance Australia's image there and underwrite our country's strategic and commercial relations with our most important partner in the Arab world.

**DP0558845** Prof N Kanawati

**Title:** **The Design and Decoration of Burial Chambers in Old Kingdom Egypt**

**2005 :** \$41,000

**2006 :** \$42,000

**2007 :** \$46,000

**2008 :** \$46,000

**2009 :** \$40,000

**Category:** 4402 - RELIGION AND RELIGIOUS TRADITIONS

**Administering Institution:** Macquarie University

**Summary:**

This project represents a significant attempt to understand the rationale behind the evolving design and decoration of Ancient Egyptian burial chambers. The undertaking of this important research by Australian based scholars will continue to establish Australia as a leading nation in the important international discipline of Egyptology, while also continuing to forge a relationship with Egypt. During an era in which Australians have in general engaged in discourses of insecurity and threat, our project will resonate with many contemporary concerns, asserting a link between the growing sophistication of society and a concomitant sense of threat and insecurity.

**DP0558166** A/Prof DM Kane; Dr EH Huntington; Prof KA Shore

**Title:** **Chaotic Semiconductor Lasers and Controllability of Semiconductor Laser Noise**

**2005 :** \$85,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** Macquarie University

**Summary:**

Chaotic semiconductor lasers (CSLs) are emerging as a potentially important light source for optical communication systems with improved security. Novel designs for compact, practical CSLs that can be integrated into existing optical communications networks will result. CSL systems suitable for secure point-to-point optical communication systems will also be developed. Fabrication of the devices in Australia means there is the opportunity for commercial exploitation at a national level. The scientific study of the characteristics of the CSLs, especially the chaos, will be interesting to the scientific and general community. The early career researchers involved will benefit from high quality professional development experiences.

**DP0556805** A/Prof S Kinoshita; Prof MC Mozer; Prof SJ Lupker

**Title:** **Developing a general theory of reaction time (RT) control**

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Macquarie University

**Summary:**

Speeded responses are used widely as a tool to study cognitive processes. Context has a large effect on speeded responses, undermining the assumption that reaction time (RT) provides a direct measure of the complexity or efficiency of underlying cognitive processes. Understanding the role of context in initiating speeded responses will bring both basic and applied benefits: It will help refine theories of cognitive processes, many of which are based on data collected with RT tasks, and it will be useful in designing tests that measure an individual's cognitive capacity.

**DP0557098** Prof SN Lieu; Prof MM Franzmann; Dr I Gardner; Dr GB Mikkelsen; Prof A van Tongerloo; Prof N Sims-

**Title:** **Mission and Inculturation: the Manichaeian and Nestorian experience in China - a textual, iconographical and epigraphical investigation**

**2005 :** \$56,500

**2006 :** \$29,600

**2007 :** \$63,000

**2008 :** \$65,700

**2009 :** \$72,400

**Category:** 4402 - RELIGION AND RELIGIOUS TRADITIONS

**Administering Institution:** Macquarie University

**Summary:**

The project aims to investigate the introduction of two 'Western' religions, Manichaeism and Nestorian Christianity, into China through textual and archaeological evidence. The project will explore important multi-cultural aspects such as theological inculturation and artistic synthesis. The iconographical material from South China is both unique and of great artistic value and has already attracted the attention of national media (newspapers, radio and TV).

**DP0558754** Dr F Liu

**Title:** The Baylis-Hillman Reaction: Asymmetric Organocatalysis and Applications

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** Macquarie University

**Summary:**

Many drugs come in two chiral mirror images (enantiomers) where the therapeutic effect is usually associated with only one while the other has no effect or can be harmful as was the case with thalidomide. Chemical reactions that yield just the desired mirror image, or enantiomer, and not the other are therefore in great demand and heavily pursued by the pharmaceutical, fine chemical and materials industries as a frontier technology. This project will result in the development of novel catalytic reactions that allow the synthesis of chiral chemicals in a cost-efficient and green manner needed by many industries, and also training of students with highly desirable synthetic skills to lead the next wave in pharmaceuticals and biotechnology.

**DP0556594** Dr BC Mabbutt; A/Prof PM Curmi; A/Prof HW Stokes

**Title:** New Proteins from the Mobile Genome: Structure-Led Discovery

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** Macquarie University

**Summary:**

The project will provide full descriptions of proteins with the capacity to become mobilised, as well as providing a source of completely novel genes with commercial potential. The proteins and enzymes discovered, and the metabolic processes with which they are identified, will have applications in a wide range of Australian industries: agriculture, forestry, pollution control and pharmaceutical design. This work therefore offers opportunities for many future directions in biotechnology, an area of growing strength in Australia.

**DP0558212** Dr AK McIver; Dr CC Morgan; Prof T Nipkow

**Title:** Algebraic reasoning for serialisability in probabilistic transaction systems

**2005 :** \$46,693

**2006 :** \$50,000

**2007 :** \$49,654

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** Macquarie University

**Summary:**

The ability to analyse complex systems is a vital part of the development of large-scale computer applications; a method that improves the quality of the analysis task would increase the competitiveness of the software industry, would attract future development work (in complex and intelligent systems) to Australia, and could contribute to national security.

The results of this project will have a direct influence on currently available design tools; the fact that Australian institutions will be responsible for key theoretical results in this growing field will strengthen Australia's position worldwide as an international centre for computer science.

**DP0557081** Dr NR Moore

**Title:** Sex in a Strange Country: Literary Obscenity in Twentieth-Century Australia

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$100,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** Macquarie University

**Summary:**

As recently as February 2004, Australian newspapers were again raising the question of how obscenity is defined. This project is the first comprehensive literary treatment of Australian obscenity censorship. It places the Australian case in context for similar studies in the UK and US, and particularizes it as an instance of colonial regimes. The publications that result will enhance the knowledge base of key stakeholders in that debate, from the Australian Film and Literature Classification Board to writers and other cultural producers, to public policy debates, and scholarship in the fields of literary, legal and cultural history in Australia.

**DP0557601** A/Prof HK Nevalainen; Prof PL Bergquist

**Title:** Role of the proteasome in eradication of misfolded proteins in fungal cell factories

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** Macquarie University

**Summary:**

Filamentous fungi contribute to the well being of modern society as surrogate hosts for the synthesis of vaccines, hormones and enzymes for their application to health, agriculture, industry and the environment. However, attempts to express foreign proteins to the full potential of a given system have been disappointing. It is vital to understand unexplored molecular and physiological factors such as protein quality control in the cell to take advantage of the global opportunities that recombinant gene expression indisputably offers in the form of unrestricted supply of proteins of social and economic value. The project will create novel IP and licensing opportunities for Australia.

**DP0558933** Prof BJ Orr

**Title:** **Narrowband coherent light sources for spectroscopic sensing**

**2005 :** \$130,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** Macquarie University

**Summary:**

The project will develop optical instruments and sensing techniques based on novel high-performance tunable optical parametric oscillator devices. These laser-like devices will be designed to monitor gases in a highly sensitive, molecule-specific way and thus indicate the presence and concentration of particular species with characteristic spectroscopic signatures. Useful applications will include optical sensing in science, industry, medicine, agriculture, community security, and the environment. In addition to making significant scientific discoveries and technological advances, the project will provide training for postgraduate research students and will develop intellectual property that may be of commercial benefit.

**DP0558598** Dr S Paoli

**Title:** **HIGHER CATEGORICAL STRUCTURES IN HOMOTOPY THEORY AND HOMOLOGICAL ALGEBRA**

**2005 :** \$67,494

**2006 :** \$67,494

**2007 :** \$67,494

**Category:** 2301 - MATHEMATICS

APD Dr S Paoli

**Administering Institution:** Macquarie University

**Summary:**

This proposal falls in an area of research, that of higher categories, which has been receiving a lot of attention in recent years and which has applications to diverse areas of mathematics. The proposed research will contribute to continue the prominent role of Australian Research in this rapidly expanding field. History has proved that fundamental research in pure mathematics in the long term produces major and often unexpected outcomes in applied sciences which have a direct impact on society. The area of higher categories has already proved to have an impact on applied fields such as computer science.

**DP0558113** A/Prof AE Parker

**Title:** **Achieving high linearity over broad bands in transistor circuits for communication applications**

**2005 :** \$81,000

**2006 :** \$81,000

**2007 :** \$81,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** Macquarie University

**Summary:**

This project provides techniques to achieve the distortion performance required for the next generation communication circuits. By establishing new knowledge and skill within Australia to expand international competitiveness, it will position Australia as the leader in high performance circuit design, strengthen international collaboration, and allow the development of high performance broadband systems. An opportunity will be presented to enter the transistor characterization market on a competitive basis, which is a business suited to distance working within the international sector. Improved circuit performance will enable breakthrough discoveries in areas like radio astronomy, medical imaging, radar and detection, and instrumentation.

**DP0556486** Dr DA Raftos; Dr SV Nair; A/Prof C Smith

**Title:** **Diversity and Defence: Characterisation of Extremely Variable Defensive Proteins from Sea Urchins**

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** Macquarie University

**Summary:**

Antibiotic resistance is a global problem. In this project, we will study a new class of potential antibiotics - purpuratins - from sea urchins. Purpuratins are unique when compared to other antimicrobials because of their extreme structural diversity. By investigating that diversity, we will shed new light on biological methods for targeted drug design. This information will be critical to the development of tailor-made antibiotics that are fine-tuned to kill particular micro-organisms. Our work represents a collaboration between researchers in Australia and the United States. It contributes directly to international scientific co-operation whilst providing high level training for young Australian researchers and students.

**DP0558852** Dr D Richards; Dr M Kavakli; Dr M Dras

**Title:** Risk Management using Agent-Based Virtual Environments

**2005 :** \$136,000

**2006 :** \$111,000

**2007 :** \$116,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** Macquarie University

**Summary:**

Since September 11, terrorism and its prevention has been high on the agenda of modern governments. On reflection, there were many signs that could have alerted US government officials to what was about to transpire and saved many lives. But much of the knowledge needed to detect and handle such situations can not be learnt from a book. Many things we need to experience in order to learn. This project combines the investigators' expertise in knowledge based, agent based and natural language fields to produce an interactive virtual environment for the user to engage with.

**DP0558837** A/Prof MJ Roberts

**Title:** Cultural Politics in Victorian England: the Cowper-Temples and their circle

**2005 :** \$45,000

**2006 :** \$30,000

**2007 :** \$45,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Macquarie University

**Summary:**

In an era of 'culture wars' across the English-speaking world (Australia included) the link between elite cultural attitudes and the formation of political agendas is a controversial one - easier to allege than to prove. This project aims to give a firm basis for exploration of interaction between cultural and political elites by going back to historical baseline. Taking the period of the coming of democracy in Victorian England as this baseline, it investigates the ways in which political insiders in that pioneering society grappled with the possibilities of harnessing cultural issues to shape political agendas.

**DP0556898** Dr A Scott

**Title:** Bowers of Bliss: Literary and Cultural Representations of Luxury in Early Modern England, 1580-1630

**2005 :** \$75,000

**2006 :** \$72,000

**2007 :** \$72,000

**Category:** 4202 - LITERATURE STUDIES

APD Dr A Scott

**Administering Institution:** Macquarie University

**Summary:**

Luxury consumption is now commonplace in western societies including our own. It is also the subject of intense moral and ethical debate and part of an international discussion about human well-being. Our desire to consume has a long and complex history which is elucidated by early modern representations of luxury and by their recourse to enduring myths, symbols and rituals, still associated with luxury today. As a credit-based society addicted to luxury consumption, Australia is part of an ongoing global discussion about consumption, morality and society: this project will expand our contribution to that debate, while also furthering our own understanding of a concept which continues to evoke both fear and fascination.

**DP0556431** A/Prof I Shparlinski

**Title:** Mathematics of Cryptography

**2005 :** \$102,000

**2006 :** \$102,000

**2007 :** \$101,000

**2008 :** \$100,000

**2009 :** \$100,000

**Category:** 2301 - MATHEMATICS

APF A/Prof I Shparlinski

**Administering Institution:** Macquarie University

**Summary:**

The Australian society and economy requires fast, reliable, and secure communication. First-generation security solutions are not capable of supporting the efficiency and scalability requirements of mass-market adoption of wireless and embedded consumer applications. New security infrastructures are emerging and must be carefully, but rapidly, defined. Thus developing new mathematically solid tools in this area is one of the most important and urgent tasks. Besides, the intended work advances our knowledge of the theory and the quality of our culture. As such, it will promote the Australian science and will also have many practical applications in Cryptography, Computer Security and E-Commerce.

**DP0556029** Dr RJ Stevenson

**Title:** **The mind's nose: Evocation, representation and similarity of imaginary and real odours**

**2005 :** \$56,000

**2006 :** \$56,000

**2007 :** \$56,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Macquarie University

**Summary:**

The food industry is a key sector in the Australian economy, accounting for 26.6 Billion Dollars in exports in 2001/2. Every year substantial sums are spent advertising, developing and testing new products, with notoriously high failure rates. Arguably both advertising and development depend, to some degree, on the ability of people to imagine the flavour and smell of these products. This project should identify procedures which enhance peoples ability to do this. Such findings should enable advertisers to design advertisements that are better able to induce imaginary aromas in their audience and enhance the training of food product developers, so they too can better imagine and conceptualise new food products.

**DP0558522** Prof V Varadharajan; Dr Y Wang

**Title:** **Security for Peer-to-Peer Systems**

**2005 :** \$61,000

**2006 :** \$56,000

**2007 :** \$61,000

**Category:** 2805 - DATA FORMAT

**Administering Institution:** Macquarie University

**Summary:**

The importance of adequate security for Internet and online services has been underscored by recent events. The protection of information infrastructures in this ever-increasing digital world has become essential for businesses, governments and individuals. Secure interactions over the Internet have become a strategic necessity and it is critically important for Australia to possess the technology to anticipate and respond to security threats to its industry and society. The outcomes of this research project will result in secure and trustworthy computing technologies that will enable secure e-commerce applications and on-line services and trusted interactions between users over the Internet.

**DP0557159** Dr IB Walker

**Title:** **Arabian Africans or African Arabs? The dynamics of Islamic African identity in the Arabian Peninsula**

**2005 :** \$80,500

**2006 :** \$73,500

**2007 :** \$76,500

**Category:** 3703 - ANTHROPOLOGY

APD Dr IB Walker

**Administering Institution:** Macquarie University

**Summary:**

An understanding of the social and cultural background to current conflicts is a step towards resolving them and this project is a significant contribution to Australia's understanding of the world and of Muslims. It will explain how and why many non-Arab Muslims are drawn towards the Arab world, by virtue of what it can offer them and of what the alternatives are increasingly failing to offer, both on a personal level and in a political sense. This is a study of African Muslims, but as a comparative study it has a direct relevance to Australia's relationship with the Islamic world, Arab, African or Asian. Ultimately, it will help to explain why contemporary events seem to have led to the clash of two civilisations, the West and Islam.

**DP0558773** Dr H Wang; Dr C Charnes

**Title:** **Private Information Retrieval**

**2005 :** \$111,000

**2006 :** \$95,000

**2007 :** \$90,000

**Category:** 2805 - DATA FORMAT

**Administering Institution:** Macquarie University

**Summary:**

The deliverables of this project will enhance information protection which is essential for rapidly expanding e-commerce applications and network communication. It will maintain and strengthen national capability of protecting the confidential integrity of digital systems and the network infrastructure in Australia. It will contribute to maintaining Australia's leading position in telecommunications and information industries. It will enhance the quality of our culture by protecting individual's privacy and providing security for sensitive data.

**DP0558411** Dr IJ Wright

**Title:** Leaf economics, and the acquisition and use of water and nitrogen for photosynthesis

**2005 :** \$150,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

APD Dr IJ Wright

**Administering Institution:** Macquarie University

**Summary:**

Successful and sustainable management of both natural and human-modified ecosystems flows from advances in our understanding of the fundamentals of plant ecology. Improved understanding of acquisition and use of water and nutrients by plants should lead not only to better management in the present day, but better-founded management decisions under possible future scenarios such as global warming, higher atmospheric CO2 concentrations or altered rainfall regimes. High-impact publications resulting from this project will sustain Australian leadership in environmental plant biology.

## The University of New England

**DP0558400** Prof BE Dollery; A/Prof NA Marshall; A/Prof AD Sorensen

**Title:** Regional Governance in Rural NSW: Emerging Issues and Future Options

**2005 :** \$50,000

**2006 :** \$45,000

**2007 :** \$48,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** The University of New England

**Summary:**

Effective service delivery, community development and environmental management are crucial issues for Australian rural communities, albeit varying regionally in type and importance. This project will demonstrate how their quality of provision depends on the structure and capacity of regional governance including the roles of local and other tiers of government, other institutions, and private actors. It considers the need for flexible governance, and for systems of service delivery and management tailored to regional problems and capacities. Although these themes will be developed in a representative sample of three NSW rural regions, the findings will have wider national implications.

**DP0557886** Prof F Geiser

**Title:** The Role of Torpor in the Life of Arid Zone Mammals

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$70,000

**2008 :** \$70,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** The University of New England

**Summary:**

Global warming is predicted to significantly affect our climate. The study will provide critical information about the thermal and energetic capabilities and requirements of native Australian mammals. As little is known about the functional adaptations of arid zone mammals in the wild, these results will be a significant advancement in knowledge about the biology of native Australian species. The data will allow us to predict whether and how populations may be affected in the future and provide wildlife managers with an additional tool for making appropriate and sound decisions for the conservation of wildlife. Moreover, the project will enhance the scientific standing of Australia, improve international collaboration, and train students.

**DP0558995** Prof CW Goddard; Dr AC Schalley

**Title:** Natural Semantic Metalanguage (NSM): formalisation, computation, referential semantics

**2005 :** \$78,000

**2006 :** \$68,000

**2007 :** \$68,000

**2008 :** \$68,000

**Category:** 3802 - LINGUISTICS

APD Dr AC Schalley

**Administering Institution:** The University of New England

**Summary:**

Meaning is what links language with culture, communication and cognition but strangely enough, most linguists do not regard semantics (the systematic study of meaning) as a central part of their discipline. This project pursues basic research in the leading meaning-based theory of language: the natural semantic metalanguage (NSM) theory, which has been originated and developed primarily in Australia. It aims to make this theory more precise, to work out how it can be used by computers, and to connect it with other, more mathematically inspired approaches to meaning.

**DP0558992** Dr PR Grave; Dr LK Kealhofer

**Title:** **Iron Age Exchange in Anatolia 1200-200BC, an archaeometric approach**

**2005 :** \$76,000

**2006 :** \$65,000

**2007 :** \$75,000

**2008 :** \$60,000

**2009 :** \$75,664

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY

**Administering Institution:** The University of New England

**Summary:**

Currently researchers from Turkey, Europe, Australia, Japan, and the US are prominent in a wide variety of archaeological and historical projects in the Eastern Mediterranean and Anatolia that overlap the period studied here. Establishment of a robust geochemical model for the complex Iron Age assemblage of trade ceramics of Anatolia will provide a major national and international scientific resource for ongoing research in the archaeology, history and economic history of the region. The project would represent a new phase of close collaboration between US, European and Australian institutions as well as an ideal setting for graduate student training both in archaeology and archaeological science.

**DP0558345** A/Prof MJ Gunter; Prof JK Sanders

**Title:** **Nanomaterials: Probing supramolecular self-assembly at the solution/solid interface**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$75,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** The University of New England

**Summary:**

Australia's competitiveness in nanotechnology must be underpinned by fundamental innovation and research. In a 'bottom-up' approach to nanomaterials, it is important to understand, for the smallest possible machines that can be produced, how singular molecular components interact with one another, both during the assembly of any device and afterwards as it performs its function. For working devices the molecules need to be assembled on a solid surface so that they can work in unison. In this project, in conjunction with researchers at the University of Cambridge, we use the new technique of gel-phase NMR spectroscopy to understand the factors involved as molecular components assemble on the surface of polystyrene beads.

**DP0556398** Prof LJ Rogers

**Title:** **Brain lateralization: its function, evolution, development and change with ageing**

**2005 :** \$120,000

**2006 :** \$100,000

**2007 :** \$100,000

**2008 :** \$100,000

**2009 :** \$100,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** The University of New England

**Summary:**

Brain research is undoubtedly one of the key research fields today. This project involves highly innovative research at the highest international level, keeping Australia at the forefront of research on brain lateralization, a very important field of brain research in humans and animals (co-founded by the applicant). This project 1) investigates dynamic changes of the developing, mature and ageing brain for vital functions using animal models, thus contributing importantly to our understanding of normal functions of the human brain, including some forms of mental dysfunction and also ageing; 2) trains postgraduate students at the highest standards and 3) maintains important collaboration with colleagues in Europe.

**DP0559299** Prof MA Spackman; Dr AL Rohl

**Title:** **Hirshfeld surfaces in molecular crystals: Revolutionary tools for crystal engineers**

**2005 :** \$120,000

**2006 :** \$100,000

**2007 :** \$110,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of New England

**Summary:**

Crystal engineering is an exciting modern branch of chemistry that seeks to understand intermolecular interactions in the context of crystal packing, and to use this understanding in the design of new materials with desirable physical and chemical properties. This project will considerably extend our already significant contribution to the detailed analysis of intermolecular interactions in molecular crystal structures. It will achieve this by a substantial enhancement of our novel visualization tools, by improving upon current approaches to the analysis of theoretical and experimental crystalline electron distributions for molecular materials, and by ensuring the widespread availability of resulting software to all researchers.

**DP0557022** Dr KA Vernes

**Title:** **Unravelling community interactions between mammals and fungi, and the role of mycophagy in mediating biodiversity and driving ecosystem processes.**

**2005 :** \$104,000

**2006 :** \$84,000

**2007 :** \$79,000

**Category:** 3008 - ENVIRONMENTAL SCIENCES

**Administering Institution:** The University of New England

**Summary:**

Maintenance of Australia's forest biodiversity and healthy forested ecosystems are of national importance. Mammal species that are key to dispersing beneficial fungi in our forests have suffered greatest declines in the past, and further declines may ultimately lead to ecosystem collapse. My research seeks to unravel community relationship between mammals and fungi, and how interactions within and between these groups maintain diverse communities. My results will enable forest managers to protect forest biodiversity from current and future threats and to restore degraded ecosystems. Through training of early career ecologists, the research also represents a tangible benefit to Australian science.

## The University of New South Wales

**DP0559817** Prof CA Alexander

**Title:** **The child writer: an edition and critical study of Literary Juvenilia.**

**2005 :** \$39,000

**2006 :** \$29,000

**2007 :** \$50,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of New South Wales

**Summary:**

The project will add significantly to the theorization and documentation of children's literary and cultural history. It will contribute to the establishment of Literary Juvenilia in the academy, making it a viable and recognized area of literary research. It will enlarge and alter the critical reception of childhood writings, in particular those of literary professionals. Such a study will also benefit approaches to literature in schools (the study of juvenilia can be inspiring for young writers); will show-case Australian authors; and, in ranging across national boundaries, will make an innovative contribution to international relations.

**DP0559097** Dr A an Huef

**Title:** **Extension of representations and homogeneous spaces.**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

The CI is an early-career researcher who is establishing her research program. The proposed project will allow her to broaden the scope of this program by involving other young Australians, including students. The project involves taking a new approach to a classical problem in representation theory; the outcomes will be of interest to a broad range of the mathematical community in Australia and overseas.

**DP0559984** Dr BL Anderson

**Title:** **The perception and recognition of surfaces and objects: Segmentation and completion**

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

One of the most difficult problems in visual processing involves recovering the structure of objects when multiple objects are present. Near objects can partially occlude distant objects; distant objects can partially camouflage near objects; and objects can become 'mixed' in conditions of transparency. The proposed work will provide fundamental knowledge about how humans extract object structure in conditions that are pervasive in images used for both medical and security diagnosis (such as x-rays). The proposed research will provide critical insight into how the human visual system extracts the structure of objects and surfaces that can inform both the design of imaging devices and automated detection systems.

**DP0559765** A/Prof MC Ashley; Prof CW Akerlof; Prof WT Vestrand

**Title:** **Gamma-ray burst astronomy in the Swift era**

**2005 :** \$110,000

**2006 :** \$105,000

**2007 :** \$105,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The University of New South Wales

**Summary:**

The study of gamma-ray bursts is one of the most active and exciting fields in contemporary astrophysics, and touches on subjects that are of interest to all humans: e.g., to what extent was life on earth shaped by cataclysmic explosions in our galaxy? ROTSE-III, at Siding Spring Observatory, is arguably the best telescope in the world for answering some of these questions, and the only telescope capable of rapid (under 10 seconds) follow-up in the Southern Hemisphere. It will provide Australian astronomers with a competitive advantage in this high-profile field. This project, and our proposed innovations in instrumentation, will involve and inspire some of our best physics and engineering students.

**DP0557618** Dr ME Baird

**Title:** **Development of a coupled physical-biological model of size-structured biota in marine waters.**

**2005 :** \$105,000

**2006 :** \$90,000

**2007 :** \$90,000

**2008 :** \$90,000

**2009 :** \$90,000

**Category:** 2604 - OCEANOGRAPHY

ARF Dr ME Baird

**Administering Institution:** The University of New South Wales

**Summary:**

The marine environment contains highly valued economic, social and environmental resources. Natural resource management in Australia is shifting from considering the value of a single resource, such as the South Eastern Trawl Fishery, to considering complete ecosystems with their multiple uses, such as the South East Australian coastal and shelf waters. With such a shift in perspective, Australia is a world leader. A new suite of tools is required to understand ecosystem dynamics and to formulate management strategies. By providing well-defined manageable outputs from a complex natural system the coupled physical-biological model to be developed will provide such a tool.

**DP0558755** Dr J Bao; Prof PL Lee

**Title:** **Dynamic Controllability Analysis for Plantwide Process Design and Control**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

World-wide chemical plants represent many billions of dollars of investment. Improvements to the process designs in terms of controllability would have the potential to provide large economic benefits, as it implies improved productivity, reduced operating costs and product variability. This proposed research will be a step towards integration of process design and control, which has been widely recognized as the key to this improvement. The outcomes from this project may be readily implemented in process design practice, and therefore have a direct impact to the Australian and world-wide process industries, helping to build a more efficient and environmental conscious Australian process industries.

**DP0557839** Dr K Bekki

**Title:** **Formation and evolution of galaxies in the Local Group**

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$100,000

**2008 :** \$100,000

**2009 :** \$100,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

ARF Dr K Bekki

**Administering Institution:** The University of New South Wales

**Summary:**

This project will represent a significant contribution in the context of Australian numerical astrophysics tackling fundamental questions in the field of galaxy formation and evolution. It will address questions that relate to our very existence, through trying to understand the formation of our Milky Way galaxy and the Local Group in which it resides. It will 'value add' to the large investment made in optical/radio telescope facilities in this country, by focussing on data obtained from these telescopes. The animations produced from the project's simulations provide a clear and graphic way of conveying the results of the study to the public, and hence exciting and educating them about this important area of astronomy.

**DP0558814** Prof BH Bennett

**Title:** **The Spying Game: Australian Constructions of Espionage**

**2005 :** \$37,500

**2006 :** \$32,500

**2007 :** \$32,500

**2008 :** \$32,500

**2009 :** \$32,500

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of New South Wales

**Summary:**

The Spying Game will explore the human dimensions of espionage in the contexts of Australian history and culture. While technological aspects of spying and institutional histories of intelligence and security organisations have been prominent, very few scholarly investigations have been made of the cultures of espionage and the human dilemmas of spying. By investigating the ways in which spying has been understood and represented in Australian society, and comparing these representations with international examples, I will contribute significant new knowledge and understanding of a burgeoning field of employment and activity during a period of crisis for the intelligence community and wider society.

**DP0556015** A/Prof CD Bertram; Dr SD Hall; Dr M Heil; Dr AL Hazel

**Title:** **Flow-induced oscillation in flexible tubes: experimental and numerical investigation of mechanism and**

**2005 :** \$100,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

We seek to understand when instability arises in flow over very deformable structures. This will help us to design highly flexible structures specifically either to avoid the danger of flow-induced oscillations, which may be damaging (cardiac surgery, sails, parachutes), or in other circumstances to take advantage of them as an innovative way involving no sliding-parts mechanisms to create vibration, or flow pulsation, or sound, or motion (as in swimming-pool cleaners). Confidence in designing with highly flexible tubes will allow minimal resource consumption in manufacture of products to transport fluids, and will allow design use of the flow limitation property, whereby such a tube can control flow-rate.

**DP0555964** Dr RC Brooks

**Title:** **Additive and non-additive genetic benefits of mating behaviour: a synthesis of sexual selection and conservation genetics**

**2005 :** \$190,000

**2006 :** \$160,000

**2007 :** \$160,000

**2008 :** \$160,000

**2009 :** \$160,000

**Category:** 2702 - GENETICS

QEII Dr RC Brooks

**Administering Institution:** The University of New South Wales

**Summary:**

This research will forge a synthesis between the study of mating behaviour and its consequences (sexual selection) and the field of conservation genetics. It will have direct relevance to conservation attempts, and far-reaching implications for how we understand sexual behaviour and the complex mating decisions animals and humans make. The work will enhance Australia's strong research reputation in evolutionary genetics, sexual selection and conservation biology.

**DP0558041** Dr AJ Brown; Dr MA Lyons

**Title:** **Defining the Regulatory Pool of Cholesterol in the Mammalian Cell**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

Heart disease remains the greatest killer of Australians and Alzheimer's disease represents a growing burden in our aging population. The information gained in this project will be invaluable in advancing our understanding of how cholesterol levels are controlled within the cell and will provide the groundwork for further research that can help to identify novel targets for new drugs to fight heart disease and Alzheimer's disease.

**DP0556440** Prof PR Brown; Dr SA Owen; Prof TS Walter

**Title:** **Do Some Firms Grow Too Quickly? An Investigation of Common Factors in the Underperformance of IPOs, SEOs and Mergers**

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** The University of New South Wales

**Summary:**

Findings in line with our expectation, that equity financing transactions are followed by substantial share market losses, will greatly benefit managers of public companies, investment analysts and professional fund managers. Firms that overuse equity financing will be highlighted and can expect closer monitoring by the capital market. Analysts would review past equity raisings and build them into their investment recommendations. The added attention should trigger changes to managers' compensation contracts and companies' governance systems. Investment funds would be redirected away from companies that squander their equity capital and channelled into more worthwhile investment opportunities. Widespread community benefits will result.

**DP0557103** Prof RA Bryant

**Title:** **Controlling Unwanted Thoughts: A Hypnotic Study of Suppression**

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The University of New South Wales

**Summary:**

Controlling unwanted thoughts is central to maintaining good mental health, and failed mental control underpins many mental disorders. This project aims to enhance the capacity to control unwanted thoughts by adopting hypnosis as an investigative tool. By identifying the strategies that assist thought control, the project will directly shape ways to enhance mental health of Australians. Through improved mental health, Australia can enjoy fewer demands on health services and increased productivity.

**DP0557211** A/Prof R Cavicchioli; Dr MJ Raftery; Dr FJ JOUX

**Title:** **The molecular basis of oligotrophy: an integrated genomic and functional proteomic study of the model marine oligotroph, *Sphingopyxis alaskensis***

**2005 :** \$100,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of New South Wales

**Summary:**

The project will enable Australia to take the lead in the global analysis of oligotrophy, highlighting the reputation Australian scientists have in scientific programs of global significance. As Australia is surrounded by some of the most oligotrophic waters in the world, we have access to an enormous natural resource suitable for the isolation of oligotrophs. Realising the potential of oligotrophs may therefore provide an invaluable source of compounds, enzymes and molecules for biotechnology and industry. Understanding microbial oligotrophy will also ensure we protect our \$50 billion dollar tourism industry by remaining abreast of factors which influence the marine environment and directly impact on all coastal activities.

**DP0557228** Dr DS Chan

**Title:** **Noncommutative Algebraic Geometry**

**2005 :** \$46,000

**2006 :** \$46,000

**2007 :** \$45,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

As algebra moves into the twenty-first century, we see a strong trend towards interactions with geometry. This project is right in the thick of this trend and will keep Australia abreast of some of the most interesting developments in algebra. The project seeks to start up a research group in noncommutative algebraic geometry which will foster a lively intellectual atmosphere. This will involve training postgraduate students, inviting international experts to give seminar talks and establishing relations with other Australian mathematicians in related areas.

**DP0556000** Prof JB Chan

**Title:** **Creative culture: The development of innovative research practices in science, technology and art**

**2005 :** \$130,000

**2006 :** \$85,000

**2007 :** \$120,000

**2008 :** \$120,000

**2009 :** \$120,000

**Category:** 3706 - HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE

TR Prof JB Chan

**Administering Institution:** The University of New South Wales

**Summary:**

The proposed research will contribute to our understanding of the factors and conditions conducive to scientific, technological and artistic innovations. Australian governments and industries devote hundreds of millions of dollars annually to support scientific research and artistic projects. An understanding of how creativity can be fostered and maintained is therefore important for the appropriate use of such resources. The project will contribute directly to the goal of 'promoting an innovation culture and economy' under the National Research Priority framework, as it focuses on the organisational processes and socialisation techniques that favour a culture of creativity among researchers in science, technology and art.

**DP0556983** A/Prof V Chen; Dr RM STUETZ

**Title:** **Macromolecular Fouling in Membrane Bioreactors**

**2005 :** \$210,000

**2006 :** \$105,000

**2007 :** \$120,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

As the demands for domestic and industrial water increasing in Australia and overseas, membrane bioreactors (MBR) offer an alternative for producing higher effluent quality wastewater compared to conventional processes. However, aeration costs used to remove fouling deposits (which reduce the operating performance) need to be further minimised. The proposal aims to study fundamental mechanisms involve in the deposition of foulant components by using model systems of polysaccharides, proteins and microbial cells and comparing these with real MBR systems. The effect of bubbling varied gas compositions (air/H<sub>2</sub>S ratios) a novel approach in this study will be investigated to prevent or remove foulants in MBR systems.

**DP0558479** A/Prof V Chen; A/Prof DE Wiley

**Title:** **Optimising Removal of Proteinaceous Foulants from Membranes**

**2005 :** \$120,000

**2006 :** \$98,000

**2007 :** \$80,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

Removal of proteinaceous foulants from membrane systems imposes both significant economic costs in terms of chemical usage as well as significant environmental costs in terms of water usage and production of effluents from the cleaning and rinsing waters. The outcome of this project should allow us to develop methods for the prediction and optimisation of membrane cleaning performance of relevance to major Australian industries including the dairy, food processing and water and waste water treatment industries.

**DP0558687** Prof BH Chong; Dr JI Turner; Dr JC Kwok

**Title:** **Regulation of mammalian heart development by transcription factors FHL2, GATA-4 & FOG-2**

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

FHL2 is involved in many biological processes including intracellular signaling and gene transcription. GATA and FOG proteins are critical for the development of diverse tissues, including the heart. Knowledge gained in this project will advance our understanding of many cellular processes, including heart development, and will contribute to our knowledge in Biology, Zoology and Veterinary Science. More specifically, it will contribute to Stem Cell research, a 'hot' area in the biotechnology industry, particularly towards building a strong base of expertise, skills and technological capability in this new field, and may even lead to the development of a commercial product e.g. a heart muscle cell-coated biomaterial to aid failing heart.

**DP0557701** Dr CE Clarke; Dr JI Vandenberg; Prof TJ Campbell; Dr AM Torres; Dr A Mathie

**Title:** **Characterisation of two-pore domain potassium channels: structure-function studies of the M1-P1 loops of TASK channels.**

**2005 :** \$95,000

**2006 :** \$91,000

**2007 :** \$91,000

**Category:** 2499 - OTHER PHYSICAL SCIENCES  
APD Dr CE Clarke

**Administering Institution:** The University of New South Wales

**Summary:**

TWIK-related Acid Sensitive K<sup>+</sup> (TASK) channels are members of the novel class of two-pore domain potassium channel family. They are potently inhibited by local anaesthetics and have been implicated as having important roles in many pathophysiological conditions such as heart arrhythmias, stroke, epilepsy, breast and other cancers. The in depth structural and functional characterisation of this class of potassium channels is of great importance as they are interesting targets for new therapeutic developments. Advancement of knowledge in the structure and function of these channels will underpin drug targeting that will aid preventative healthcare, allowing Australians to age well and age productively.

**DP0557462** Dr SB Colbran

**Title:** Understanding aerobic respiration: Models for the catalytic centre in proton-pumping heme-copper

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of New South Wales

**Summary:**

This project tackles 'head on' a key challenge in contemporary biological inorganic chemistry, understanding how at the atomic level aerobic life uses oxygen. All life we see is aerobic, and thus the conceptual advances from this research will progress understanding of our world and ourselves' an important cultural goal. Advancing knowledge of such fundamental processes sits firmly in the area of the Research Priority Goal: Breakthrough Science. Postgraduate research students will be trained in sophisticated state-of-the-art theoretical and synthetic chemical methodologies. The project will enhance Australia's research capability in biological (inorganic) chemistry and promote Australia's standing in the International research community.

**DP0559909** A/Prof AG Crosky; Dr RN Lumley; Dr BR Hinton

**Title:** Temper Development Using Secondary Precipitation for Stress Corrosion Cracking Resistance in 7xxx Series Aluminium Alloys

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2913 - METALLURGY

**Administering Institution:** The University of New South Wales

**Summary:**

The work has the potential for very substantial benefit to Australia. Novel stress corrosion cracking resistant tempers with improved strength have the potential for widespread application in the aircraft industry. Since the patent for the interrupted ageing process is held by CSIRO there is the potential for substantial economic benefit to Australia from the licensing of the novel tempers world-wide. Additionally, it would be possible to develop the novel tempers in-situ on existing aircraft structures to improve their performance. This would be of particular benefit to the Royal Australian Airforce with its fleet of ageing aircraft.

**DP0556407** Prof IW Dawes

**Title:** Cellular Gene Regulation Networks

**2005 :** \$115,000

**2006 :** \$115,000

**2007 :** \$115,000

**2008 :** \$115,000

**2009 :** \$115,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of New South Wales

**Summary:**

The benefit to Australia will be scientific in terms of providing an understanding of how cells integrate transcriptional control systems and the networks that are involved. This will inform research on folate deficiency and aberrant human development and towards identifying genes that are important in improving efficiency of microbial fermentations. Additional and more practical major benefits will follow from the development of tools to analyse interactions between control systems, including software of value to the research community. The work will provide postgraduate students with major training in up-to-date genomic technologies, and in the interface between application of bioinformatics and experimental science.

**DP0556659** Dr D Del Favero; Prof J Shaw; Prof S Benford; Prof J Goebel

**Title:** Co-evolutionary narrative as machine autonomy in the relationship between artificial agents and human participants in interactive cinema

**2005 :** \$167,874

**2006 :** \$152,874

**2007 :** \$162,874

**2008 :** \$135,874

**2009 :** \$100,126

**Category:** 4103 - CINEMA, ELECTRONIC ARTS AND MULTIMEDIA

QEII Dr D Del Favero

**Administering Institution:** The University of New South Wales

**Summary:**

The research has pioneering cultural and economic benefits for Australia and is focused on integrating machine and human intelligence within interactive cinema with potential application across a range of new media art forms, location based entertainment, home theatre and on-line education. This study anticipates autonomous machine agent and human convergences, where there is high demand for narrative enrichment as a way of satisfying a voracious demand for content and experiential permutations. The capacity for investing autonomous machine agent and human interactions with aesthetic potential represents a significant cultural aggregation for an expanded cinema, entertainment and educational industry.

**DP0559185** Prof TM Deviney; Prof JJ Louviere; Dr P Auger; Dr A Gunnthorsdottir; Dr MT King

**Title:** Information Provision and the Valuation of Social Issues

**2005 :** \$60,000  
**2006 :** \$80,000  
**2007 :** \$65,000

**Category:** 3502 - BUSINESS AND MANAGEMENT

**Administering Institution:** The University of New South Wales

**Summary:**

Societies are more than the sum of the transactions in which people engage. Understanding the tradeoffs that people make between social attributes embedded within products and the functional components of those products are critical if we are to value fully the consumption of the society. In particular, to the extent that the social component of consumption is undervalued or biased because of a lack of understanding of what is being purchased, the society will be allocating its consumption dollar in a manner that is both economically and socially inefficient.

**DP0559328** A/Prof R Diprose

**Title:** A philosophical examination of how bodies support communal bonds and how these bonds can be

**2005 :** \$40,000  
**2006 :** \$40,000

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** The University of New South Wales

**Summary:**

By explaining how bodies support open senses of belonging with others and to places, this project accounts for a key element of the social fabric that is usually overlooked in cognitive models of social and political interaction. This grounding of community in the corporeal and affective exposes a range of ways that communal bonds can be threatened or weakened which would be otherwise left out of account. The study thereby points to the political conditions necessary to foster vibrant, healthy, and ethical community.

**DP0557457** Prof AH Dooley

**Title:** Symmetries in analysis

**2005 :** \$101,000  
**2006 :** \$91,000  
**2007 :** \$91,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

Technical research is like an iceberg. The 10% you see in applications is supported by 90% hidden, long-term, sometimes abstruse or theoretical-sounding work. The area of mathematical analysis has, for over 200 years, proved its worth as part of the unseen 90%, giving us such important tools as Fourier analysis, statistical mechanics and quantum mechanics. Australia is known as a world leader in mathematical analysis, and it is important for the country to maintain that edge in a number of key disciplines, so we can continue to participate in global technological advance. The project has an international focus which will enable that to happen. It will also provide training for the next generation of mathematicians.

**DP0559813** Prof M Eisenbruch; Prof G Vimpani; Dr G Alperstein; Dr HN Phung; Dr G Flores; A/Prof V Nossar

**Title:** Investing in the Future of Children in Multicultural Australia - Cultural Competence in Families First (CULCOFAM)

**2005 :** \$160,000  
**2006 :** \$115,000  
**2007 :** \$130,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** The University of New South Wales

**Summary:**

Healthy start to life - Discovering how to use valuable parenting knowledge of parents from culturally different backgrounds will help us to draw on them and achieve their childrens' potential (National Agenda for Early Childhood initiative). Preventive healthcare - Knowing how to use cultural resources will help us to promote parenting in culturally appropriate ways, and strengthen capacity for children to grow in best health (Focus on Prevention Initiative). Strengthening Australia's social fabric - The results will help to ensure that child services strengthen local community cohesion, and families can make culturally acceptable choices to better look after their children (National welfare reform and participation agendas).

**DP0556939** Dr MH England; Prof LM Leslie; Dr SB Power; Prof DJ Karoly

**Title:** **Australian climate extremes and predictability in a changing CO2 world: the unique role of the Southern Hemisphere extratropical ocean-atmosphere**

**2005 :** \$75,000  
**2006 :** \$75,000  
**2007 :** \$75,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** The University of New South Wales

**Summary:**

Australia's climate is extreme, with harsh droughts, severe bushfire seasons, climate change, soil loss, and salinity all posing potentially enormous socio-economic challenges over the next fifty years. Research into climate variability, extremes, and predictability is thus highly significant for Australia, and will underpin efforts to protect our biodiversity and ensure the nation's environmental sustainability. We propose to launch a major new initiative in extratropical climate analysis. This work will have significant benefits for the many sectors of society reliant on interseasonal-interannual climate prediction. Prominent examples include agriculture, energy, freshwater supply, bushfire control, air quality, health, and tourism.

**DP0556927** A/Prof M Ferry; Dr JM Cairney

**Title:** **3-D investigation of internal interfaces in annealed metals using 3-D focused ion beam tomography**

**2005 :** \$125,000  
**2006 :** \$110,000  
**2007 :** \$115,000

**Category:** 2913 - METALLURGY

**Administering Institution:** The University of New South Wales

**Summary:**

The research will utilise a suite of highly sophisticated techniques to study the interfacial structure in annealed metals. The dual beam platform is the first of its kind in Australia and will generate high resolution 3-D images from any solid material. There is enormous potential for its use in materials science and other research fields which is beneficial to Australia's standing in basic science. Considering the sophisticated nature of the techniques, the project will provide an excellent research training environment for early career researchers who will develop expertise with techniques that are expected to make a major contribution to fundamental and applied research over the next few years.

**DP0556345** Prof V Flambaum

**Title:** **Test of unification theories in atomic and nuclear phenomena**

**2005 :** \$170,000  
**2006 :** \$170,000  
**2007 :** \$170,000  
**2008 :** \$170,000  
**2009 :** \$170,000

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS  
APF Prof V Flambaum

**Administering Institution:** The University of New South Wales

**Summary:**

This project will help to establish Australia among the leaders in important areas of modern science: tests of models unifying all physical forces and search for variation of fundamental constants of Nature. It may help to create new theory unifying physics and cosmology, and may reveal hypothetical extra dimensions in our Universe, or many different sub-Universes. The training of students and researchers combined with a rich international collaborative program will ensure that Australia is well-placed to prepare for the approaching revolution in physics and cosmology.

**DP0557612** Prof JP Forgas; A/Prof WH von Hippel

**Title:** **Hearts and minds: Affect, thinking and behaviour**

**2005 :** \$120,000  
**2006 :** \$100,000  
**2007 :** \$120,000  
**2008 :** \$110,000  
**2009 :** \$110,000

**Category:** 3801 - PSYCHOLOGY  
APF Prof JP Forgas

**Administering Institution:** The University of New South Wales

**Summary:**

Understanding the influence of affect on health, adjustment and on many everyday behaviours remains an enduring puzzle. This project will produce direct national and community benefit by developing a new, integrative theory of affective influences on thinking and action, and exploring the mechanisms that facilitate or inhibit affective influences on everyday behaviours. The real-life consequences of affect infusion in health, organisational, educational, marketing and clinical settings will also be explored. The project will also contribute to Australia's research capability by training doctoral and postdoctoral students, and fostering international research collaboration.

**DP0559742** Dr SJ Foster

**Title:** **FRACTURE OF STEEL FIBRE-REINFORCED CONCRETE: MODES I & II.**

**2005 :** \$85,000  
**2006 :** \$63,000  
**2007 :** \$50,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

In 2000-2001 Australia spent 17.5 billion dollars on heavy engineering infrastructure development (3% of its gross domestic product). As this infrastructure ages costs of repairs and maintenance magnifies. Conventional structural concrete can significantly deteriorate with time requiring regular and often costly maintenance. This research goes to the development of a class of 'super' concretes with very high strengths and with excellent durability properties. With improved understanding of fracture and fracture processes with these materials, new models can be developed to represent the behaviour of structural elements fabricated with this 'super' class of concretes and speed their implementation into Australian construction practice.

**DP0559033** A/Prof KJ Fox; Prof WE Diewert

**Title:** Measurement and Sources of Productivity Growth under Imperfect Competition

**2005 :** \$70,000

**2006 :** \$107,393

**2007 :** \$80,000

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** The University of New South Wales

**Summary:**

The relative growth performance of countries using net output will free comparisons from the contentious and differing adjustments made by many statistical agencies in an attempt to take account of quality change in capital goods. Thus, Australia will have a better understanding of its relative performance in terms of growth, and thus be better positioned to make informed policy decisions. In addition, whether productivity growth is mainly driven by technical progress or returns to scale, and the size of monopolistic markups, has a large bearing on how we view the performance of an economy and its potential for future growth.

**DP0559469** A/Prof KJ Fox; Dr RQ Grafton

**Title:** Biosecurity or Trade Barrier? The Economic Costs of Quarantine.

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The University of New South Wales

**Summary:**

Agricultural, fishing and forestry groups are united in supporting strict biosecurity measures, such as quarantine, in order to prevent any possibility of the importation of diseases. However, the importation of certain products from 'diseased' countries does not necessarily mean that the disease will also be imported, and even if imported it may not result in the destruction of the local industry. The "diseased" countries obviously remain competitive if they are able to export the products. Foreign quarantine restrictions are restricting Australia's access to international markets. The costs to consumers of the current zero-tolerance policy has not been quantified. The costs may indeed exceed the benefit.

**DP0557295** Dr B Garner; Prof DA Jans

**Title:** Nuclear Trafficking of Apolipoprotein-E

**2005 :** \$115,000

**2006 :** \$105,000

**2007 :** \$105,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

Apolipoprotein-E (apoE) regulates specific age-related neurodegenerative and cardiovascular diseases. The role of apoE in these disorders is unclear. This project will benefit our community by providing the basic cell biology knowledge required to understand disease mechanisms and ultimately provide avenues for better treatments. Aspects of the project will focus on the modification of apoE by carbohydrates and the interaction of apoE with cellular carbohydrate-containing structures. The importance of carbohydrates in the regulation of cellular and protein function is increasingly recognised and forms a foundation for the rapidly expanding discipline of glycobiology. This project will strengthen Australia's glycobiology research capacity.

**DP0556554** Dr K Gaus

**Title:** Lipid raft and cytoskeleton organization: How membrane domains give cells direction

**2005 :** \$150,000

**2006 :** \$130,000

**2007 :** \$130,000

**2008 :** \$130,000

**2009 :** \$130,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

ARF Dr K Gaus

**Administering Institution:** The University of New South Wales

**Summary:**

For a large number of cells in our body it is imperative that they are able to orientate themselves relative to their environment, sense direction and translate incoming signals. To do so it is hypothesised that lipids on the cell surface are redistributed to form specialized domains. An asymmetric distribution of membrane domains can provide cells with a front and rear end and can further concentrate and co-ordinate signalling molecules to a specific site. The project will determine the role of lipid domain in stabilizing cell shape and their remodelling during cell migration, the digestion of foreign particles and the formation of cell-cell contacts.

**DP0558629** A/Prof AD GEORGE MULGAN

**Title:** **APEC, the WTO and bilateral free trade agreements (FTAs): which way forward for Japan's agricultural trade liberalisation?**

**2005 :** \$35,000  
**2006 :** \$20,000  
**2007 :** \$30,360

**Category:** 3499 - OTHER ECONOMICS

**Administering Institution:** The University of New South Wales

**Summary:**

Japan is an important market for Australian farm products, but high import barriers prevent the full potential of this market from being realised. Japan has consistently presented stiff opposition to agricultural trade liberalisation - in APEC, at the WTO, and in bilateral free trade negotiations. The project, by identifying which negotiating arena is most likely to deliver an agreement to liberalise agricultural trade, will contribute to the advancement of Australia's economic and trading interests. Improving access to the Japanese market for agricultural products in the context of a broader trade agreement will generate substantial dividends for Australian farmers as well as tangible benefits for the wider community.

**DP0560032** Dr CR Gibson; Prof J Connell; A/Prof G Waitt; Prof DJ Walmsley

**Title:** **Reinventing rural places? The extent and impact of festivals as regeneration strategies**

**2005 :** \$85,000  
**2006 :** \$55,000  
**2007 :** \$45,000

**Category:** 3704 - HUMAN GEOGRAPHY

**Administering Institution:** The University of New South Wales

**Summary:**

This research addresses the important problem of rural decline in Australia. The project will make available new knowledge on innovation in rural places. Benefits will accrue to specific communities from insights on the possibilities and limitations of renewal through festivals. Tourism promoters and regional development policy makers will be able to make use of the online database of rural festivals. National benefits include greater understanding of the significance of festivals. Research will empower rural communities and advance theory on rural restructuring, post-productivism and the reciprocal relationship between place and identities. In these ways, the project seeks to strengthen the social and economic fabric of rural Australia.

**DP0558370** Prof RI Gilbert

**Title:** **The implications of low-ductility reinforcement and strain localisation on the strength and ductility of reinforced concrete two-way slabs**

**2005 :** \$220,000  
**2006 :** \$195,000  
**2007 :** \$220,000  
**2008 :** \$225,000  
**2009 :** \$125,000

**Category:** 2908 - CIVIL ENGINEERING  
APF Prof RI Gilbert

**Administering Institution:** The University of New South Wales

**Summary:**

In the design of reinforced concrete structures, ductility is an important requirement, providing warning of failure, redistribution of internal actions at overloads and justification of many of the assumptions made in structural analysis and design. The recent introduction in Australia of low-ductility, deformed welded wire fabric reinforcement (Class L) has resulted in concrete slabs with relatively brittle failure modes and its use has been the subject of much debate. This research will investigate the ductility of two-way slabs containing Class L mesh and the applicability of established design procedures. It will lead to safer and better performing r.c. floor systems and, if necessary, new ductility specifications for Class L steel.

**DP0559897** Prof BJ Gillam; Dr BL Anderson

**Title:** **Occlusion, surface perception and illusory contours.**

**2005 :** \$63,000  
**2006 :** \$60,000  
**2007 :** \$60,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

Almost half the brain deals with vision, and for good reason. Complex problems must be solved in order for perception to appear effortless. One of the most intriguing is that objects are not incomplete when they are occluded by nearer objects. This project will advance our understanding of how visual systems deal with occlusion, studying perceived continuation, "illusory contours" and the perception of surface layout. This issue is also relevant to recognition with sparse visual inputs, the effects of brain damage and image interpretation in virtual reality, security and medical applications.

**DP0558539** Dr B Goldys; A/Prof RS Womersley

**Title:** **Market Model of Implied Volatility**

**2005 :** \$86,000

**2006 :** \$86,000

**2007 :** \$81,000

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** The University of New South Wales

**Summary:**

The outcomes of the project will constitute a new methodology with a wide range of tools to handle the market uncertainties with practical applications in the finance industry. Consequently, the benefits of this project to the nation include enhancing its scientific standing in the international community, the training of Australian researchers in forefront methods of modelling of complex stochastic systems and the benefits resulting from its commercially relevant elements.

**DP0556397** Dr JJ Gooding; Prof MN Paddon-Row

**Title:** **Understanding Electron Transfer through Surface Bound Rigid Molecular Constructs: From Fundamental Studies to New Sensing and Photovoltaic Applications**

**2005 :** \$180,000

**2006 :** \$150,000

**2007 :** \$150,000

**2008 :** \$150,000

**2009 :** \$150,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of New South Wales

**Summary:**

Electron transfer is not only a vital process in biological systems but is the cornerstone of the new generation of nanoscale devices such as molecular electronics, photovoltaic devices and biosensors. For most applications electron transfer occurs close to a surface but the influence of the surface is not well understood. This project aims to increase our understanding of the role of surfaces on the electron transfer behaviour using a novel range of rigid 'molecular wires'. The knowledge gained will be exploited in the development of novel biosensors for environmental and health monitoring and new highly efficient solar cells for energy conversion.

**DP0558434** Dr SC Griffith

**Title:** **Integrating sexual selection and the allocation of sex in the zebra finch: back to the outback**

**2005 :** \$170,000

**2006 :** \$135,000

**2007 :** \$135,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of New South Wales

**Summary:**

The Australian zebra finch has become the primary avian model species in evolutionary biology studies in Europe and North America as the focus of classic laboratory-based studies of sexual selection, and sex allocation. Surprisingly, these studies have focused on populations of birds maintained in an unnatural environment and in captivity for decades that have been through tens of generations of artificial selection, the effects of which are unknown - not a trivial issue for students of evolution. Using experimental manipulations I will study these high profile research areas in wild populations, focusing international attention on this internationally recognised Australian species and raising the profile of Australian research.

**DP0558769** A/Prof AR Hamilton; Prof PE Lindelof; Dr Y Hirayama; Prof C Hanna; Prof M Pepper

**Title:** **Quantum coherence and many-body interactions in inorganic and organic nanoscale electronic devices**

**2005 :** \$165,000

**2006 :** \$140,000

**2007 :** \$140,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of New South Wales

**Summary:**

The multi-trillion dollar semiconductor industry drives the explosive growth in information technology that we have witnessed over the past 25 years. Although Australia is not presently a major player in the industry, this proposal will enable Australia to play a role in its future development of nanoscale electronics, both in conventional (inorganic) semiconductor devices, and in new (organic) device technologies based on carbon nanotubes. This research program will allow Australian researchers and students to work both with leading international universities (Cambridge (UK) and Copenhagen (Denmark)), and a leading Japanese industrial research facility - Nippon Telegraph and Telecommunications.

DP0559327 Prof DB Hibbert; Dr JS Quinton

**Title:** Development of stable, patterned Self-Assembled Monolayers on carbon for sensors and other nanotechnology applications

2005 : \$75,000  
2006 : \$60,000  
2007 : \$60,000

**Category:** 2504 - ANALYTICAL CHEMISTRY

**Administering Institution:** The University of New South Wales

**Summary:**

Nanotechnology - science at the scale of a billionth of a metre - rests on our ability to manipulate molecules and to build structures that will be part of useful devices. We shall develop new methods to put that chemistry on carbon surfaces - leading to very stable and cheap devices that will have 'real world' applications in environmental monitoring. A 'bottom up' method of fabrication exploits the ability of similar molecules to line up on a suitable surface, so-called 'Self Assembly'. The project is based on sound fundamental science for an applied research outcome and therefore will enhance Australian's standing as a strong scientific country that applies its knowledge at the forefront of technological advancement.

DP0556174 Dr TD Hoang; Dr B Vo; A/Prof V Jeyakumar

**Title:** Convex optimisation for control, signal processing and communication systems

2005 : \$146,000  
2006 : \$131,000  
2007 : \$126,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

Renewable control of complex systems, signal processing, telecommunication and in general any industries interested in these applications stand to benefit from our research. In particular, the automotive and defence industries stand to benefit from the nonlinear control design aspect of the proposed project outcomes. The telecommunications industries, on the other hand, benefit from the signal processing and communications aspects. We also build a core expertise in optimisation and its applications in Australia by training PhD students and Postdoctoral researchers. The research collaborations will cement and maintain the international linkages which will improve applied research in Australia.

DP0558596 A/Prof MJ Hoffman; Dr T Furukawa; Prof J Roedel; Prof KJ Bowman

**Title:** Development of Cyclic Fatigue Degradation Criteria for Piezoelectric Ceramic Components

2005 : \$125,000  
2006 : \$110,000  
2007 : \$115,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

Piezoelectric ceramics are widely used in advanced engineering applications such as actuators in the automotive industry, sonars for submarine mineral exploration and defence, and a broad range of medical devices, e.g. ultrasound probes. The reliable operational lifetime of these devices is, however, severely limited because they suffer cyclic fatigue leading to both degradation in performance and device failure. The proposed project seeks to develop an understanding of the mechanisms of fatigue and develop a design model for engineers such that piezoelectric ceramic devices can be operated for longer periods with higher levels of reliability.

DP0559626 Prof PJ Hogg

**Title:** Activation of Tissue Factor by a Disulphide-Bond Switch

2005 : \$140,000  
2006 : \$140,000  
2007 : \$140,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

This project will define the molecular mechanism of activation of tissue factor, the initiator of blood coagulation, and design and test novel antibody therapeutics that block this activation. The applicant suggests that tissue factor is activated by a disulphide-bond switch. Should this hypothesis prove correct it would be the first example of activation of a mammalian protein by this means and, moreover, would be very amenable to therapeutic intervention because activation occurs on the membrane surface inside blood vessels. Tissue factor activation and thrombus formation is the precipitating event in acute myocardial infarction, unstable angina and ischemic stroke, which are responsible for the majority of deaths in Australia.

DP0556049 Dr TE Humphrey

**Title:** High efficiency thermoelectric nanomaterials

2005 : \$75,000  
2006 : \$70,000  
2007 : \$70,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS  
APD Dr TE Humphrey

**Administering Institution:** The University of New South Wales

**Summary:**

High efficiency thermoelectric power generators and refrigerators will have a wealth of applications in the automotive, semiconductor and power generation industries, among many others. Such technology could be used to recycle a significant fraction of the waste heat produced in industrial processes or in car engines, reducing fuel consumption and greenhouse gas emissions, or to produce high efficiency domestic refrigerators with no moving parts. This project will improve our theoretical understanding of the fundamental physics which underlies the operation of thermoelectric power generators and refrigerators, and will assist the design and optimisation of the next generation of high efficiency thermoelectric nanomaterials.

**DP0556438** Dr RA Iedema; A/Prof J Braithwaite; Prof LJ White; Dr K Williams

**Title:** **Anchoring preventive health care to positive learning: an exploration of local methods of organising and improving clinical practices.**

**2005 :** \$121,000

**2006 :** \$121,000

**2007 :** \$123,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The University of New South Wales

**Summary:**

Safe health care is the most important treatment factor for patients and families. This project focuses on how clinical professionals achieve quality and safety in their daily practices, by investigating their team processes and communications. The project produces methods and approaches for enhancing the social, organisational and clinical conducts that best realise high quality and safe care.

**DP0557519** A/Prof SK JHA; Dr S Banerjee

**Title:** **Resilience Oriented Multicast for Real-time Multimedia**

**2005 :** \$88,000

**2006 :** \$72,000

**2007 :** \$80,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of New South Wales

**Summary:**

The current communication infrastructure market is one of the largest market segments in the world. However, it is evident that the current Internet provides limited support for a multitude of current, emerging and future services that require multicasting support (worldwide, enhanced IP service revenues are forecast to grow to \$104.4 billion in 2005). The introduction of enhanced multicasting services will result in lowered input costs to industries and consumers with a wider choice of enhanced services. The mechanisms developed in this project will allow service providers to raise additional revenue and differentiate themselves by offering a wide range of enhanced services.

**DP0557113** Dr NJ Kessissoglou; Prof Dr JC Lai; Dr L Benassi

**Title:** **Active vibration control of a fluid loaded cylinder using inertial and reactive actuators**

**2005 :** \$80,652

**2006 :** \$109,000

**2007 :** \$74,542

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

APD Dr L Benassi

**Administering Institution:** The University of New South Wales

**Summary:**

The active control technology outlined in this proposal presents a practical solution for low frequency noise problems associated with a submarine. The successful outcomes will be directly applicable to the Collins Class submarine, and thereby will greatly benefit Australia's naval defence industry. The active control transducer technology developed in this project will be patented, and has the potential to result in great commercial value for Australia. This project will contribute significantly to Australian research capacity in cutting-edge technologies in active vibration control. The collaboration between UNSW and the Maritime Platforms Division of DSTO will promote technology transfer and enhance Defence research expertise.

**DP0560163** A/Prof N Khalili

**Title:** **Experimental Investigation and Constitutive Modelling of Thermo-Hydro-Mechanical Coupling Effects in Unsaturated Porous Media**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

The research proposed in this project will benefit the Australian community through provision of a methodology for a more realistic and fully coupled modelling of flow and deformation in unsaturated porous media subject to thermal loading. The developments proposed in this research will be immediately applicable to many engineering problems of national interest, including storage of nuclear wastes, removal of contaminants using air sparging, steam drive/steam flooding, and in situ combustion. The work will also benefit Australia and the Australian research community through the development of a new expertise within Australia, which will have a high potential for export to other countries.

DP0556775 A/Prof GH Kingston; Dr HJ Bateman; Dr LA Fisher; Prof M Sherris; Prof KW Clements; Ms SJ Thorp

**Title:** Risk Management for Bonds, Currencies and Commodities

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The University of New South Wales

**Summary:**

Understanding maturity-structure policy is a neglected topic. It needs research before we can determine whether public debt policy should accommodate the emerging needs of self-funded retirees - for long-term debt, new issues of index bonds, and 'survivor' bonds. Planning for annuity-rate risk has lagged far behind the sales of complying pensions. Over 2003 the Australian dollar rose by 34 percent, revealing major deficiencies in the standard advice on managing currency risks to retirement incomes. Uninsured disruptions to electricity supply have been an issue (eg in California), and demonstrate a need for innovative financial instruments that cushion and spread the costs.

DP0558729 Dr G Kouvaros

**Title:** The Misfits and the iconography of post-war American acting

**2005 :** \$30,000

**2006 :** \$58,000

**2007 :** \$30,000

**Category:** 4103 - CINEMA, ELECTRONIC ARTS AND MULTIMEDIA

**Administering Institution:** The University of New South Wales

**Summary:**

The project will address a shortage of scholarly writing on transformations in the iconography of post-war American acting. It will develop a model of analysis in which the study of social and institutional forces surrounding the development of performance styles works in tandem with a reading of iconic images. The project outcomes will enhance the profile of Australian film studies by providing a model for other research concerned with the complex relation between national culture and styles of performance.

DP0557483 Mr H Lee

**Title:** Real-Time Integration of GPS with INS For Precise Long-Baseline Kinematic Positioning

**2005 :** \$67,494

**2006 :** \$71,822

**2007 :** \$71,822

**Category:** 2910 - GEOMATIC ENGINEERING

APD Mr H Lee

**Administering Institution:** The University of New South Wales

**Summary:**

Although Australian researchers have played an important role in the development of carrier phase-based GPS kinematic positioning algorithms and methodologies over the last two decades, investigations concerning high precision multi-sensor integration have been comparatively limited. This ARC project would go a significant way towards remedying this situation by building up theoretical and practical expertise in sensor integration techniques at the postdoctoral level. The outcomes of this project will represent a significant contribution to Australian R&D in the fields of precise positioning and navigation, since they will be directly applicable to the design and development of a variety of integrated multi-sensor systems.

DP0558903 Prof E Leonardi; Dr V Timchenko

**Title:** Heat Transfer Enhancement Techniques for Air Conditioning and Refrigeration Equipment

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

The proposed Project will make significant contribution towards the both fundamental understanding of heat transfer enhancement using dimpled surfaces and the design of heat exchangers and, in particular to the application of dimpled surfaces in air conditioning and refrigeration industries. Unlike the previous CFD studies which have been made on the assumptions that the flow is steady and decoupled from the heat transfer calculations in this Project the fully coupled problem will be solved, in which unsteady flows are allowed to occur over a dimpled surfaces. As a result we will be able to more accurately determine the resultant effects on the pressure drop and heat transfer.

DP0559431 Dr E Magnani; Prof DS Hamermesh

**Title:** The Demand for Older Workers: Technology, Skill and Employment Opportunities

**2005 :** \$91,426

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The University of New South Wales

**Summary:**

"Productive ageing" policies are central to Australia's strategies for the governance of population ageing. But little is known about the determinants of firms' demand for older workers. By uncovering the impact that technological change has on firms' hiring and training decisions, this study will critically complement our understanding of older workers' constrained employment opportunities. In so doing it seeks to inform the long-term policy debate on how best to adjust our economy to the current major demographic and technological development. Its outcomes will be of interest and use to policy makers, industry, advocacy groups, unions and the wider community.

**DP0558615** A/Prof CD McFarland; Prof BK Milthorpe; Dr A Sakellariou; Dr JA Hunt

**Title:** **Growth of Bioartificial Tissue Containing an Inbuilt Blood Supply**

**2005 :** \$110,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

The large and growing demand for replacement tissues and organs has spurred rapid growth in the emerging field of tissue engineering, which aims to form new tissues in the laboratory by combining living cells and synthetic scaffolds. A major challenge lies in the production of thick tissues, which require a blood supply in order to survive. Uniquely, this project aims to grow in the laboratory a vascular system based on natural structures, which can then be used to support new tissue growth. Australia is well placed to reap the rewards of this work, having a track record in commercialisation of medical technologies, resulting in an improved quality of life for many Australians and substantial direct and indirect economic benefits.

**DP0559967** Dr GP McNally; A/Prof R Richardson

**Title:** **The psychobiology of forgetting: Opioid receptors and inhibitory constraints on storage of long-term memory.**

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

This project has four main national benefits. First, it addresses a fundamental scientific and practical issue: the psychobiology of forgetting. Second, it will provide important insights into variations in memory functioning across the lifespan. A significant challenge facing Australia is understanding, and where possible alleviating, the decline in mental function that occurs with age. This project may help identify targets to alleviate age-related impairments in memory. Third, this project will contribute to Australia's international reputation in behavioural neuroscience. Fourth, this project will provide outstanding training opportunities for Australian undergraduate and postgraduate research students in behavioural neuroscience.

**DP0556363** Dr KJ Meagher; Dr A Wait; Prof T Van Zandt

**Title:** **Market Contingent Hierarchies: Theory and Evidence**

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** The University of New South Wales

**Summary:**

Operating in a small open economy trying to pursue an export-led strategy for economic growth, Australian firms are increasingly exposed to the types of market uncertainties that are the subject of this project. Australian firms cannot rely on economies of scale developed through large domestic markets but must instead depend on innovation and organisational nimbleness to exploit opportunities as they appear. This project will develop and test with Australian data the organisational theories necessary for the international success of Australian firms.

**DP0556759** A/Prof BA Messerle

**Title:** **New Catalysed Routes to the Efficient Synthesis of Biologically Active Molecules**

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$85,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of New South Wales

**Summary:**

Enhancing the economic viability and the energy efficiency of chemical transformations is of fundamental importance in the chemicals industry, and is essential in the targeted production of drugs and fine chemicals for frontier technologies. By using multiple metal centres to simultaneously promote series of reaction steps in a single pot, this project will develop an innovative approach to efficient syntheses of biologically active molecules. The new methods and new catalysts for enhancing the synthesis of highly functionalised compounds will improve significantly the environmental impact of chemical processes by reducing the amount of chemicals required, and reducing waste and energy requirements.

DP0557126 Prof JH Middleton; Prof RW Griffiths; A/Prof AM Moore

**Title:** WAKE FLOWS WITH UPSTREAM TURBULENCE IN MARINE, ATMOSPHERIC AND BUILT ENVIRONMENTS

**2005 :** \$260,000

**2006 :** \$232,000

**2007 :** \$240,000

**2008 :** \$240,000

**2009 :** \$220,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

Through improved understanding of turbulent wakes the project will have applications across aeronautics and hydrodynamics, leading to more efficient engineering designs to reduce flow drag. In marine environments our findings will improve coastal ocean models and the prediction of pollutant dispersal, nutrient fluxes and sediment transport, and contribute to the management of biological productivity (NRP 1.5). In the atmospheric boundary layer, the results will assist planners to improve wind environments near large buildings or clusters of buildings, benefiting the safety of aircraft at takeoff and landing. The project will develop collaboration and help maintain the strength of Australian research in environmental flows.

DP0556847 Dr CJ Mitchell; Prof G Hall

**Title:** Discrimination learning in humans: Associative and attentional mechanisms

**2005 :** \$45,000

**2006 :** \$45,000

**2007 :** \$45,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

This project offers three major benefits: (1) Australian researchers excel in cognitive neuroscience, learning and psychopharmacology, areas based largely on animal models of human cognition. This project contributes to these areas by specifying the relationship between animal learning and human cognition; (2) the project enhances Australia's international reputation in these areas via its collaboration with a scientist of Geoff Hall's stature; it also offers students outstanding research training and international exposure; (3) given Chris Mitchell's industry experience and the relevance of this work to advertising/marketing, this project will generate knowledge relevant to, and possible future collaborations with, Australian industries.

DP0557657 Dr AJ Moorhouse; Prof PH Barry

**Title:** Investigating the mechanisms of flavonoid actions on glycine receptors

**2005 :** \$110,000

**2006 :** \$95,000

**2007 :** \$95,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

The research to be conducted in this project will use state-of-the-art electrophysiological and molecular biological approaches to carefully characterise the actions of certain flavonoid compounds on the glycine-receptor channel. These compounds have recently been reported to act as modulators of ligand-gated ion channels, proteins integral to brain function and disease. However, no-one has studied in any detail the mechanisms by which these compounds act. By discovering their site and mechanisms of action we will further our understanding of these important proteins and their modulation, maintain Australia's significant expertise in this field and provide leads for future development of drugs with potential therapeutic value.

DP0557728 Dr ML Moulds

**Title:** Rumination and Memory Functioning in Depression

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The University of New South Wales

**Summary:**

By investigating and identifying the cognitive processes underlying symptom maintenance, this research will advance cognitive conceptualisations of depression. The findings will result in the generation and empirical evaluation of psychological treatment procedures for depression by taking a strong science-practitioner approach, ultimately enhancing: (i) the efficacy and cost effectiveness of psychological treatments for depressive disorders, and (ii) the provision of mental health services to the Australian community. In applying rigorous experimental methodologies to answer theoretically driven questions about depression maintenance, these studies represent the interface of empirically sound and clinically-oriented experimental research.

**DP0556484** A/Prof BA Neilan; Dr F Pomati

**Title:** Sodium homeostasis and the molecular basis for neurotoxin production by bacteria and algae

**2005 :** \$200,000

**2006 :** \$190,000

**2007 :** \$190,000

**2008 :** \$190,000

**2009 :** \$190,000

**Category:** 2703 - MICROBIOLOGY

APF A/Prof BA Neilan

**Administering Institution:** The University of New South Wales

**Summary:**

An understanding of the physiology of saxitoxin-producing microorganisms in response to salt stress is critical for the prevention of toxic blooms and for risk assessment of contaminated water bodies. This is nowhere more relevant than in the depleted and increasingly saline water resources of inland Australia. This project will develop genetic tests to assay for saxitoxin-producers and to monitor toxin production in response to the environment, representing an easier, more economic and ethical alternative to current tests. The market for this type of predictive test includes environmental, anti-bioterrorism and fishery organisations. These genes will also allow the bioengineering of novel therapeutic drugs based on neuroactive alkaloids.

**DP0558181** Dr BR Newell

**Title:** Predicting the future: testing a unitary account of judgment under uncertainty.

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

The research uses innovative techniques to examine how people use multiple sources of information to make judgments in situations when the outcomes are uncertain. This basic ability is a key feature of many aspects of our lives, thus understanding the fundamental mechanisms involved has considerable potential to improve judgment and decision-making skills across a range of environments. These include, economic forecasting, predicting consumer behaviour, understanding and rectifying gambling behaviour, and improving educational training. In addition, the research will be published in international journals enhancing the reputation of Australian science, and conduct of the project will provide valuable research training for students.

**DP0558678** Dr GD Otto

**Title:** Speculative Bubbles in Property Markets

**2005 :** \$50,000

**2006 :** \$50,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The University of New South Wales

**Summary:**

It is anticipated that the test for speculative bubbles outlined in this research proposal will make significant progress towards establishing the existence (or non-existence) of property market bubbles. While the proposed application is to the Sydney market, the method will be applicable to property markets in other cities and regions, both in Australia and internationally. An improved test for speculative bubbles will provide a better understanding of the nature of bubbles and will benefit policy-makers by providing a more solid basis for policy development. The research will also produce hedonic pricing models that can be used to understand the determinants of property prices and rents in Australian cities.

**DP0559845** Dr DJ Oxley; A/Prof DG Meredith

**Title:** HEIGHT, WEIGHT and LENGTH: Biometric explorations of Australia's socio-economic fabric in the long run, 1860-1970

**2005 :** \$70,000

**2006 :** \$80,000

**2007 :** \$85,000

**Category:** 3705 - DEMOGRAPHY

**Administering Institution:** The University of New South Wales

**Summary:**

HEIGHT, WEIGHT and LENGTH is a biometric analysis of Australian living standards. This project is significant because it illuminates the very fabric of Australian social and economic organisation. It traces what happened to living standards over the long run 1860-1970, covering booms, busts and wars. It examines the functioning of the family as an economic unit at the core of distributing welfare-enhancing resources. It identifies who were the winners and the losers. It teaches lessons about vulnerability and strength during economic change that should inform future policy makers. Finally, it pushes the methodology in new directions with implications for its use around the world.

**DP0559880** A/Prof S Parameswaran

**Title:** Automatic Co-Processor Synthesis for Application Specific Instruction Set Processors

**2005 :** \$91,000

**2006 :** \$86,000

**2007 :** \$86,000

**Category:** 2916 - COMPUTER HARDWARE

**Administering Institution:** The University of New South Wales

**Summary:**

Embedded system processors comprise of about eighty percent of the processor market. This project targets this particular segment, customising processors for a particular embedded application, resulting in superior performance, low power and reduced cost. Direct benefits will include clear understanding of architectures and algorithms, research training, better processors for the embedded market, and quality publications. Indirect benefits will be commercialisation and licensing of this technology for use in the processor design industry.

**DP0559877** Prof IR Petersen

**Title:** **Uncertain Systems Theory applied to Nonlinear Robust Control and Filtering**

**2005 :** \$202,000

**2006 :** \$142,000

**2007 :** \$141,000

**2008 :** \$160,000

**2009 :** \$160,000

**Category:** 2301 - MATHEMATICS

APF Prof IR Petersen

**Administering Institution:** The University of New South Wales

**Summary:**

Feedback control systems are becoming increasingly important in manufacturing industry, the automotive industry, defence applications as well as in many non-industrial applications such as the management of the environment or the economy. By developing new techniques for the design of high performance robust nonlinear controllers and filters which are widely applicable in industrial applications, this project will help make existing industrial technologies more efficient and make new industrial technologies feasible. Moreover, the research training carried out in the project will add to available a pool of experts in the areas of robust nonlinear control and filtering.

**DP0558634** Dr Y Pi; Prof F Tin-Loi

**Title:** **Elasto-plastic distortional analysis and strength of structures doubly-curved in space**

**2005 :** \$90,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

The novel and effective finite element model developed will lead to increased economy and safety in the design of curved structures. With the efficiency of the national structural steel industry nearing a crisis, techniques developed will contribute to maintaining a competitive edge of the national steel industry. This project will provide recommendations on rules of design of structural curved members for the current national design standards. Australian structural engineers will be more competitive in the Australian and international consulting markets by using these recommendations. The project will keep Australian research at the forefront of the discipline and maintaining its internationally recognised reputation in this area.

**DP0558561** Dr LA Poole-Warren; A/Prof RA Simmons; Dr EB Hume

**Title:** **Functional drug-releasing polymer nano-composites for preventing medical device infection and encrustation**

**2005 :** \$80,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

By developing new methodologies for producing functional biomaterials, this research will benefit Australia by continuing our high profile in this research field and by producing economic benefits arising from development and export of materials technologies to the major user groups in USA and Europe. With our demonstrated linkages with Australian based biomaterials developers at CSIRO and University of Queensland, as well as with companies involved in the commercialisation of polyurethane based medical devices (Aortech P/L), this group is well placed to continue the research at a more applied level once the early basic stage is complete.

**DP0556372** Dr A Poore

**Title:** **Factors controlling marine food webs: consumer vs. nutrient limitation of mobile invertebrates and algae**

**2005 :** \$78,000

**2006 :** \$71,000

**2007 :** \$65,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of New South Wales

**Summary:**

An understanding of the strength of interactions in marine food webs is crucial to predicting change in coastal habitats due to human activities. The outcomes of this research will indicate the relative importance of changes in nutrient inputs from terrestrial runoff (eutrophication) and predation pressures (via overfishing) - both of which may strongly affect the structure of marine habitats - on an extremely abundant and diverse component of coastal marine habitats.

**DP0556685** Prof L Qi

**Title:** **Constrained and Stable Solutions of Nonlinear and Semismooth Equations**

**2005 :** \$101,000

**2006 :** \$86,000

**2007 :** \$90,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

In this project, comprehensive models for designing safe power system parameters will be proposed, efficient algorithms for solving these models will be constructed. The new models and algorithms in this project will provide efficient tools to prevent catastrophic events in power systems, which is related with national security. This project will also strengthen collaboration of Australian applied mathematicians with international researchers and engineering scientists. This is important for the advance of science and technology in Australia.

**DP0556848** Prof C Rizos; Dr AG Dempster; Dr IG Petrovski; Mr KJ Parkinson

**Title:** **Designing Next Generation GNSS Receivers Using the Software Approach**

**2005 :** \$91,000

**2006 :** \$81,000

**2007 :** \$86,000

**Category:** 2999 - OTHER ENGINEERING AND TECHNOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

GNSS products & services are continually being developed to make Australian farmers & miners more productive, road transport & air & marine navigation safer, & geospatial data capture more efficient. The value of GNSS products & services will grow rapidly, and may be over a billion dollars pa in Australia by the end of the decade. In addition, the impact on society of ubiquitous positioning made possible using GNSS will be profound. GNSS devices will be embedded within mobilephones, consumer items, clothing & other personal effects. An enhancement of Australia's R&D capabilities as proposed in this project will allow new GNSS receiver designs to be quickly developed & tested that take advantage of the next generation GNSS signals.

**DP0559060** Prof V Sahajwalla

**Title:** **Recycling of Waste Plastics in Electric Furnace Steelmaking: Kinetics of Carbon Dissolution into Steel**

**2005 :** \$85,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2913 - METALLURGY

**Administering Institution:** The University of New South Wales

**Summary:**

Waste plastics form an ever-increasing component of industrial and municipal solid waste and there are serious environmental hazards associated with current methods of plastic waste disposal. This project will produce an in-depth understanding on the critical aspects of recycling waste plastics in steelmaking processes as a carbon and energy resource. Potentially huge quantities of plastic waste can be utilised in the steelmaking industry in a way which will be clean, economic and environmentally friendly. The possibility of recycling infusible and insoluble thermoset plastics will also be investigated.

**DP0556626** Dr WK Schief; Prof C Rogers

**Title:** **On the Geometry of Liquid Crystals and Biological Membranes**

**2005 :** \$121,000

**2006 :** \$91,000

**2007 :** \$91,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

This project will provide fundamental insights via realistic mathematical models into two areas of technological importance in the development of certain advanced materials involving liquid crystals and biomembranes. The use of liquid crystal devices is ubiquitous in the design of optical display units. Biomembranes are of much current importance, in particular, in connection with sophisticated drug delivery systems. The design of advanced 'smart' materials which admit solitonic behaviour is an area at the forefront of materials science and as such is important to the continued development of an advanced technological base within Australia.

**DP0560162** A/Prof Y Shao; Prof LM Leslie; Prof J Le Marshall

**Title:** **Predicting soil loss from wind erosion, using an integrated, high resolution, land surface data assimilation-modelling system**

**2005 :** \$85,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** The University of New South Wales

**Summary:**

Australia is an ancient, dry, continent. Soil losses from wind erosion are practically irreversible. Prevention of wind erosion, especially in agricultural areas, is a major challenge to agricultural communities and land management organisations. For continental and regional scale assessment of wind erosion potential, the high-resolution integrated wind erosion modelling system developed here is a powerful tool. The system will identify areas prone to soil erosion and provide a solid scientific basis for strategic and practical measures for wind erosion prevention. The proposal allows the CIs to continue to play a leading international role in this National Research Priority area.

**DP0559363** A/Prof WB Sherwin; Prof RA Nichols

**Title:** Testing indicators of genetic exchange and adaptation of populations, essential for biodiversity assessment and management

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of New South Wales

**Summary:**

There will be diverse benefits from our testing and improvement of genetic indicators for exchange between populations and adaptive differentiation of populations. Managers and population biologists will have confidence in choice and use of these vital tools in sustainable use of our terrestrial and aquatic bioresources, as recommended by the federal State of Environment system. Also, the use of these tools to identify differential genetic adaptations is the first step in bioprospecting, as well as revealing the raw material for natural and artificial populations to adapt to changes: soil loss, salinity, acidity, climate change. Forensic genetics will benefit from the improved tools for defining subpopulations.

**DP0559177** Dr HS Sidhu; Dr MI Nelson

**Title:** Efficient Operation of Bioreactors using Nonlinear Dynamical Systems Theory

**2005 :** \$32,166

**2006 :** \$32,166

**2007 :** \$32,166

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

Current methods of determining optimal operating conditions in bioreactors have recently been shown to be inefficient, resulting in serious omissions of crucial parameter regions. We will use mathematical techniques from dynamical systems theory to establish a general framework by which bioreactor systems can be efficiently and systematically investigated to improve reactor performance. By communicating these results at relevant fora, we will increase the awareness within the Australian and international engineering communities of the advantages of modern mathematical techniques. Although this proposal focuses on bioreactors, the techniques can be easily adapted to improve the performances of other chemical processes.

**DP0558640** Prof R Simnett

**Title:** Do Converged International Auditing Standards Result in Converged International Auditor Behaviour?

**2005 :** \$65,000

**2006 :** \$40,000

**Category:** 3501 - ACCOUNTING, AUDITING AND ACCOUNTABILITY

**Administering Institution:** The University of New South Wales

**Summary:**

This research has both national and international benefits. International convergence of standards is beneficial as it reduces costs incurred in understanding and evaluating variations in national auditing standards. However, if auditor behaviour does not converge under converged standards, such benefits are reduced, and costs and information risk are increased. Australia has a policy of international convergence by 2005, and it is important that Australian representatives have input into the standard-setting process, and policy and research supporting these standards. Simnett, being the academic on the international standard-setting body, is in a unique position to directly provide this input, and improve the quality of these standards.

**DP0559850** A/Prof A Sowmya; A/Prof A Nymeyer; A/Prof S Parameswaran; Prof S Ramesh

**Title:** Provably Correct on-chip Communication-based Design

**2005 :** \$71,000

**2006 :** \$66,000

**2007 :** \$66,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** The University of New South Wales

**Summary:**

This project falls in the priority area of Frontier Technologies for Building and Transforming Australian Industries. Embedded systems have complex communication architectures and functionalities due to their mission- and time-critical applications. This project will develop verifiable algorithms and techniques for design reuse to address them, help solve outstanding problems in the VLSI/SoC community and to lift the country's visibility and credibility in the area. The economic benefits are better techniques for design reuse for embedded systems that may be integrated into existing Computer Aided Design environments, with potential to commercialise the algorithms to Electronic Design Automation and vendors.

DP0557973 Prof JW Storey; Dr JS Lawrence

**Title:** Will Antarctic telescopes detect the first new habitable planets?

2005 : \$170,000

2006 : \$150,000

2007 : \$145,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The University of New South Wales

**Summary:**

Within the next fifteen years the first habitable-zone planets will almost certainly have been detected around other stars. If, as we believe, Antarctic observatories play a leading role in this emerging field, Australia's astronomers will be exceptionally well placed to lead and to partner major international programs. This will bring Australian industry increased access to cutting edge technology, and create business opportunities in the infrastructure and support of Antarctic research. This project aims to ensure that the lead Australia currently holds in Antarctic astronomy is maintained, allowing us to fully capture the benefits of future international investment.

DP0558029 Dr RM STUETZ; Prof NJ Ashbolt

**Title:** Removal of Potential Impact of Pharmaceutical Active Compounds during Wastewater Treatment

2005 : \$190,000

2006 : \$150,000

2007 : \$155,000

**Category:** 2911 - ENVIRONMENTAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

The increasing application of antimicrobial compounds in pharmaceutical and personal care products (PPCPs) requires improved understanding of their impact on the environment. Wastewater treatment plants (WWTPs) are a major removal process, however little is known about why certain PPCPs are removed during wastewater treatment and other are not. The project aims to study the fate of PPCPs and the spread of bacterial resistance in wastewater treatment. Studies will compare the effects of different treatment processes, operational conditions and environmental factors on the removal and treatment of PPCPs. The outcome will be the development of more sustainable WWTPs design and operation in terms of PPCPs removal.

DP0558712 Dr J Suchard; Prof IG Sharpe

**Title:** An analysis of capital raising by Australian listed firms : The factors that drive the choice of type of security and issue method

2005 : \$50,000

2006 : \$47,000

2007 : \$37,585

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** The University of New South Wales

**Summary:**

Firstly, this study will guide the setting of stock exchange listing rules and tax legislation by providing an analysis of how changes in listing rules and the tax treatment of debt and equity issues affect firms' choice of security and distribution method. Second, the focus on capital raising in international markets will assist corporate treasurers in determining the location of their financing and has implications for macro economic policy through the influence on capital flows and the balance of payments. Third, the integrated model of financing decisions will assist firms, their advisors and capital providers in financing and investment activities.

DP0559320 Prof OP Sushkov

**Title:** Novel approaches to studies of violations of fundamental symmetries of nature

2005 : \$85,000

2006 : \$80,000

2007 : \$80,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of New South Wales

**Summary:**

This project will contribute to research at the leading edge of fundamental physics. This is an international project that incorporates intensive collaboration with US experimental groups which will base their work on our calculations. Ultimately these studies will shed light on the origin of matter-antimatter asymmetry in the Universe.

DP0559317 A/Prof IM Suthers; Dr ME Baird; Mr RL Stephenson; A/Prof CT Taggart

**Title:** Prediction of fishery year-class-strengths from larval growth and zooplankton size structure

2005 : \$90,000

2006 : \$75,000

2007 : \$75,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of New South Wales

**Summary:**

The abundance of young fish produced in the ocean each year is highly variable, and banks or managers need to prepare for these future changes when the fish reach market size. Therefore many nations conduct special trawl surveys of juvenile fish each year, but these are expensive, particularly when Australia has over 200 commercially harvested fish. We propose that the growth of fish larvae, recorded as daily growth rings within the earstone of undersized fish from the fishery, could predict future abundance. We will link growth to a cost-effective assessment of their zooplankton prey in spawning areas that lead to Australia's South East Trawl region.

**DP0556732** Dr M Tanaka; Dr AR Francis

**Title:** Evolutionary models and bioinformatic analyses of genetic variation in pathogens

**2005 :** \$90,000

**2006 :** \$85,000

**2007 :** \$90,000

**Category:** 2399 - OTHER MATHEMATICAL SCIENCES

**Administering Institution:** The University of New South Wales

**Summary:**

The benefits of this project are better preparedness for the ever-present threat of infectious disease spread and the stimulation of bioinformatic research in Australia. Epidemics such as the Influenza Pandemic of 1918, which killed over 20 million people, highlight the need to understand and track pathogens that can potentially cause such devastation. Along with the development of molecular technologies, it is important to maintain active creation of analytical methods that appropriately apply to growing databases. These include methods to understand genetic variation in pathogens. This project will help to keep Australia at the forefront of research in theoretical biology.

**DP0558136** Prof I Tyrrell

**Title:** American Imperialism and Cultural Expansion

**2005 :** \$85,000

**2006 :** \$60,000

**2007 :** \$80,000

**2008 :** \$35,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of New South Wales

**Summary:**

The project will study the cultural expansion contributing to an informal American 'empire.' Given heightened U.S. power and the most dramatic foreign intervention since the 1960s, understanding the development of this great power are clear. The underlying nature of its modes of foreign influence require analysis, not day to day perspectives on the latest crisis alone. Australia's close relationship with the US depends on this broader global context of American 'empire' and the study of Australian-American contacts must be deeply rooted and broadly conceived. This study will contribute to the process of uncovering these long-term patterns of global American power; and provide a new Australian perspective on US history.

**DP0557386** Em/Prof S Valliappan

**Title:** Unified approach for the stability analysis of large concrete dams due to ageing degradation

**2005 :** \$75,000

**2006 :** \$73,000

**2007 :** \$75,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of New South Wales

**Summary:**

The expected outcome of this research is the availability of an innovative methodology for the safety assessment of aged concrete dams. Most of the concrete dams built in Australia and elsewhere have been in service for over 50 years. Degradation effects on aged concrete dams, and resistant ability of such aged concrete dams against hostile natural events, such as earthquakes, are of great concern for engineers. The safety assessment of aged concrete dams can be done rationally by the proposed method which will provide a better knowledge of the ageing effects on concrete dams. The approach will provide a tool for rational decision-making as to the structural rehabilitation of large concrete dams affected by ageing degradation.

**DP0558710** Prof TD Waite; A/Prof BA Neilan; Dr MJ Furnas; Dr MA Burford; Mr AL Rose

**Title:** Mechanisms of Iron Acquisition by the Cyanobacterium Trichodesmium in Coastal Waters

**2005 :** \$142,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2604 - OCEANOGRAPHY

APD Mr AL Rose

**Administering Institution:** The University of New South Wales

**Summary:**

The toxic cyanobacterium Trichodesmium is the most conspicuous phytoplankter in Great Barrier Reef waters which, as a nitrogen fixer, produces and biologically packages "new" nitrogen into forms potentially available to other marine organisms and, as such, is likely to be a key driver of food web dynamics on the GBR. In this study, we will clarify the mechanism by which the critical nutrient iron is acquired by this organism and, in so doing, assess the role that terrestrial activities play in iron supply.

DP0556309 Dr LP Wakelin

**Title:** Synthetic Endonucleases: Novel DNA Cleaving Agents for Cancer Chemotherapy

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$90,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The University of New South Wales

**Summary:**

Cancer is a common disease in our society, with more than 1 in 4 of us dying from it. The current survival rate is 50%, and has been so for the past 5 decades. Thus, there is clearly an urgent need for better forms of therapy. Chemotherapy is the mainstay of treatment once the disease has spread from its original site. The National Benefits from the development of a new class of effective cancer drug are two-fold. Firstly, much relief will come to people suffering from cancer, as some will live longer, and some will be cured. Secondly, the economic benefits are extensive, since the world market in cancer drugs is measured in billions \$US, and significant monies will flow to those who hold the intellectual property rights.

DP0556518 Prof M Wand; Dr I Koch

**Title:** Statistical Methods for Flow Cytometric Data

**2005 :** \$132,000

**2006 :** \$84,000

**2007 :** \$85,000

**Category:** 2302 - STATISTICS

**Administering Institution:** The University of New South Wales

**Summary:**

The project will aid users of flow cytometry throughout Australia. It will help foster collaborations between the biological and mathematical scientists. Biological research is an important part of Australia's future and is becoming very quantitative. During the course of the project, two PhD students will be provided strong training in Statistics geared towards biological applications. The project is aligned with the 8th Human Leucocyte Differentiation Antigen workshop to culminate in Adelaide in December 2004 and will aid the fight against blood cell cancers. The project will also aid research on plankton with potential commercial benefits for Australia's marine scallop industry.

DP0559689 Prof F Westbrook

**Title:** The neural substrates of attentional learning in Pavlovian conditioning

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$72,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

Current psychological theories use error correction mechanisms to explain the development of normal fear, exaggerated fear and the failure to develop fear. One class of theory proposes that these mechanisms produce such outcomes by determining the allocation of attention. Mechanisms for attentional learning have yet to be incorporated into neurobiological treatments of learned fear. This project will identify the neurobiological substrate of attentional learning and thus further our understanding of the neurobiology of fear. This understanding is necessary for the development of more effective treatments of disorders of fear (e.g., Post Traumatic Stress Disorder).

DP0557863 A/Prof JM Whitelock; Dr LA Poole-Warren; Dr PJ Martens

**Title:** Heparan sulfate complexes with VEGF for control of angiogenesis in tissue engineered constructs.

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of New South Wales

**Summary:**

The national/community benefits that will arise from this work include, the generation of knowledge related to the growth of blood vessels in the presence of a synthetic polymer that has been made to look like the natural polymers present in the body. This will lead to an understanding of the underlying mechanisms involved that may have down stream effects relevant to the replacement of many types of tissues being generated for clinical applications, including possible applications in the treatment of heart disease, the largest killer of people in the Western world.

DP0556465 Prof GJ Williams

**Title:** Terrorism and Public Law after September 11

**2005 :** \$90,000

**2006 :** \$90,000

**2007 :** \$90,000

**2008 :** \$70,000

**2009 :** \$70,000

**Category:** 3901 - LAW

**Administering Institution:** The University of New South Wales

**Summary:**

The threat posed by terrorism is multifaceted. It can directly or indirectly affect the lives of almost every citizen, whether through a relationship with a person affected by terrorism, such as the Bali bombing, or even through increased airport security. The law lies at the forefront of responses to terrorism in the wake of September 11. New laws are important to protect the community from violent harm, but must also ensure that the democratic values that governments seek to protect are not undermined. This project, in providing sustained research and legal analysis in this area, offers significant security, personal, economic and social benefits to Australia as well as to other nations affected by the threat of terrorism.

**DP0559532** A/Prof AM Williamson

**Title:** Time of day, time awake and alcohol: the effects on fatigue and performance

**2005 :** \$115,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The University of New South Wales

**Summary:**

The results of this study will clarify the effects of sleep deprivation and time of day on the experiences of fatigue and on performance. This information will have a direct impact on policy and practice relating to the management of fatigue. The results will have a direct impact on community safety, especially on the road and in the workplace. The study therefore has direct relevance for guidelines and regulations developed by bodies such as national and state road safety and workplace health and safety bodies.

**DP0559730** Dr C Wu

**Title:** Investigation of Delay Propagation in Airline Schedules and the Impact on Network Reliability

**2005 :** \$28,016

**2006 :** \$30,366

**2007 :** \$30,366

**Category:** 3504 - TRANSPORTATION

**Administering Institution:** The University of New South Wales

**Summary:**

This project will investigate the phenomenon of delay propagation in airline schedules and potential ways to mitigate the impact on network reliability. This project will improve our understanding of the complex behaviour of airline schedule systems in dealing with delay propagation and significantly enhance airlines' ability of controlling schedule delays. Australian airlines and passengers will benefit from this project by improving schedule reliability, reducing schedule delays and delay costs, which are estimated at a hundred million dollars per year. This saving will also benefit passengers through lower fares. Developed scheduling methodologies are applicable to all other airlines.

**DP0557970** Prof AB Yu

**Title:** Granular dynamics: theories, modelling and simulation

**2005 :** \$250,000

**2006 :** \$222,000

**2007 :** \$250,000

**2008 :** \$240,000

**2009 :** \$240,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

APF Prof AB Yu

**Administering Institution:** The University of New South Wales

**Summary:**

Particle science and technology is a rapidly developing interdisciplinary research field and is of paramount importance Australia in view of the heavy dependence on raw materials processing. This project will tackle the core problems in this field by developing novel theories and mathematical models to describe the flow of particles. Application of the research outcomes can lead to better process or product control, a decrease in energy consumption and an improvement in productivity, which, together with the research training offered through the conduct of the work, is very helpful to maintaining Australia's leading position in resource, energy, process and allied industries.

**DP0559872** Dr Y Zhao; Dr C Cheng; Dr M Murakami

**Title:** Improvement of Critical Current Density of High Temperature Superconductors by Reforming Microstructure at Nanoscale

**2005 :** \$145,677

**2006 :** \$140,000

**2007 :** \$145,677

**2008 :** \$145,677

**2009 :** \$145,677

**Category:** 2914 - MATERIALS ENGINEERING

APF Dr Y Zhao

**Administering Institution:** The University of New South Wales

**Summary:**

Strengthening Australia's capability and leading position in this frontier technology;  
Providing human resources for the superconductivity technology industries in Australia;  
Transferring new technology gained from this research to the superconductivity technology industries in Australia;  
Generating patents to enrich Australian intellectual property base;  
Strengthening the collaborations between Australia and other countries, such as Japan where research is also at the forefront in this field; Providing training for Australian research students and engineers.

**DP0556403** Dr H Zreiqat; Prof MV Swain; Dr DR Haynes; Dr G Anderson

**Title:** Improving orthopaedic/dental devices by surface chemical modification

**2005 :** \$210,000

**2006 :** \$180,000

**2007 :** \$165,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of New South Wales

**Summary:**

The estimated world market for the orthopaedic implants is expected to be US\$125 billion by 2010. Australia imports most of its orthopaedic implants with an estimated cost in excess of AUD300 million by 2010. The current rate of prosthetic failures in orthopaedic patients is unacceptably high. The project aims to develop new implants that integrate better into bone, thus reducing the rate of revision arthroplasty. This would lead to a significant reduction in the cost of health care in our aging population and improve the quality of life for prosthetic recipients. Knowledge gained will facilitate the optimization of orthopaedic and implant dentistry, promoting the technology transfer from academia to the relevant medical device industry.

## The University of Newcastle

**DP0557648** Dr A Agrawal

**Title:** Lattice Boltzmann method based simulation of complex microchannels and mixing at micro-scales

**2005 :** \$78,000

**2006 :** \$67,494

**2007 :** \$69,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

APD Dr A Agrawal

**Administering Institution:** The University of Newcastle

**Summary:**

The proposed study explores fundamental aspects of microfluidics using new tools, which will enhance the country's database of knowledge. It will lead to the development of a low-cost versatile software package, an important tool for solving microfluidics problems of interest to industries and academics, and will facilitate development and optimization of future microdevices. Further, it will improve Australia's competitiveness in the areas of LBM and MEMS both of which are new techniques with promising applications in their respective areas. The project falls under the National Research Priorities areas of Breakthrough Science and Frontier Technology. The potential applications of the technology encompass several key areas.

**DP0559931** Prof LK Ashman; Dr M Wright

**Title:** CD151 and functional overlap in tetraspanins

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Newcastle

**Summary:**

The applicants are currently world leaders in the tetraspanin field. This project will enhance existing international collaborations to maintain and increase the applicants', and hence Australia's, international standing in this field and Australia's reputation in cell and molecular biology in general. The project will greatly increase our understanding of this important but poorly understood family of proteins. It will also provide training opportunities for postgraduate students in state-of-the-art approaches in biotechnology.

**DP0555893** Prof IV Belova

**Title:** A Theory to Predict and Control Porosity Occurring During Diffusion-Bonding

**2005 :** \$160,000

**2006 :** \$135,000

**2007 :** \$140,000

**Category:** 2913 - METALLURGY

**Administering Institution:** The University of Newcastle

**Summary:**

This Project will guide the design of strategies that will substantially improve the diffusion-bonding process and broaden the range of materials possible for bonding. Many Australian industries, from manufacturers of computer chip connectors to aircraft engines, could benefit significantly from the results of this research. By means of the training of computational and theoretical materials scientists/engineers, this Project will also make a substantial contribution to building Australia's research capacity in this internationally recognized growth area.

**DP0557907** Asst Prof HM Carey

**Title:** Religion and Imperialism in Australia from Colony to Nation

**2005 :** \$35,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Newcastle

**Summary:**

In international contexts, imperialism and religion have been recognised as two of the most powerful forces for social cohesion, identity, transformation and conflict. The preliminary work undertaken for this project indicates that Australia has not been immune from these significant historical forces. This project will be of national benefit in providing insight into the historical pattern of imperialism on the formation of religious and cultural values. By contributing to the education of the scholarly and general public on religious issues, this project seeks to contribute to the quality of public debate and policy analysis in this key emerging field of national and international significance.

**DP0559256** A/Prof WJ Collins

**Title:** A test for Pangean breakup models

**2005 :** \$130,000

**2006 :** \$127,000

**2007 :** \$127,000

**2008 :** \$114,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Newcastle

**Summary:**

This project addresses a core issue of planetary-geology, with project outcomes providing an unparalleled synthesis of global-scale Earth processes that highlight hitherto unsuspected links between peripheral orogenic systems and Pangean breakup. The project directly addresses the key problem 'How do the continents work?', outlined by the National Committee of Earth Sciences. It links internationally to [ERAS], a multi-national proposal to investigate accretionary orogens through geologic time, and nationally via the seed-funded ARC Network (AEON) to ACcess, RSES (ANU) and with a National Key Centre, (GEMOC), with whom the University of Newcastle is a research partner. 2PhD projects are involved.

**DP0558051** Prof LH Connor; Dr GA Albrecht; A/Prof NH Higginbotham

**Title:** Open Cuts to Land and Culture: Rural Community Engagement with Large-Scale Industrial Development.

**2005 :** \$52,000

**2006 :** \$40,000

**2007 :** \$30,000

**Category:** 3703 - ANTHROPOLOGY

**Administering Institution:** The University of Newcastle

**Summary:**

The effects of coal mining and combustion on local communities have not been adequately researched even though export-oriented coal production is a key element of Australia's economy in the 21st century. Increasing numbers of rural Australian communities are affected by profound changes to climate, environment and social life associated with open-cut mining and coal-fired power stations. This research examines the impact of these developments in the Hunter Valley of NSW, from the point of view of local communities. The understandings we gain will offer government, corporate and community stakeholders the prospect of mutually beneficial outcomes in dealing with these impacts.

**DP0559417** Dr PC Dastoor; Prof RN Warrener

**Title:** Organic Field Effect Transistors for Biosensor Applications

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$100,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Newcastle

**Summary:**

The development of future Australian industries based on polymer electronics is tangible. The prohibitive establishment costs mean that there is effectively no Australian conventional semiconductor manufacturing industry. However, polymer electronic devices are simple to manufacture with low fabrication costs. As such, the commercial barriers to the development of an Australian soft electronics industry are much lower. Internationally, soft electronics is developing apace and securing a soft electronics industry in Australia requires the urgent development of an Australian skill base in fabricating soft electronic devices. This project offers the opportunity of establishing a significant capability in soft electronic device fabrication.

**DP0559514** Dr PC Dastoor; A/Prof J O'Connor; Dr W Allison; Dr TC Noakes

**Title:** Helium Atom Detection in Scanning Helium Microscopy

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Newcastle

**Summary:**

The development of an imaging helium atom detector based on carbon nanotubes would be world-first achievement and would place Australia at the forefront of technology in this field. The concurrent goal of understanding the contrast mechanisms that occur in helium atom scattering is also fundamental to the development of the scanning helium microscope. This project secures Australia's position at the forefront of atom microscopy by strategically targeting the cutting-edge science critical for this emerging technology. A significant side-benefit of a nanotube based detector is that it could be incorporated into battery-operated portable gas sensors for use in environmental, industrial and even counter-terrorism applications.

**DP0560017** A/Prof BZ Dlugogorski; A/Prof EM Kennedy; A/Prof JC Mackie; Prof MA Delichatsios

**Title:** Formation of organic pollutants in fires of treated and contaminated wood

**2005 :** \$205,000

**2006 :** \$195,000

**2007 :** \$200,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Newcastle

**Summary:**

This project quantifies the emission of dioxins and biphenyls in burning of treated and contaminated wood to provide data on whether combustion of such materials should be regulated in Australia and whether an educational campaign needs to be mounted to make public aware of this problem. For example, our preliminary results indicate that, timber treated with copper boron azole, a non-arsenic replacement for CCA preservative, produces extremely high levels of dioxins, both in flames and in the ash. If the preliminary results are confirmed, this agent must be disallowed as a wood preservative in Australia, as it poses unacceptable risks to the Australian population and environment.

**DP0556725** Dr EC Eklund

**Title:** Frontiers of Labour: Identity and Belonging in Australian Mining and Industrial Towns, 1850-2000

**2005 :** \$35,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Newcastle

**Summary:**

This study of mining and industrial towns will be an important intellectual and cultural contribution to understanding the significance and diversity of regional Australia. The research will provide historical information on eleven case studies as well connect those case studies to patterns of national history. The research will highlight the history of places that are often overlooked or disparaged in the eyes of outsiders.

The outcomes will provide rich material for other researchers and policy makers to study the historical conditions which generated long-term sustainable prosperity and town development in the often isolated and vulnerable localities that are the subject of this research.

**DP0559774** Prof GM Evans; Dr P Schwarz

**Title:** Drag Force on Bubbles and Particles in Turbulent Flows

**2005 :** \$100,000

**2006 :** \$98,000

**2007 :** \$90,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of Newcastle

**Summary:**

Australian exports are dominated by the minerals, metallurgical and chemicals industries, with minerals exports worth at least \$40 billion annually. Many of the production processes are underpinned by the complex interaction between particles, bubbles and liquids. It is important that we understand the complex interactions taking place. This will enable us to improve existing operations and also to design completely new technologies, especially in the emerging fields of nano and biotechnology. This project is important because it adds to our knowledge in the national priority area of Transforming Australian Industries, and its success will ensure that our industries remain at the forefront of innovation and are globally competitive.

**DP0559943** Dr SG Fityus

**Title:** Theoretically derived calibration of the neutron moisture meter.

**2005 :** \$130,000

**2006 :** \$78,000

**2007 :** \$70,000

**Category:** 3001 - SOIL AND WATER SCIENCES

**Administering Institution:** The University of Newcastle

**Summary:**

The moisture content of soils is of key importance in a wide range of situations including agriculture, engineering and land and water management. The measurement of soil moisture contents in the field is problematic, and even commonly used methods like the neutron probe give results of limited accuracy. This research will enable calibration curves for the neutron probe to be determined theoretically, thereby improving the accuracy of moisture content measurements and enhancing its usefulness to industry and research.

**DP0559210** Prof PS Foster; Prof KW Beagley; Dr PM Hansbro

**Title:** CD4 T cell programming by neonatal and early-life infection

**2005 :** \$90,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 3202 - IMMUNOLOGY

**Administering Institution:** The University of Newcastle

**Summary:**

T lymphocytes (T cells) are white blood cells that play a critical role in protecting the body from infection. Before T cells can function they need to be programmed so that they can specifically respond to an infectious agent (a type of bacteria or virus). Inappropriate programming can lead to disease. Whether T cells respond to an infectious agent or foreign substance in a protective or destructive manner may critically depend on the age that an individual first encounters the infection. Our project will identify critical periods in life that direct T cell programming to subsequent protective or destructive responses, providing new insights into the developing immune system that may be exploited to treat disease or develop vaccines.

**DP0556961** A/Prof KP Galvin

**Title:** Particle classification using a ferrofluid in a non uniform magnetic field

**2005 :** \$96,999

**2006 :** \$91,000

**2007 :** \$99,578

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of Newcastle

**Summary:**

The separation of micron size components of suspensions according to the size and density of the particles is presently an intractable problem. However, by using a magnetized ferrofluid it should be possible to generate unique particle trajectories for each combination of particle size and density. This study investigates the potential of this strategy for separating such particles, laying the foundation for new small-scale diagnostic "lab-on-a chip" technology that could be used in biotechnology to study whole blood, or in mineral processing to control energy intensive ball mills for mineral particle liberation.

**DP0558022** Dr AS Griffin

**Title:** Social learning about predators: is it just Pavlovian conditioning?

**2005 :** \$85,000

**2006 :** \$78,000

**2007 :** \$78,000

**Category:** 3801 - PSYCHOLOGY

APD Dr AS Griffin

**Administering Institution:** The University of Newcastle

**Summary:**

Australia has a strong tradition of studying the basic principles that control learning in animals and humans. In step with recent developments in animal cognitive research, Australia has begun to acquire an international reputation in cognitive ecology. By studying social learning within a controlled, but nevertheless ecological framework, the proposed research builds upon these strengths, while opening new research avenues. Findings will attract international attention and contribute to enhancing Australia's research profile and its ability to attract overseas scientists. Charismatic animal behaviour research coupled with potential implications for wildlife management will help promote science careers amongst young Australian people.

**DP0556941** Dr GR Hancock; Prof JD Kalma; Prof JJ McDonnell

**Title:** Carbon, nutrient and sediment dynamics in a semi-arid catchment

**2005 :** \$180,000

**2006 :** \$115,000

**2007 :** \$75,000

**Category:** 2605 - HYDROLOGY

**Administering Institution:** The University of Newcastle

**Summary:**

Carbon, nutrient and sediment dynamics has a large impact on stream ecology so our ability to better understand and manage disturbance in a catchment is essential if we are to better manage our resources and natural systems. The project will provide fundamental data and insight into carbon, nutrient and sediment dynamics in a semi-arid region.

**DP0556350** Dr MD Harvey; Dr M Amberber; Dr BJ Baker

**Title:** Verbs and coversbs: a cross-linguistic re-analysis of part-of-speech categories

**2005 :** \$40,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 3802 - LINGUISTICS

**Administering Institution:** The University of Newcastle

**Summary:**

This project will make a significant contribution to the maintenance of Australia's Aboriginal cultural heritage. Aboriginal people consistently identify the maintenance of traditional languages as one of their primary concerns. The project will result in detailed documentation of three endangered Australian languages. The material produced by the project will be an invaluable resource both to linguists internationally and to Aboriginal communities, to whom materials will be returned in accessible formats to support language maintenance activities. The project will maintain Australia's momentum at the forefront of digital archiving technology for language documentation.

**DP0556525** Mr R Jeffrey

**Title:** **The role of sulphate reducing bacteria in the pitting corrosion of mild steel as used for engineering infrastructure applications**

**2005 :** \$76,316

**2006 :** \$83,000

**2007 :** \$71,322

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Newcastle

**Summary:**

The present project will provide better understanding necessary for the improved assessment of infrastructure potentially suffering pitting corrosion deterioration, including hazardous material containers, tanks, pipelines, offshore platforms and ships. Mild steel has been proposed (in the UK and USA) for the design of nuclear waste containments. In some locations the saline ground-waters may cause pitting. Extremely long time horizons are involved and hence improved understanding is important.

**DP0559603** Prof MG Jones; Em/Prof AW Roberts

**Title:** **Modelling the Transient Effects in Dense Phase Gas-Solids Flow in Pipelines.**

**2005 :** \$125,000

**2006 :** \$110,000

**2007 :** \$115,000

**Category:** 2903 - MANUFACTURING ENGINEERING

**Administering Institution:** The University of Newcastle

**Summary:**

Almost every physical item we use in our daily lives at some point requires the transport and handling of powdered or granular materials during the manufacturing process. Be it food (sugar, flour), chemicals (soap powders, detergents), cosmetics (talc, face powder) or electricity generation (coal and ash); each of these industries uses the flexibility of pipeline systems to transport powders and granular solids using air as the motive force. However, the cost of poor design and the inaccurate prediction of system performance adversely affect the efficiency of many industries. Improvements to the accuracy of gas-solid flow modeling particularly for low velocity dense phase systems will have a direct impact on manufacturing efficiency.

**DP0558393** A/Prof DF Lemmings; Dr C McCreery; Dr CI Walker

**Title:** **Moral Panics and the Law in Eighteenth-Century England**

**2005 :** \$65,492

**2006 :** \$35,160

**2007 :** \$30,360

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Newcastle

**Summary:**

This project will reveal the origins of a phenomenon that is ubiquitous in modern western society. By doing so it will attract international attention from academic historians and sociologists. It will also contribute to Australia's reputation for producing high-quality intellectual products, and further enhance its standing as a leading centre for the study of Britain in the eighteenth century. Because of its contemporary relevance the study will provide a critical perspective on modern politics, especially the perception that governments legitimise their authority by helping to constitute popular anxiety about threats to moral and personal security.

**DP0559283** Dr K Mahata

**Title:** **A Bayesian framework for frequency domain identification**

**2005 :** \$41,000

**2006 :** \$29,386

**2007 :** \$29,386

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Newcastle

**Summary:**

The national and social benefits of the project will be reflected through the application recognition of the research work in the various industry and research community; and also through our international collaboration. The national and social benefits are also delivered by producing specialized researchers and engineers in systems and control engineering. These people include the research students who will participate in and learn from the proposed project.

**DP0559544** A/Prof FW Menk; Dr MA Clilverd

**Title:** **DYNAMICS OF EARTH'S RADIATION BELTS**

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** The University of Newcastle

**Summary:**

Space weather is produced by rapid variations in wave fields and particle populations in near-Earth space, and has many effects. These include damage to spacecraft (causing operational anomalies and loss of service), degrading the performance of GPS, space-ground, HF radio and cable-based networks, and affecting surveillance radars. The core aim of this project is to improve knowledge of the waves and particles causing these effects. While being important to aerospace engineers, this work also consolidates Australia's international space profile and provides excellent training in this field. Since space weather causes significant radiation exposure to aircraft crew and passengers this work also has broader ramifications.

**DP0559755** Dr PA Moscato; Prof RJ Scott; Dr R Berretta; Dr C Cotta

**Title:** Evolutionary algorithms for problems in functional genomics data analysis

**2005 :** \$76,000

**2006 :** \$71,000

**2007 :** \$71,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Newcastle

**Summary:**

Skin cancer has a high incidence in the Australian population. Schizophrenia is a psychiatric disorder that affects a significant proportion of the population worldwide. Both illnesses have genetic roots and can be triggered by environmental factors. We will uncover genetic relationship to disease and their responses to environmental conditions using computational methods and mathematical algorithms that can aid in the determination of function, especially in disease states. Understanding the complex genetic interactions that trigger these illnesses would give great benefits in preventive health care, skin cancer and schizophrenia genetic basis, and may lay the ground for building new methods for "personalized medicine".

**DP0556217** A/Prof CE Offer; Dr DW McCurdy; Mr MJ Talbot

**Title:** Plant Transfer Cells - Discovering the Mechanisms of Wall Ingrowth Formation

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2704 - BOTANY

**Administering Institution:** The University of Newcastle

**Summary:**

This project seeks fundamental molecular understanding of how specialized plant cells that are designed for optimum transport of nutrients develop. So-called "transfer cells" are important for efficient nutrient transport and distribution in many crop species of significance to agriculture. Discovering the mechanisms that coordinate development of these specialized cells will maintain Australia's international reputation in this field of research, as well as provide technological opportunities to enhance crop yields by manipulating the efficiency of nutrient distribution in crop species.

**DP0559411** A/Prof PM O'Neill; Dr PM McGuirk; A/Prof RH Bryan; Prof F Stilwell

**Title:** Understanding Sydney's changing role as a global city in the Australian urban and regional network

**2005 :** \$100,000

**2006 :** \$50,000

**Category:** 3704 - HUMAN GEOGRAPHY

**Administering Institution:** The University of Newcastle

**Summary:**

In recent decades Sydney has changed from being a capital city linked mainly to a hinterland of NSW towns and regions, to a global city with a 'blizzard' of linkages in new sectors involving cities and territories around Australia and across the globe. As yet we know little about this blizzard apart from what can be inferred from the global cities literature and from minimal evidence that is largely selective and anecdotal. This Project will produce a detailed profile of Sydney's linkages - locally, nationally and internationally. Better data and analysis on Sydney's place in the global economy is a critical issue for government and corporate planning especially in and around the Sydney basin where growth pressures are intense.

**DP0556973** A/Prof DC Rowe

**Title:** Handling the 'Battering Ram': Rupert Murdoch, News Corporation and the Global Contest for Dominance in Sports Television

**2005 :** \$41,222

**2006 :** \$40,414

**2007 :** \$54,605

**Category:** 4001 - JOURNALISM, COMMUNICATION AND MEDIA

**Administering Institution:** The University of Newcastle

**Summary:**

The flow and control of culture through the media is of profound importance to all societies. Sport is a key component of Australian culture, and access to peak sports events is recognised in 'anti-siphoning legislation' preventing exclusive capture by pay TV. There is strong pressure to de-regulate Australian TV sport, especially from Australia's largest media organisation and most successful global media 'player', NewsCorp and Rupert Murdoch. This Project's community benefit derives from its significant contribution to crucial debates about the power of nation states to control global media organisations, and by informing key considerations of cultural citizenship and media diversity.

DP0557100 Dr ST Rozario; Prof GB Samuel; Asst Prof HM Carey

**Title:** Muslims and Christians: Women, Religious Nationalism and Sustainability in the Asia Pacific Region.

**2005 :** \$64,472

**2006 :** \$30,632

**2007 :** \$30,000

**Category:** 3703 - ANTHROPOLOGY

**Administering Institution:** The University of Newcastle

**Summary:**

This project should provide agencies concerned with national security and immigration with an improved understanding of the impact of religious nationalism on communities and individuals. It should contribute to the effectiveness of Australian overseas aid initiatives, both government and voluntary, by increasing the available knowledge of how communities are sustaining themselves at present. It should, further, produce findings that make it easier for health, education and welfare agencies to deal sensitively with Muslim communities within Australia

DP0556908 Dr M Rubin; Dr S Paolini; Dr RJ Crisp

**Title:** Investigating a New Explanation of Discrimination Against Migrant and Excluded People

**2005 :** \$40,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Newcastle

**Summary:**

Migrants and socially excluded people are often the subjects of discrimination and prejudice. Our research will provide valuable knowledge about when and why people discriminate against migrant and excluded individuals as well as how this type of behaviour can be reduced. Our research will benefit Australia by contributing scientific information to the policy developments of national organizations that aim to reduce discrimination and prejudice. Hence, our research falls within the Government's broader goal of creating a more harmonious multicultural Australian society.

DP0557331 Mr SR Schofield

**Title:** Silicon-based molecular electronics

**2005 :** \$158,322

**2006 :** \$113,322

**2007 :** \$111,322

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

APD Mr SR Schofield

**Administering Institution:** The University of Newcastle

**Summary:**

A whole new class of electronic devices based on single atoms and molecules is emerging. At this scale, the device components cease to behave like ordinary matter and novel quantum effects can be exploited. The tremendous potential for both device miniaturisation and the exploitation of quantum effects afforded by single-molecule devices has already been demonstrated. However, methods for assembling single-molecules into circuits and integrating them with conventional technology remain elusive. Here, a strategy is presented for combining the functionality of organic, carbon-based components, with more conventional, silicon-based technology. The potential economic benefits for Australia of this hybrid carbon/silicon strategy are huge.

DP0557161 Dr D Sheng

**Title:** FRICTION AND CONTACT IN SOIL-STRUCTURE INTERACTION AT LARGE DEFORMATION

**2005 :** \$125,000

**2006 :** \$110,000

**2007 :** \$115,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Newcastle

**Summary:**

The proposed research addresses the fundamental mechanics of contact for a wide range of civil engineering structures such as piles, retaining walls, and soil anchors. Piles and anchors are essential parts of off-shore platforms which, in turn, are key elements of the Australian oil and gas industry. The numerical tool the project aims to develop is capable of analysing the entire process of installation and loading of a pile foundation. Such a tool does not currently exist and will result in safer and cheaper geotechnical design. The methods developed in this project can also be extended to study human joints and joint replacements.

DP0557243 Mr AD Sims

**Title:** Operator algebras associated to product systems, and higher-rank-graph algebras

**2005 :** \$74,627

**2006 :** \$71,272

**2007 :** \$74,952

**Category:** 2301 - MATHEMATICS

APD Mr AD Sims

**Administering Institution:** The University of Newcastle

**Summary:**

Operator algebras are used to study a wide range of physical systems in quantum physics and quantum computing, and in electrical engineering. The clearer our picture of how operator algebras work, the better we are able to predict and explain how these physical systems will behave. The proposed research project is aimed at showing that we can describe operator algebras in terms of simple coloured diagrams rather than abstract mathematical symbols. Consequently, the project will lead to a simpler and less technical approach to the physical problems which operator algebras are used to study.

**DP0556497** Dr DM Stevenson; A/Prof DC Rowe

**Title:** **Culture Circuits: Exploring the International Networks and Institutions Shaping Contemporary Cultural**

**2005 :** \$64,000

**2006 :** \$51,000

**2007 :** \$60,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** The University of Newcastle

**Summary:**

This comparative Project will analyse the international export and exchange of cultural policy discourses and personnel, and their local consequences. The Project will provide a sophisticated understanding of cultural policy formation and the primary relations between culture, governance and nation shaping its development and orientation in Australia. In analysing significant external influences on Australian cultural development, the Project will aid in the creation and maintenance of a distinctive national culture, so enabling the formulation of cultural policy that is attuned to specific Australian circumstances and better able to play a productive and strategic role in Australia's social and economic development.

**DP0556913** A/Prof MG Stewart

**Title:** **Risk Assessment and Mitigation of Blast Damage to Structural Systems**

**2005 :** \$80,000

**2006 :** \$63,000

**2007 :** \$65,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Newcastle

**Summary:**

The cost of providing blast-resistant protective measures to potentially hundreds or thousands of existing buildings is immense and beyond the resources of government and society. The decision-making framework proposed herein provides a means to allocate funds to those buildings shown to have high risk of damage in the event of bomb blast. This will enable existing risks to be quantified and compared in a rational and consistent manner, thus ensuring that risk mitigation is maximised given expenditure of limited resources. Public safety will be governed by the extent and effectiveness of building protective measures. Lives will be saved, likelihood and extent of injury reduced and social and economic disruption minimised.

**DP0559745** Dr GJ Suaning; Dr S Dokos

**Title:** **Large-scale Parallelization of Neural Stimulation in a Visual Prosthesis**

**2005 :** \$81,000

**2006 :** \$76,000

**2007 :** \$76,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Newcastle

**Summary:**

Over time, engineers have been able to treat a large number of disorders through new technologies. For example, the deaf can now hear again through cochlear implants. Similar efforts to provide vision to the blind, however, have met with difficulties owing to the high quantities of sites that must be stimulated to provide 'useful' vision. This study addresses the important issues relating to the delivery of large quantities of electrical stimulations to surviving nerves in the eyes of blind patients in an effort to devise a beneficial visual prosthesis or 'bionic eye'. The outcomes of this study could substantially enhance Australia's already prominent reputation in neurostimulation and provide much needed treatments to vision disorders.

**DP0557579** Dr B Trefalt

**Title:** **Post-war repatriation to Japan: citizenship, identity and integration, 1945-1956**

**2005 :** \$40,000

**2006 :** \$30,000

**2007 :** \$30,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Newcastle

**Summary:**

This research project contributes to our knowledge of the region by exploring the early post-war history (in which Australian troops participated as part of the British Commonwealth Occupation Forces) of one of Australia's most important and oldest trading partners. However, the project also has broader and more contemporary significance: on the one hand, it contributes to our knowledge of the increasingly important 20th century phenomenon of mass migration, and of the development of strict state controls over population movements across national borders. On the other hand, it explores the complex integration of minority groups into national populations; this is a process which clearly has relevance beyond Japan and beyond the 1950s.

**DP0556478** A/Prof DF van Helden; Dr RJ Callister; Dr AM Brichta

**Title:** INVESTIGATION OF A BRAIN RHYTHM

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3207 - NEUROSCIENCES

**Administering Institution:** The University of Newcastle

**Summary:**

Elucidation of brain function remains a frontier for human discovery. To date, research has largely focussed on brain connectivity with major advances in knowledge of input/output function of brain regions. Yet, there remains little understanding of higher order processes that underlie functions such as mood states and consciousness. Investigation of brain rhythms represent a step to unravelling such processes, as rhythms both act as autonomous clocks and generate synchronised neuronal activity. This project aims to investigate mechanisms underlying a specific class of brain rhythm implicated in control of mood states. Positive outcomes from this basic research may lead to better drug therapies for controlling specific mental disorders.

**DP0555908** Dr EJ Wanless; Prof SP Armes

**Title:** Microgel thin films for controlled release

**2005 :** \$85,000

**2006 :** \$65,000

**2007 :** \$75,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Newcastle

**Summary:**

This project represents a real and timely opportunity for Australian research to take a leading position in the field of stimulus-responsive thin films. The potential applications of the targeted advanced coatings lie in areas for which Australia is already a significant world player (water treatment, biomaterial/implant coatings, sensors) and will add value to these industries. The development of these 'smart' films will have commercial potential for 'next generation' nanotechnology or biotechnology companies. The project will increase the momentum of an internationally competitive research partnership. The training of a research associate, PhD and honours students will lead to competitive employment for these burgeoning scientists.

**DP0559771** Dr CL Waters; Dr BJ Anderson

**Title:** Electrodynamics of the High Latitude Ionosphere

**2005 :** \$65,000

**2006 :** \$65,000

**2007 :** \$65,000

**Category:** 2405 - CLASSICAL PHYSICS

**Administering Institution:** The University of Newcastle

**Summary:**

Electrical power ( $\sim 10^{12}$  W on average), incident over the high latitude ionospheres drives auroral displays, causes magnetic disturbances and other space weather effects over the globe, including Australia. This project uses Iridium, a US\$6 billion, commercial satellite constellation, to study energy deposition into the ionosphere from near-Earth space. The Iridium data is not public domain. This project provides data access, representing a significant cost-effective way for Australia to participate in observational space science. Australian postgraduate training is an integral part of the project, providing international level access and interpretation of scientific satellite and over the horizon radar network data.

**DP0556017** Dr GA Willis; Dr J Ramagge

**Title:** Geometric representation of small-rank totally disconnected groups

**2005 :** \$86,000

**2006 :** \$72,000

**2007 :** \$76,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Newcastle

**Summary:**

Mathematics research creates and develops new concepts for understanding the world. Group theory is a branch of mathematics based on our innate sense of symmetry. It was invented 200 hundred years ago and has grown into a language for analysing and classifying things ranging from wallpaper patterns to crystals, the fundamental particles of physics and Rubik's cube. The chief investigators have significant breakthroughs in the study of symmetry groups of networks, giving Australia an international lead in this research. The project will develop the insights gained to make Australia a centre of expertise on these symmetry groups, which have applications to information and communication technology, among many others.

## The University of Sydney

**DP0559637** Dr DW Airey

**Title:** Miniature triaxial tests to investigate effects of pore fluid salt concentration on the mechanics of clays

**2005 :** \$60,000

**2006 :** \$30,000

**2007 :** \$40,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Sydney

### Summary:

Mitigating the land degradation caused by salinity is a national priority. In the urban environment salinity and the associated waterlogging have the potential to seriously degrade infrastructure and domestic housing. Currently the effects of salinity on the mechanical response of the ground are not well understood and there is a paucity of engineering models capable of predicting ground behaviour. This project aims to address this situation by providing new knowledge and understanding of how changes in salt concentration affect the soil, and by developing models capable of predicting the observed behaviour. This will assist in the development of rational approaches to mitigate the effects of salinity.

**DP0557281** Prof DG Allen

**Title:** The role of intracellular calcium stores in cardiac pacemaking

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 3206 - MEDICAL PHYSIOLOGY

**Administering Institution:** The University of Sydney

### Summary:

The spontaneous firing of pacemaker cells is central to regulation of the cardiovascular system particularly during exercise. The discovery that pacemaker cell function is modulated in part by calcium ions will change our understanding of the changes in heart rate during exercise and in diseases which affect the pacemaker cells. Better understanding of the way in which spontaneous activity of these cells is regulated is the key to controlling or modifying their function.

**DP0559436** Dr PR Anstey; Dr SA Harris

**Title:** John Locke, botany and natural kinds

**2005 :** \$51,000

**2006 :** \$51,000

**2007 :** \$71,000

**Category:** 3706 - HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE

**Administering Institution:** The University of Sydney

### Summary:

This project will enhance the status of research into early modern science and philosophy in Australia. It is a project of major significance in Locke studies and in the history of botany and it will impinge on a number of current philosophical debates to which Australians are already making a major contribution: the nature of biological species; natural kinds; and scientific method. Those who work on early modern thought in Australia will also benefit from the close relationship that will be established between the University of Sydney and Oxford University. The publications issuing from the project will be of international significance.

**DP0556740** Prof PF Apps; Prof AL Booth; Prof R Rees

**Title:** Modelling the labour market and the impact of the tax-benefit system on employment and GDP

**2005 :** \$94,000

**2006 :** \$100,000

**2007 :** \$125,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The University of Sydney

### Summary:

The key national benefit from the proposed project will be development of a more informed and rigorous basis for analysing and making decisions on an important set of policy issues. The project will develop a more empirically relevant modelling framework than currently available for analysing changes in the labour market and in tax and welfare policies. The results will assist policy analysts in identifying directions for reform that can raise living standards and achieve a more egalitarian society. The project will also identify reforms required to avert an ageing crisis, and those that inhibit GDP growth due to their negative effects on female employment, household saving and fertility.

**DP0556529** A/Prof SW Armfield; Dr W Lin; Dr GD McBain; Prof T Asaeda

**Title:** Turbulent fountains in stratified fluids with opposing buoyancy flux.

**2005 :** \$135,000

**2006 :** \$120,000

**2007 :** \$120,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

Improved design tools will be developed for use in industries which must deal with turbulent fountains in stratified fluids. These tools will assist in the design of more efficient apparatus, reducing energy consumption and thereby reducing both consumer costs and Australia's total greenhouse gas output, as well as providing Australian industry with a competitive advantage. Turbulence modelling for stratified fluids is one of the grand challenge areas of science, and graduate students and postdoctoral researchers trained in this will provide continuing service to Australia in many areas of advanced engineering and science.

**DP0557329** Dr AC Bashford

**Title:** World Health: the intellectual history of a twentieth century idea

**2005 :** \$35,000

**2006 :** \$40,000

**2007 :** \$60,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

After SARS, bird flu, anthrax and smallpox scares, public health is now more global than ever. This project will offer fresh historical understandings of globalised public health and Australia's place in it. It will present new empirical information about, and interpretive models for the very ideas governing Australian public health: 'good health', 'health promotion', 'preventative healthcare'. It will map the history of national and international ambitions to link health with social and economic fabric. By understanding the biopolitical history of global public health, the social and political reach of current health policy will be more easily recognised.

**DP0557658** Dr TR Bedding

**Title:** Asteroseismology as a window to stellar interiors

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

This project will see our group cement our place as world leaders in stellar astrophysics and develop strong and vigorous collaborations with astronomers in Denmark and the USA. We also envisage considerable benefit to the Anglo-Australian Observatory, whose telescope we will exploit to deliver high-impact science with low-cost observations that will enhance its reputation and fit well into its plans for the coming decade.

**DP0556232** Dr AV Betts; Prof VN Yagodin

**Title:** Chorasmian temples: an archaeological study of early Zoroastrianism and its precursors in Central Asia

**2005 :** \$82,000

**2006 :** \$47,000

**2007 :** \$70,000

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY

**Administering Institution:** The University of Sydney

**Summary:**

The project is a collaboration with the Uzbek Academy of Sciences. National benefits to Australia are in international relations and in broadening our understanding of cultural issues in the potentially volatile and politically significant region of Central Asia. The team has developed a high profile in Uzbekistan and internationally, reflecting well on Australia's cultural strengths, international involvement and support for developing countries in Asia. Our research features regularly in the Uzbek media and has the personal approval of President Karimov. We are involved with Zoroastrian and Parsi communities in Australia and overseas, particularly in India and the USA, and our results are published regularly in the community press.

**DP0560023** Dr GF Birch; Dr GE Batley; Prof FA Gobas

**Title:** Modelling contaminant dynamics in a well-mixed/stratified estuary

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 3008 - ENVIRONMENTAL SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

The proposed mixed/stratified estuarine model is unique and will predict effects of stormwater discharge on water quality, provide guidelines for loading from various contaminant sources, assess impact of marine construction activities, establish effects of natural and anthropogenic resuspension and determine spatial/temporal changes in contaminant distributions. Knowledge generated will assist making decisions locally and overseas regarding the protection of valuable living resources, the future environmental status of estuarine systems under alternative management and remedial strategies, management contaminated sediments, new legislation for best management practise, and support for long-term policy development for this estuary type.

DP0557861 Prof RA Boakes

**Title:** Resistance to extinction of learned flavour preferences

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

Australia is one of several countries experiencing an epidemic of obesity that will have major disease consequences for future decades. Obesity results from sustained liking and surplus intake of foods that override the bodily mechanisms that normally keep bodyweight constant. An important element of overeating is the ability of the sensory properties of foods (flavours) to stimulate short-term appetite. There are close parallels between flavour preference learning in rats and humans. Increasing understanding of the factors that influence persistence of preferences in rats will contribute to more effective programs at both a mass and an individual level for preventing overeating.

DP0557434 Dr CB Campbell; Prof GE Sherington

**Title:** The Australian middle class and school choice: A generational study of changing anxieties and

**2005 :** \$80,000

**2006 :** \$58,000

**2007 :** \$58,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

There have been major changes in the ways that the Australian middle class think and behave as a response to economic reforms from the 1970s. The significance of this study is to add a new element to the argument by examining changing attitudes toward public and private education and school choice - from the point of view of the urban middle class. The hypothesis is that family decisions about schooling are a major site for exploring the history of the middle class. The benefit of the study is a new analysis of the middle class from the 1950s through the changing patterns of its participation in public and private schooling. It also offers an opportunity for school choice and social equity policy makers to respond to its conclusions.

DP0558891 Dr JJ Cannon; Dr C Fieker; Prof ME Pohst; Prof Dr F Hess

**Title:** Explicit Construction of Global Function Fields with Many Rational Places

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Sydney

**Summary:**

The use of error-correcting codes and cryptosystems is fundamental to the secure and reliable operation of many technological devices that we depend upon in our everyday lives. Essentially invisible, both coding theory and cryptography are essential for banking (ATM machines, e-banking), commerce (e-commerce), defense (cryptography) and entertainment (digital TV and radio, music CDs, DVDs). While certain families of "good" codes and cryptosystems can be constructed from specific function fields whose existence is guaranteed by abstract theory, often no actual construction for the function field is currently known. We aim to close this gap, making a greater range of "good" codes and cryptosystems available for practical applications.

DP0559073 Dr MG Chapman; Dr TJ Tolhurst; Dr RJ Murphy

**Title:** Understanding biodiversity by experimental analysis of links between physical, chemical and biological properties of intertidal sediments

**2005 :** \$140,000

**2006 :** \$115,000

**2007 :** \$120,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Sydney

**Summary:**

The coastal zone accounts for 38 % of total environmental services, estimated as \$12 trillion per year. Over 90 % of current development and 80 % of Australians are found within 50 km of the coast, putting enormous pressure on these habitats. Intertidal/shallow subtidal sediments are the most extensive and productive (biologically and economically) coastal habitats, supporting much of Australia's unique biodiversity. Their functioning depends on complex interactions among physical, chemical and biotic processes, yet is largely unknown. Understanding these processes is crucial for coastal planning and management, to minimise habitat-loss and retain biodiversity in these important habitats.

DP0559005 Dr S Chawla

**Title:** New Directions in Mining Complex Spatial Relationships in Large Scientific Databases

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$63,000

**Category:** 2805 - DATA FORMAT

**Administering Institution:** The University of Sydney

**Summary:**

International and Australian organizations are investing in large projects involving the collection of terabytes of scientific data. The Anglo-Australian Galaxy Redshift Survey in eastern Australia has obtained data for a quarter of a million galaxies. Similarly the Tropical Ocean Global Atmosphere(TOGA) program is being expanded to collect data from the equatorial pacific region which will help better understand the El Nino/Southern Oscillation Cycle. We are developing powerful spatial data mining tools which will go a long way in finding potential nuggets of useful information in these large databases and help Australian and international scientists hypothesise new theories to explain the underlying phenomenon.

**DP0556765** A/Prof DP Coleman

**Title:** **Insect societies and social butterflies: natural history and sociability in the Romantic period**

**2005 :** \$62,930

**2006 :** \$65,691

**2007 :** \$69,498

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

During the eighteenth century, the Pacific islands and New Holland replaced America as the testing ground for ideas about the state of natural man and the origins of society. In looking at Enlightenment ideas about the natural, the human, and the social, this project will help us to learn more about ourselves as the dominant species.

**DP0556187** Dr MJ Coster; Prof CJ Burrell; Dr P Li

**Title:** **Design and Development of HIV-1 Integrase Inhibitors Based on a Natural Product Lead**

**2005 :** \$120,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

HIV/AIDS is a significant health problem with over 40 million people infected with HIV worldwide. Resistance to current drugs is rising rapidly and new therapeutics are urgently needed. This project will bring together local expertise in organic synthesis and virology in order to develop new and better treatments for HIV/AIDS. Ultimately, Australians with HIV may benefit directly from anti-HIV compounds produced and may also benefit from advances in our understanding of this elusive virus resulting from the project.

**DP0556268** Dr MJ Coster

**Title:** **Anti-Cancer Natural Products: Total Synthesis and Biological Evaluation of Lasonolide A and Analogues**

**2005 :** \$130,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

One in three men and one in four women in Australia will be diagnosed with cancer before they reach 75. Cancer is a leading cause of death within this country with 28% of deaths each year due to this disease. Although there have been advances in the treatment of various forms of cancer there remains a pressing need for new therapies with improved potency, selectivity and reduced side effects. This project will provide new compounds of potential clinical use in the treatment of cancer, thereby aiding the large population of Australians who will be affected by this disease. Furthermore, the new advanced materials produced by this project will aid in the study of biochemical processes involved in cancer.

**DP0556177** Prof NE Dancer

**Title:** **STABLE AND PEAK SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS**

**2005 :** \$112,000

**2006 :** \$90,000

**2007 :** \$81,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Sydney

**Summary:**

We aim to produce mathematics which is not only of interest to mathematicians but is useful in the study of many physical and biological processes. They occur in processes in industry and the study of the environment.

**DP0559560** Dr MJ Davies

**Title:** **Mechanistic studies on the oxidation of amino acids, peptides and proteins and its biological**

**2005 :** \$130,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

Exposure of amino acids and proteins to radicals, oxidants, UV light, and metal ions results in oxidation, with consequent alteration to protein structure and function. It has been shown that these reactions occur during food spoilage, exposure of plants to excess UV light, and in a number of human diseases (e.g. heart disease and cancer). Despite evidence for a key role for protein oxidation in these events, the fundamental chemistry and biochemistry of protein oxidation is incompletely understood. This is addressed in this project. Knowledge of the mechanisms of these reactions is a vital pre-requisite to the rational design of preventative strategies that might enhance food quality, minimise UV damage and enhance human health.

**DP0557346** Dr A Dong

**Title:** **Computational Methods for the Social Accounting of Teamwork**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** The University of Sydney

**Summary:**

The cornerstone of the knowledge industries underlying the Australian economy is not just mechanical efficiency but also teamwork productivity. The increasing trend toward placing Australian employees nearer to their customers means that Australian companies face an even greater challenge in managing effective teamwork. This research examines the pragmatics and theoretical issues of developing computer-based systems that enable real-time assessments of teamwork productivity. Automated assessments of how well relationships are progressing in teams will enable them to realise the same levels of productivity gains that automated workflow management has facilitated.

**DP0556493** Dr A Dutkiewicz; Dr JR Ridley; Dr SC George

**Title:** **Biosphere, hydrocarbon and ore fluid interactions in the Early Precambrian**

**2005 :** \$150,000

**2006 :** \$150,000

**2007 :** \$150,000

**2008 :** \$120,000

**2009 :** \$120,000

**Category:** 2601 - GEOLOGY

QEII Dr A Dutkiewicz

**Administering Institution:** The University of Sydney

**Summary:**

Ore deposits and petroleum are important for economic and social areas of Australia's growth. New discoveries are needed to maintain Australia's wealth as mines reach the end of operations and petroleum supplies decrease. This project will demonstrate how ore fluids and hydrocarbons interact in the geological environment. It should, therefore greatly expand the conceptual framework in which to explore for both mineral and hydrocarbon resources, particularly in old, deep and hot basins, which are considered to be the last frontiers of exploration. Outcomes concerning the nature of early life will be of global interest.

**DP0558256** Dr NA Eckstein

**Title:** **BEYOND THE NEIGHBOURHOOD: THE URBAN HISTORIES OF SOCIABILITY AND COMMUNITY IN RENAISSANCE FLORENCE, 1400-1500.**

**2005 :** \$50,000

**2006 :** \$50,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

Australians are internationally-recognised leaders in Renaissance history. In 2000, this reputation directly contributed to a major international agreement with the Italian Cassamarca Foundation. The Foundation has funded eleven Italian-studies lectureships and many scholarships in Australian universities, raising Italian culture's profile in academia, the student body and the wider community. The present project on Florentine urban society will advance the field of Renaissance social history, reinforce Australia's already high international profile in the area, and promote international agreements such as that with the Fondazione Cassamarca, thereby conferring major academic, cultural and economic benefits on Australian national culture.

**DP0556781** Prof BJ Eggleton; Dr C Grillet; Dr N Savvides

**Title:** **Microfluidic photonic systems**

**2005 :** \$182,000

**2006 :** \$92,000

**2007 :** \$91,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Sydney

**Summary:**

Australia is set to reap commercial benefits nationally and internationally from new developments in the highly competitive domain of microtechnology. In this project, a group of Australia's leading researchers propose an innovative combination of two exciting fields of scientific research. Microfluidics is the manipulation of minute quantities of liquids in microscopic channels, while photonics is the generation, transmission, detection and analysis of light as a means to convey, collect and process information. The marriage of these two fields promises the development of novel, high performance tunable devices for sensing, biotechnology and telecommunications.

**DP0557923** Dr JH Field

**Title:** **First Australians, Last Megafauna? Modern Approaches To A Prehistoric Puzzle.**

**2005 :** \$110,000

**2006 :** \$112,000

**2007 :** \$132,000

**2008 :** \$60,000

**2009 :** \$60,000

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY

**Administering Institution:** The University of Sydney

**Summary:**

Animal species will be, and have been, threatened with extinction continuously through time. Understanding the possible role of people in these events and how climate change may have made some species more vulnerable to extinction than others is an important aspect of ongoing debate in our society. How these factors influenced the extinction process has implications for how we might manage our policies on land, conservation, biodiversity, and 'at-risk' animal species. Additionally, the involvement of indigenous communities provides important employment and cultural exchange opportunities.

**DP0557195** Prof LD Field

**Title:** **Organometallic Transformations of Organic Molecules**

**2005 :** \$185,107

**2006 :** \$200,000

**2007 :** \$200,000

**2008 :** \$180,000

**2009 :** \$175,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

Simple hydrocarbons such as natural gas and petroleum are amongst the most abundant and readily available natural feedstocks for the organic chemical industry. However, apart from simply burning them for fuel, there are very few methods for using these materials as starting materials for industry. In chemical terms, simple hydrocarbons are very stable and this makes them difficult substances to convert cleanly to other more useful compounds. This research program investigates new approaches for converting hydrocarbons to more useful materials by using metals such as iron and ruthenium. This research program will provide a new route to 'value-added' products from hydrocarbons and develop new uses for these abundant raw materials.

**DP0559815** Dr A Fitzmaurice

**Title:** **State formation and European expansion**

**2005 :** \$35,000

**2006 :** \$35,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

There is a direct national benefit from this research. The aim of an intellectual history of colonisation is to provide an account of what Europeans engaged in expansion understood themselves to be doing. This account explores the justifications and political motivations for expansion and is accordingly of fundamental importance to contemporary legal debates over dispossession and the larger legacy of colonisation.

**DP0558130** A/Prof RJ Fletcher; Dr DA Penny; A/Prof MF Barbetti; Dr C Pottier

**Title:** **Urban Infrastructure, Inertia and Ecology: the growth and decline of Angkor, Cambodia (9th to 16th Century AD)**

**2005 :** \$242,126

**2006 :** \$201,126

**2007 :** \$197,126

**2008 :** \$202,126

**2009 :** \$160,126

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY

ARF Dr DA Penny

**Administering Institution:** The University of Sydney

**Summary:**

Australia emphasises the value of partnerships with developing nations in the Asia-Pacific for the continued stability of our region. Australia has played a significant role in assisting Cambodia toward stability and sustainable growth, and Australian researchers have assisted greatly in the development of individual and institutional capabilities. This project's large, multi-disciplinary research team provides a significant new perspective on a cultural site of global importance and extends active collaboration with Cambodian agencies responsible for managing Angkor - the Asia-Pacific flagship World Heritage site - by providing engagement with world-class research expertise and facilities.

**DP0559497** Dr N Gallery; Dr GT Gallery

**Title:** **Strengthening the Role of Financial Disclosure in the Governance of Superannuation Funds**

**2005 :** \$30,000

**2006 :** \$30,000

**Category:** 3501 - ACCOUNTING, AUDITING AND ACCOUNTABILITY

**Administering Institution:** The University of Sydney

**Summary:**

This project will provide evidence about the usefulness of superannuation fund financial reports and whether funds are disclosing unbiased measures of their financial position and performance. This evidence will directly assist regulators in their deliberations in reforming accounting standards and other disclosure regulation governing superannuation fund financial reporting. Such reforms are necessary to ensure that all Australians in superannuation funds have access to relevant, reliable and comparable financial information to facilitate full accountability of superannuation fund trustees and informed decision making by stakeholders, and in turn, enhance the security of superannuation savings and maximise retirement incomes.

**DP0557050** Dr JC Gardiner

**Title:** **Engineering plants via modified microtubule dynamics**

**2005 :** \$110,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2704 - BOTANY

APD Dr JC Gardiner

**Administering Institution:** The University of Sydney

**Summary:**

The plant microtubule cytoskeleton is involved in many economically important functions such as controlling growth and development, cellulose deposition, and responses to pathogens and salinity. This project will increase our understanding of how the regulation of the microtubule cytoskeleton affects these processes and move us nearer to achieving economically important goals, such as the development of crop plants with improved traits. This project will also help maintain Australia's position at the forefront of plant cell and molecular biology.

**DP0560111** A/Prof P Gay

**Title:** **SPEAKING WOMEN: ACTRESSES' ROLES IN ENGLISH DRAMA, 1737-1800**

**2005 :** \$42,000

**2006 :** \$40,000

**2007 :** \$60,000

**Category:** 4101 - PERFORMING ARTS

**Administering Institution:** The University of Sydney

**Summary:**

This project continues the internationally celebrated tradition of Australian scholarship in English Restoration and eighteenth-century drama, a period which is of particular interest because it coincides with the originary moment of our modern nation. As a mode of popular culture, drama offers a rich source of common ideas and attitudes (for example, about gender and class), which the project will explore. Many popular eighteenth-century plays were performed in the early days of white settlement, and this project will, among other more general outcomes, investigate whether these works might be capable of successful and illuminating revival on modern Australian stages.

**DP0559885** Prof JS Gero

**Title:** **Situated Design Computing: A New Paradigm to Support Design Using Situated Reasoning**

**2005 :** \$130,000

**2006 :** \$125,000

**2007 :** \$130,000

**2008 :** \$130,000

**Category:** 3102 - BUILDING

**Administering Institution:** The University of Sydney

**Summary:**

A country like Australia with its twin disadvantages of distance from its large markets and small population as its own market has to found its goals in its wealth production on its ability to compete at the high value-adding loci of the economy. Design is a precursor to superior products and is one of the nation's high value-adding wealth generating activities. This project aims to lay the foundations for a new class of design support tools that have the capacity to be used at a variety of stages in the design process including those stages where major decisions are being taken. This will have the potential to improve the efficacy and the efficiency of Australian design and hence make it more globally competitive.

**DP0559268** A/Prof WG Gibson

**Title:** **A mathematical model relating neural activity to cerebral blood flow**

**2005 :** \$102,000

**2006 :** \$80,000

**2007 :** \$81,000

**Category:** 2399 - OTHER MATHEMATICAL SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

An ageing population is increasingly prone to neurodegenerative disease and the associated mental impairment can severely disrupt the lives of both the sufferers and the carers. Non-invasive brain imaging techniques are used to both diagnose and supervise treatment of such disease, but at present a lack of understanding of the underlying physiology leaves these methods open to criticism. The construction of a detailed quantitative model of the basic processes underlying this imaging will enable precise interpretation of such brain scans and increase their usefulness both as a research and as a therapeutic tool.

**DP0556963** Prof RG Gilbert; Dr IC Larson

**Title:** **Formation and stability of polymerically stabilized colloids**

**2005 :** \$200,000

**2006 :** \$170,000

**2007 :** \$170,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Sydney

**Summary:**

This project will bring economic, medical and environmental benefits, with improved product performance and manufacturing processes for everyday industrial items relevant to a large industrial sector with significant employment in Australia: inks and paints (for example, surface coatings that can be applied more rapidly without clogging the jets); better means of preventing the fouling of industrial membranes; and improved materials for biomedical applications, with more desirable interactions between living cells and body fluids. These advances will also speed the replacement of solvent-based lacquer paints - detrimental to both environment and user - with water-based products of high quality.

**DP0559282** Prof P Goodyear; A/Prof MT Prosser; Dr RA Ellis

**Title:** **Learning through online and co-present discussion in higher education: expectations, experiences and outcomes**

**2005 :** \$76,000

**2006 :** \$76,000

**2007 :** \$76,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

This project will make a substantial contribution to international research in the fields of learning and teaching in higher education and learning and teaching with ICT. In practical terms, the project will provide evidence-based guidelines for the integration of 'blended' learning approaches, especially with respect to the ways ICT can support small group discussion activity. Scientifically, the project will add to our understanding of how students and teachers approach learning and teaching through discussion (co-present and online). Such knowledge is a vital, strategic asset given the growing economic importance of Australian higher education and of its international reputation for quality.

**DP0560146** Dr AA Gray-Weale

**Title:** **Disorder and Dynamics in Superionic Conductors**

**2005 :** \$75,000

**2006 :** \$69,000

**2007 :** \$69,000

**Category:** 2506 - THEORETICAL AND COMPUTATIONAL CHEMISTRY

APD Dr AA Gray-Weale

**Administering Institution:** The University of Sydney

**Summary:**

This project will pursue a powerful new approach to superionic conductors, an important class of advanced materials that are critical to the development of clean-energy technologies, such as solid-oxide fuel cells. This will be a new direction for Australian science in the theoretical treatment of material properties. The project will also make significant progress in the computer-aided design of advanced materials, and in the simulation methods themselves, contributing to pure science in the form of our understanding of the physics and chemistry of materials at the most fundamental level.

**DP0559398** Dr B Gu; Prof X FENG

**Title:** **Theoretical and Numerical Analyses on Smart-Cut Technology**

**2005 :** \$74,322

**2006 :** \$72,000

**2007 :** \$74,322

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

APD Dr B Gu

**Administering Institution:** The University of Sydney

**Summary:**

Smart-cut is an innovative and effective technique for fabricating high quality silicon-on-insulator structures which are widely used in the semiconductor and microelectronics industries. The quantification of the effects of processing parameters and the optimization of smart-cut process will be conducted in this project. The results are expected to make significant contributions to reducing cost, increasing efficiency and optimizing procedure by providing a theoretical and quantitative design methodology to improve the smart-cut technique. Consequently, the outcomes and results of the project will bring many benefits to and encourage further R&D in the semiconductor and microelectronics industries in Australia.

**DP0556600** Dr Y Gu

**Title:** **Advanced computational techniques for micro/nano multiscale systems of NEMS/BioMEMS**

**2005 :** \$75,000  
**2006 :** \$72,000  
**2007 :** \$75,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS  
APD Dr Y Gu

**Administering Institution:** The University of Sydney

**Summary:**

The outcome of this project will have the following benefits to Australia.

- 1) It will improve the research level in the area of multiscale simulation of NEMS/BioMEMS;
- 2) The project will be beneficial to possibly establish new industries in the areas of nanotechnology as well as to make good use of today's microelectronics, microfabrication and computer technology that have already established in Australia;
- 3) The manpower trained by this project in the areas of multi-scale simulation of MEMS/NEMS/BioMEMS will provide a crucial support for the future industry of Australia.

**DP0557353** Dr JM Guss; Em/Prof HC Freeman; Prof DM Dooley

**Title:** **Metalloproteins and metalloenzymes**

**2005 :** \$75,000  
**2006 :** \$75,000  
**2007 :** \$75,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

Most of the chemical reactions and physical movements in living systems are carried out by proteins. The information for producing proteins from amino acids is stored in the genes, but many biological processes depend on additional atoms or molecules ('cofactors') that are added to a protein after it is assembled. For example, more than 30% of all proteins contain metal atoms which are essential for their function. We are studying the structures of such metalloproteins and metalloenzymes so that we can better understand their activities with long term aims of creating new molecules for biotechnology and/or drugs.

**DP0557590** Dr IM Harris; Prof MC Corballis

**Title:** **Recognition of rotated objects: paying attention to orientation**

**2005 :** \$120,000  
**2006 :** \$120,000  
**2007 :** \$120,000  
**2008 :** \$120,000  
**2009 :** \$120,000

**Category:** 3801 - PSYCHOLOGY  
QEII Dr IM Harris

**Administering Institution:** The University of Sydney

**Summary:**

This research will increase our understanding of what aspects of an object contribute to our conscious visual experience and how the brain integrates information about various visual attributes. Eventually, this could be used in industry to develop more sophisticated computer pattern recognition systems. The research will also enable the design of better rehabilitation and management strategies for patients with brain damage and degenerative brain disorders, such as Alzheimer's disease.

**DP0559432** Prof MA Harris

**Title:** **George Eliot: the life of a pseudonym**

**2005 :** \$65,000  
**2006 :** \$40,000  
**2007 :** \$40,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

Australia grew to nationhood during the long reign from 1837 to 1901 of Queen Victoria. Along with British law and customs, British culture migrated to the Australian colonies. The novelist George Eliot is a significant representative of the liberal humanist ideas and attitudes that reinforced the emergence of Australia's egalitarian, secular society. Analysis of the career of this Victorian cultural icon extends understanding and interpretation of an aspect of our national heritage. In addition, this project contributes to increasing Australia's already high international standing in the field of Victorian studies.

DP0559516 Prof BS Haynes; A/Prof DF Fletcher; Dr H Lowe; Dr C Xuereb

**Title:** Multiphase flows in microchannels

**2005 :** \$200,000

**2006 :** \$145,000

**2007 :** \$150,000

**2008 :** \$150,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

This project will improve our understanding of how multiphase fluids (such as a gas and a liquid or two liquids) flow in very small passages. Such flows are at the heart of almost all chemical processing and miniaturisation of chemical processes depends on our ability to design for and control them. There is a worldwide interest in microplant for chemicals manufacture and the international partner investigators are leaders in this field. The particular benefit to Australia lies in the possibility that miniaturised, microstructured chemical plant could become the basis for remote, distributed manufacture that could, for example, allow natural gas processing on ocean platforms directly located at the point of production.

DP0556144 Dr DE Hibbs

**Title:** Experimental Electron Densities, Crystal Engineering and Molecular Recognition: A Supramolecular Approach to Drug Design

**2005 :** \$220,000

**2006 :** \$170,000

**2007 :** \$170,000

**2008 :** \$110,000

**2009 :** \$110,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

ARF Dr DE Hibbs

**Administering Institution:** The University of Sydney

**Summary:**

GABA receptors are important therapeutic targets for the treatment of a number of disorders from memory dysfunction, to muscle spasticity and chronic pain. This project is designed to address some of the fundamental questions associated with drug/target interactions. This work will lead to a greater understanding of how the chemical structure of a drug can be tailored to produce a more effective compound. The outcomes of this program will highlight Australia as a strong contributing nation in molecular design. It is certain that the outcomes of this program will benefit Australia by providing a much greater level of understanding of the fundamental properties of molecules and how others may be rationally designed to suit a specific role.

DP0559214 Dr AJ Holmes; Dr NV Coleman; Dr SM Radajewski

**Title:** Recovery and characterization of monooxygenases for biocatalysis and bioremediation through development of novel DNA- and protein-based technology.

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

Australia contains hundreds of sites contaminated with toxic waste and judged to pose significant risk of harm to the public. This project will identify enzymes and organisms capable of remediating such contaminated sites by natural processes. It will also result in training of persons and development of techniques that will contribute to making bioremediation an environmentally sustainable and cost-effective technology. The environmental proteomics strategy is a frontier technology, expected to have broad applications in health, food science and the environment. Our development of this technology will create a wide range of opportunities for Australian scientists and companies.

DP0560045 Dr S Hong; Prof PD Eades

**Title:** Topological Approaches for Three Dimensional Graph Drawing

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Sydney

**Summary:**

Human analysis of huge quantities of relational data in biotechnology, web engineering, social networks, and computer networks requires visualization. In recent years, three-dimensional visualisation has promised to give new insights into such abstract data. However the past ten years of visualization research has had very little impact on the industry; visualization software providers have not adopted visualization methods developed by academics. We hypothesise that current 3D relational visualization methods fail because they do not pay attention to the human perception of topology. In this project we will leverage mathematical topology to construct new methods for the 3D visualization of relational data.

**DP0557850** Dr AM Hopkins

**Title:** A new approach to understanding galaxy evolution

**2005 :** \$125,000

**2006 :** \$125,000

**2007 :** \$125,000

**2008 :** \$105,000

**2009 :** \$105,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

QEII Dr AM Hopkins

**Administering Institution:** The University of Sydney

**Summary:**

The proposed research will develop and refine new tools and analysis techniques that will significantly advance the capabilities of astrophysical investigations. These will contribute an important component to the International Virtual Observatory, and in conjunction with extensive international collaboration will promote Australia's prominence in this major international collaborative effort. New techniques developed for galaxy morphological classification at many wavelengths have the potential for application to the medical and industrial sectors. In addition, this project will bring back to Australia a successful researcher, proposing to undertake internationally competitive research.

**DP0558413** Dr JJ Horne; Prof GE Sherington

**Title:** The Public University in Australasia (1850-1918)

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

Australians need a clear understanding of the fundamental value of universities to their society. This project provides an important historical context to the civic functions of universities, and specifically, aims to enlighten the contemporary debate over the public and private benefits of higher education, the importance of merit-based access, universities as a public investment in the advancement of knowledge, the meaning of benefaction, and the role of universities in the making of the Australian middle class.

**DP0559074** Dr P Howie

**Title:** Optimising recall in children's testimony: The challenge of repeated questions

**2005 :** \$55,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

One of the threats to a healthy start in life for Australian children, and one which imposes substantial financial and emotional cost on the Australian community, is child abuse and neglect. This project addresses a key stumbling block in obtaining evidence from child victims/witnesses' their tendency to inconsistent testimony under repeated questioning. It seeks to understand the conditions under which inconsistency is minimized, as a basis for developing empirically and theoretically based ways to optimise the accuracy and legal utility of children's testimony. As a signatory to the United National Convention on the Rights of the Child (1990), Australia has a legal as well as a moral responsibility in this regard.

**DP0559663** Mr B Hudson

**Title:** Early settlements in Upper Burma (Myanmar): an experiment in urban living

**2005 :** \$89,000

**2006 :** \$88,000

**2007 :** \$88,000

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY

APD Mr B Hudson

**Administering Institution:** The University of Sydney

**Summary:**

This project directly increases access for Australian research to a previously self-isolated nation, Myanmar. It contributes to better understanding of our region and our world by examining how past communities worked together and how they dealt with social and environmental stress.

**DP0557664** Prof NH Hunt; Dr C Rae

**Title:** Brain metabolic changes in experimental malaria: a paradigm for the molecular mechanisms of intravascular inflammation

**2005 :** \$140,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 3204 - MEDICAL MICROBIOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

Malaria is endemic in countries directly to the north of Australia, as close as Papua New Guinea and East Timor. This project's findings about malaria also will have relevance to other infectious diseases of national importance. The outcomes will contribute to Australia's research reputation. We will build international links that will increase the national knowledge base and research skill base. Young scientists will be trained in state-of-the-art research techniques in a cross-disciplinary environment that is the way of future biological research. The project may identify potential drug targets for malaria or other infectious diseases. The Intellectual Property will be protected and commercialised.

**DP0557953** Dr Jayamanne

**Title:** **Cinema and the Senses: Temporality of the films of Stanley Kubrick, Terrence Malick and Kumar**

**2005 :** \$30,000

**2006 :** \$41,000

**2007 :** \$32,000

**Category:** 4103 - CINEMA, ELECTRONIC ARTS AND MULTIMEDIA

**Administering Institution:** The University of Sydney

**Summary:**

The resulting monograph, articles and seminars will provide new methodologies for Australian cinema studies which has tended to depend on Euro-American models. The project offers three distinct ways of thinking about an ecology of the human senses in and through cinema. The ideas on cine-synaesthesia would link up with current research on this topic in other disciplines such as neurophysiology, painting and music. The interdisciplinarity of the project offers, to the public sphere of Australian cinema, cross-cultural and cross-media perspectives on film aesthetics.

**DP0559647** Prof JS Jin; Dr W Ma

**Title:** **A scheme and a formal language for interactive video**

**2005 :** \$75,000

**2006 :** \$66,000

**2007 :** \$70,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** The University of Sydney

**Summary:**

Video has been increasingly used in many fields and plays an important role in our daily life. Most traditional video players and video formats only provide linear interaction, such as play, fast forward, fast backward or jump to a certain frame of a video stream indicated by a sequence or time on a random access device. This project aims at enabling a hyperlink type of interactions for video data through the development of video interaction mark-up language (VIML). It can find many applications in education, marketing, web presentation and digital TV.

**DP0555883** Dr KA Jolliffe; Prof LF Lindoy

**Title:** **Self-Assembly of Nanoscale Molecular Capsules**

**2005 :** \$175,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

Nature uses the self-assembly of molecules for the construction of highly complex and functional structures. An understanding of this process will enable the design of new molecular systems, capable of application in areas that include medicine, electronics and communications. Such self-assembly will play a key role in the development of nanotechnology, a rapidly expanding field that is likely to become a major technology in the foreseeable future. It is of crucial importance for Australia to maintain cutting-edge research (and research training) in this area if the nation and its industries are to be active contributors to the coming revolution.

**DP0558644** Prof S Jones; Prof RG Walker

**Title:** **Government Finance Statistics versus Accrual Accounting Standards as the Basis for Financial Reporting and Budgeting on the Operating, Financing and Investing Performance of Governments**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$50,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** The University of Sydney

**Summary:**

More than one third of our economic activity is subject to public expenditure management processes. However, recent decisions of the FRC to harmonize GFS and AASs will fundamentally reshape public sector financial reporting. Harmonization has certain benefits, but the proposal warrants careful consideration as it is unclear whether a converged GFS system will better service the needs of the community and enhance public sector accountability more generally. Focusing on the heterogeneous information needs of key stakeholder groups, this study will provide one of the first pioneering empirical investigations of alternative GFS methods and practices in Australia.

DP0560020 Dr MJ Jordan

**Title:** Predicting Environmental Effects on Structure and Reactivity

**2005 :** \$75,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2506 - THEORETICAL AND COMPUTATIONAL CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

This project tackles one of the most important and fundamental problems in theoretical chemistry: solvent effects on chemical reactions. The new methods and computer programs generated will be freely available to the Australian (and international) scientific communities and will further enhance Australia's strong reputation in Theoretical Chemistry. The applications chosen will allow new technologies in biosensing and strategies in computational drug design to be investigated. This will benefit the Australian biotechnology and pharmaceutical industries and may substantially aid in understanding the mechanism and treatment of disease.

DP0559019 Prof N Joshi; Dr CM Cosgrove; Dr S Lafortune

**Title:** Integrable Functional and Delay Differential Equations

**2005 :** \$70,000

**2006 :** \$63,000

**2007 :** \$63,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Sydney

**Summary:**

Major challenges such as predicting epidemics or modelling the dynamics of human movement, rely on our understanding of functional and delay differential equations. This research will provide new methods for prediction and analysis of such models.

DP0557222 Dr BJ Kennedy; Prof RL Withers; Dr SA Schmid; Dr CJ Howard

**Title:** UNDERSTANDING PHASE TRANSITIONS THROUGH PRECISE STRUCTURAL STUDIES.

**2005 :** \$130,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

This project will examine the fundamental nature of the structural phase transitions that are critical for the utilisation of numerous advanced materials. Researchers at Sydney University and the Australian National University in collaboration with staff at ANSTO are world leaders in the structural analysis of such materials. Through comprehensive experimental and theoretical studies of a number of such materials this project will enhance the ability of industry to develop new and improved materials.

DP0559179 Prof IR Kennedy; Dr NA Lee; A/Prof RD Allan; Dr L Van Zwieten; Dr CM Fellows

**Title:** Endocrine Disrupting Compounds: Novel tests for Analysis and Field Validation

**2005 :** \$100,000

**2006 :** \$93,000

**2007 :** \$95,000

**Category:** 3008 - ENVIRONMENTAL SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

This project will give community benefits from new analytical technology and research data to help minimise the threat of environmental contamination with endocrine-disrupting compounds (EDCs). Both urban and rural communities may feel the impacts of EDCs, with potential contamination occurring globally, affecting both wildlife and humans. The main means of transport of EDCs is as contaminants in water and it is essential to learn the extent of contamination occurring in urban and rural water supplies to decide its significance. The research will involve a multi-disciplinary approach, with benefits falling into all four National Research Priorities of sustainability, good health, frontier analytical technology and national safety.

DP0558186 A/Prof DT Kenny; Ms H Mitchell; Dr DA Cabrera; Dr MJ Halliwell

**Title:** Enhancing quality in western classical singing and pedagogy

**2005 :** \$115,000

**2006 :** \$79,999

**2007 :** \$96,000

**2008 :** \$59,000

**Category:** 4101 - PERFORMING ARTS

APD Ms H Mitchell

**Administering Institution:** The University of Sydney

**Summary:**

Music and singing are important performing arts, essential components of Australian cultural life making major contributions to the Australian economy. This study will benefit professional musicians, students, music industry and cultural reputation of Australia by investigating technical, acoustic and perceptual features that define vocal quality. Our multidisciplinary team will apply sophisticated technologies and research methods to improve vocal assessment and pedagogical practices in the musical arts, thereby enhancing the musical development and career prospects of the next generation of Australian performers and teachers. This research will place Australia at the forefront for excellence in research in the performing arts.

**DP0557000** Dr CJ Kepert; Prof KS Murray; Prof H Toftlund; Prof PJ Steel

**Title:** Polynuclear Spin-Crossover Molecular Switches: Host-Guest Chemistry, Magnetism and Memory

**2005 :** \$185,000

**2006 :** \$185,000

**2007 :** \$185,000

**2008 :** \$185,000

**2009 :** \$185,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

The generation of advanced nanomaterials requires both a control of nanoscale structure and the incorporation of specific properties into that structure. This project will lead to significant new developments in this area, with the assembly of complex molecular systems containing electronic switches. The unique combination of nanoscale switching and guest-binding and/or magnetic ordering in these systems will lead to entirely new materials properties, leading in turn to fundamental advances in the science of molecular electronics and nanomaterials. Benefits of the research are wide-ranging, and include the development of innovative new technologies for molecular sensing, molecular separations, data storage and visual displays.

**DP0559325** Prof GI Lehrer

**Title:** Geometric structures in representation theory

**2005 :** \$182,000

**2006 :** \$162,000

**2007 :** \$161,000

**2008 :** \$160,000

**2009 :** \$160,000

**Category:** 2301 - MATHEMATICS

APF Prof GI Lehrer

**Administering Institution:** The University of Sydney

**Summary:**

Mathematics underpins every aspect of people's interactions with nature (e.g. physics) and with each other (e.g. finance). Its uses range from formulating physical laws in order to understand and predict nature, to analysis of financial concepts and transactions. This project will formulate and develop three new fundamental mathematical concepts: cellular algebras, eigenspace geometries, and diagram algebras. Benefits include enhancement of Australia's position at the very frontier of world class mathematical research, and a myriad of potential applications to physics, coding theory, information technology, electronic security and experimental design.

**DP0556336** Dr NT Lucas

**Title:** Metallographic Discs as New Materials

**2005 :** \$108,310

**2006 :** \$110,615

**2007 :** \$111,579

**Category:** 2599 - OTHER CHEMICAL SCIENCES

APD Dr NT Lucas

**Administering Institution:** The University of Sydney

**Summary:**

Materials science plays a pivotal role in determining and improving economic performance and quality of life. While application of materials is the ultimate goal, basic understanding of a material's behaviour from the atomic/nano-level to macrostructural level is also of critical importance. This project builds upon the recent success of soluble, well-defined carbon discs in molecular electronics, through the preparation and study of metal-containing derivatives as new advanced crystalline and liquid crystalline materials. The possibility of enhanced electronic, optical and/or magnetic properties, along with good processability, make these materials potential candidates as the active component of future, technologically important devices.

**DP0558468** Mr A Makarenko

**Title:** Integrating human operators into large-scale sensor networks

**2005 :** \$85,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2801 - INFORMATION SYSTEMS

APD Mr A Makarenko

**Administering Institution:** The University of Sydney

**Summary:**

Information awareness is critical in many applications of national importance: from bush fire fighting and defence to transportation and health care. These applications involve tasks in which timely delivery and fusion of heterogeneous information streams is of critical importance. They can all benefit from the use of robotic and embedded sensor networks considered in this project. Human operators, acting as users or supervisors, will remain at the centre of these systems. The technology and algorithms developed in this project will efficiently structure information exchange between humans and sensor networks. Establishing Australian leadership in this fast-evolving high-technology field will spur growth and job creation.

**DP0559248** Dr G Mao

**Title:** **A unified framework for analyzing the timescale of interest for traffic measurements, modelling and performance analysis**

**2005 :** \$50,000  
**2006 :** \$50,000  
**2007 :** \$50,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Sydney

**Summary:**

The revenue generated from traditional telecommunication services is continuing to drop. New value-added services such as multimedia services become the fastest growing revenue-generating sector in Australia's telecommunications industry. The ubiquitous presence of scaling behaviour in network traffic presents a big challenge for delivering better Quality-of-Service (QoS) which is demanded by the new services. A complete understanding of the scaling behaviour and its impact is very important. This research addresses a key problem of defining the timescale range of interest for the scaling behaviour. The research outcome benefits a number of areas, which are all critical for developing enhanced QoS support and better network management.

**DP0556862** Prof Dr T Maschmeyer

**Title:** **From Nanostructured Catalysts to Process Innovation**

**2005 :** \$300,000  
**2006 :** \$150,000  
**2007 :** \$150,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Sydney

**Summary:**

The results of this research will help to advance the fundamental scientific understanding of industrially important chemical reactions and give clear leads as to how to improve them. In particular, new catalysts (i.e. agents that increase the speed and selectivity of chemical reactions) will be generated and the first steps towards process innovation will be taken, using high-throughput equipment unique in the Southern Hemisphere. These new catalysts will be the basis for the design of new and/or improved industrial processes that will be 'greener', safer, use fewer resources, produce less waste and are generally more efficient and effective. As a result the Australian chemicals industry will be more competitive.

**DP0559873** Prof AR Masri; Prof RW Bilger

**Title:** **Innovative Research in Gaseous and Spray Combustion**

**2005 :** \$150,000  
**2006 :** \$145,000  
**2007 :** \$150,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

This research will maintain Australia's lead as an international provider of new knowledge in combustion science. Novel combustion technologies which may result either directly or indirectly from these investigations will have huge benefits to Australia. World communities will continue to call for reduced emissions of greenhouse gases and combustion-generated pollutants. This demand must be pursued and satisfied by new technologies and the research program proposed here makes a step forward in this direction. The training of graduates as future combustion scientists of high standards is extremely important given that such expertise is in high demand both nationally and internationally.

**DP0559747** Dr IS McGregor; Dr PE Mallet

**Title:** **Age-dependent effects of cannabinoids on emotion, cognition and vulnerability to addiction**

**2005 :** \$75,000  
**2006 :** \$75,000  
**2007 :** \$75,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

Cannabis is the most widely used illicit drug in Australia so understanding the effects of this drug is of great importance. There is little of no basic research on cannabis currently occurring in Australia. Yet such research is critical in resolving the ambiguities and difficulties inherent in our understanding of the drug. The importance of increasing our understanding of the long-term effects of the drug on young developing brains is particularly evident. The information gained in the current project will serve to inform medical and scientific communities, government policy makers, as well as the broader Australian community.

**DP0559008** Dr B Minasny; Prof AB McBratney

**Title:** How do soils grow? Modelling soil development in the landscape

**2005 :** \$110,000

**2006 :** \$98,000

**2007 :** \$90,000

**Category:** 3001 - SOIL AND WATER SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

This project addresses the fundamental environmental issue of land degradation in Australia. The environment is both sensitive and diverse with uses from intensive agriculture, grazing, to large scale industrial. This project will build a model that will enable us to understand how soil forms and landscape evolves with time, to reconstruct the history of soil. The model will allow us to make the Australian populous aware of the fragility of soil formation. This will lead to greater social awareness of our precarious position on the Australian landscape.

**DP0559162** Prof BJ Morris; Prof PJ Leedman

**Title:** Molecular mechanism of regulation of human renin mRNA

**2005 :** \$130,000

**2006 :** \$120,000

**2007 :** \$120,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Sydney

**Summary:**

Genetic technologies and genomics research are an international priority likely to reap rich rewards intellectually and commercially. The shrinking of the once-touted gene number to a more modest level has been accompanied by a corresponding increase in the complexity in the protein products arising from each gene, and even more so the methods used by cells to control gene expression. By elucidating the latter for a key gene we will open up new avenues for control of gene expression in various organisms. Devising novel means of chemically modulating stability of specific mRNA molecules will have beneficial implications for health, livestock production and agriculture.

**DP0557326** A/Prof RD Muller; Dr M Gurnis

**Title:** Integrating Global Multidimensional Datasets to Underpin Subduction Process Modelling During the Past 60 Million Years

**2005 :** \$100,000

**2006 :** \$60,000

**2007 :** \$80,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

Subduction zones are the sites for massive sulphide, orogenic vein gold and porphyry deposits. As Australia derived 47% of its merchandise exports from its mineral and energy resources in 2001, ore-deposits constitute an important component of the Australian economy. Understanding the environment of subduction initiation and development as well as the signal that it imparts on the magmatic (ore-forming) arc, will provide improved efficiency for targeting Australia's deep-earth ore-deposits.

**DP0558059** Prof NE Newbigin

**Title:** Festival, Spectacle and Plays in Renaissance Florence

**2005 :** \$20,000

**2006 :** \$20,000

**2007 :** \$30,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

Wherever public money and community effort are expended on festive display, religious devotion, or promoting national prestige through performance, questions arise about how such expense can be justified, and how the community measures its success. This project examines those questions in relation to Renaissance Florence which provided many of the models for early modern European festivals. It will analyse some of the ways in which the community and its individual members contributed to and reaped the benefit of participation in public performance and devotion. It will also provide cautionary examples of the abuse of such modes of performance by corrupt regimes.

**DP0558170** Dr A Packman; A/Prof NJ O'Dwyer; Prof BE Murdoch

**Title:** An investigation of respiration in stuttering.

**2005 :** \$85,000

**2006 :** \$72,000

**2007 :** \$78,000

**Category:** 3210 - CLINICAL SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

Australia leads the world in stuttering research, and this project will maintain that profile. The research aims to establish if breathing has a causal role in stuttering. The new knowledge produced will support or weaken current theories of the cause of stuttering and will contribute to understanding the nature of the disorder. In particular, it will be applied to develop more effective and efficient treatments for chronic stuttering.

**DP0559242** Mr O Pizarro

**Title:** High-resolution multispectral underwater imaging for coral reef mapping and characterization

**2005 :** \$86,000

**2006 :** \$71,000

**2007 :** \$71,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING  
APD Mr O Pizarro

**Administering Institution:** The University of Sydney

**Summary:**

This project will enable improved mapping and monitoring from underwater vehicles and divers. We expect to aid the sustainable use of Australia's biodiversity in the specific case of corals reefs by increasing the quality of survey data and the extent, precision and repeatability of surveys. This project will develop technologies to assist monitoring the Great Barrier Reef and determining effects of management strategies. Since these developments focus on imaging and mapping the ocean floors they could also be of use in developing deep earth resources.

**DP0556820** Dr L Poladian; Dr LS Jermiin; Dr MC Large

**Title:** Function and evolution of optical structures in nature

**2005 :** \$211,000

**2006 :** \$151,000

**2007 :** \$151,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Sydney

**Summary:**

Designing optical structures that simultaneously satisfy multiple and conflicting criteria and satisfy difficult manufacturing constraints is technologically challenging. However, Nature has been doing this for millions of years. This project is a systematic study of optical structures in one of Nature's most diverse range of species: butterflies. The microstructures inside butterfly scales have an amazing diversity of geometries that produce structural colour and are amongst the most complex naturally occurring optical structures produced by a single cell.

**DP0556184** Prof H Price; Prof J Ismael; Dr G Bacciagaluppi

**Title:** Time and Perspective in the Quantum World

**2005 :** \$125,000

**2006 :** \$125,000

**2007 :** \$165,000

**2008 :** \$165,000

**2009 :** \$165,000

**Category:** 4401 - PHILOSOPHY  
QEII Prof J Ismael

**Administering Institution:** The University of Sydney

**Summary:**

The project deals with topics which, since the early days of quantum theory in the 1920s and 1930s, have generated wide interest among general readers. It is investigating questions to which many Australians, as well as a great many more people internationally, would like to know the answers. It brings to Australia two distinguished young international researchers, thus substantially enhancing Australia's skill base and international reputation in these fundamental fields. The project's core research team will also act as a catalyst for further international collaborations.

**DP0556065** Prof EC Probyn; Dr JA O'Dea

**Title:** Youth Cultures of Eating: A Cultural Analysis of Youth Obesity, Gender, Class, Ethnicity and Generation.

**2005 :** \$87,000

**2006 :** \$153,000

**2007 :** \$71,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

Australian children and teenagers rank among the most overweight in the world. While there has been ample information about healthy eating, the message does not seem to be getting through to youth. This will be the first in-depth nationwide cultural study of the effects of gender, ethnicity, class, generation and geographical location on the food consumption practices of youth. It will provide information and analysis about how primary and high school students, teachers and parents perceive the problem of youth obesity. It will also provide insights which will enable policy-makers, school authorities and health practitioners to better understand this issue.

**DP0557139** Dr F Probyn

**Title:** **Whiteness: A Genealogical Study**

**2005 :** \$35,000

**2006 :** \$29,000

**2007 :** \$68,000

**Category:** 3799 - OTHER STUDIES IN HUMAN SOCIETY

**Administering Institution:** The University of Sydney

**Summary:**

We know so little about the white fathers of indigenous children and yet they remain a crucial part of stolen generations history. Bringing to the fore material about white fathers may further research on the possibilities of reconciling different historical accounts of Australian social life. As such, this research promises both intellectual innovation and practical societal benefits.

**DP0556706** Prof L Radom

**Title:** **Free Radicals in Chemistry and Biology: A Computational Quantum Chemistry Investigation**

**2005 :** \$255,902

**2006 :** \$238,428

**2007 :** \$261,436

**2008 :** \$241,050

**2009 :** \$261,050

**Category:** 2506 - THEORETICAL AND COMPUTATIONAL CHEMISTRY

APF Prof L Radom

**Administering Institution:** The University of Sydney

**Summary:**

This proposal aims to carry out state-of-the-art chemistry research using computers rather than traditional laboratory techniques. Free radicals, which have widespread importance in the multibillion dollar polymer and health industries, form the centrepiece of the proposal. These are highly reactive substances that are difficult to study by conventional experimental techniques but ideal to study using computers. The increased understanding of free radicals that will stem from this research may help in dealing with ageing, and afflictions such as hardening of the arteries and vitamin B12 deficiency. It will also result in the training at the highest level of new generations of chemists in this exciting field of "chemistry with computers".

**DP0559104** A/Prof JE Rasko; Dr S Broer; Prof G Halliday; Prof JD Pollard

**Title:** **The role of neutral amino acid transport in normal physiology**

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 3203 - MEDICAL BIOCHEMISTRY AND CLINICAL CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

Future benefits of these studies include the Promotion and Maintenance of Good Health achieved by providing: (1) a better understanding of brain and balance disorders; (2) insights into the damaging effects of the sun and; (3) existing neonatal screening programmes for Hartnup disorder with greater scientific foundation regarding the implications of inheriting this condition, including dietary advice. We will be able to provide Australians who inherit Hartnup disorder with a better understanding of this disease by enabling individuals and families to make choices that lead to healthy, productive and fulfilling lives.

**DP0559983** Dr KJ Rasmussen; Prof GJ Hancock

**Title:** **Behaviour and innovative design of drive-in steel storage racks**

**2005 :** \$80,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

Drive-in steel storage racks offer the most space-effective solution to storage needs. They have become increasingly sought after as population growth concentrates in the main Australian metropolitan areas, which is pushing up the cost of land and storage. However, the high failure rate of drive-in racking systems is costly to society, as they cause disruptions to our production and supply cycles, and lead to increased costs to Australian industry and the consumer of the final product. There are great national benefits to be gained from developing innovative drive-in storage systems which have minimum risk of structural failure. Such systems will also enhance the international competitiveness of the Australian rack manufacturing industry.

**DP0558261** A/Prof PM Redding

**Title:** **Idealism and the objectivity of norms and values: a neglected path from the eighteenth century**

**2005 :** \$35,611

**2006 :** \$35,159

**2007 :** \$40,360

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** The University of Sydney

**Summary:**

The problem of understanding how norms and values can be objective within the modern, secular scientific worldview became a focus of European philosophical concern in the early modern period; it is now of vital practical concern for the community as a whole. From the perspective of modern culture, both high and low, individuals are often portrayed as facing a choice between individual gratification and a self-less commitment to values or norms which cannot be rationally justified. By showing this to be a false dichotomy, this project promises a way beyond this impasse.

**DP0559665** Prof PR Reeves; Dr GN Samuel

**Title:** Elucidation of bacterial glycosyltransferase specificity

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2708 - BIOTECHNOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

The benefits are involvement in the growth area of polysaccharide research, with potential for major industrial spin off. Polysaccharides are critical in all organisms as signalling, structural and storage compounds. Bacteria make a wide variety with extensive use of unusual sugars, some with uses from oil emulsifiers to food thickeners. The project is on the enzymes that assemble bacterial polysaccharides. We are world leaders in genetics of the gene clusters especially synthesis of the unusual sugars. We now aim to fill a major gap by determining which enzymes make which bonds, leading to options for new gene combinations and novel structures. We have a lead in research in this area and Australia gains if we maintain that lead.

**DP0560014** Prof P Reimann; Prof P Goodyear; A/Prof J Kay; Dr K Yacef

**Title:** Analyzing and supporting cooperation management in online learning communities

**2005 :** \$90,000

**2006 :** \$55,000

**2007 :** \$55,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

Australian companies, universities and other organizations are competing with other nations in the 'knowledge market', and given the size of Australia's population compared to many of its competitors, keeping a position at the forefront of knowledge production and innovation has become an economic necessity. Communities of practice and other forms of collaborative teams are becoming important as producers and disseminators of knowledge and social capital. Our research will help such knowledge producing entities to make optimal use of modern communication media, employing elements of 'smart' technologies. Research outcomes will contribute to the design and support of knowledge building communities in form of guidelines and software tools.

**DP0557118** Dr LM Rendina; A/Prof JA Coderre

**Title:** Platinum-Carborane Complexes as New Agents for Boron Neutron Capture Therapy

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

The development of new drugs and treatments for cancer is highly important to human health and the well-being of the community. This research has the potential to lead to new anticancer pharmaceuticals that will expand the clinical efficacy of current drugs and generate significant export income through future IP development and possible commercialization. The innovative nature of this research will also contribute to Australia's science knowledge base, a key element in its future economic prosperity, and it will provide excellent training of young researchers for employment in the rapidly expanding field of biotechnology.

**DP0557235** Dr LM Rendina; A/Prof MM Harding

**Title:** DNA Nanoshuttles: A New Class of DNA-Binding Molecules

**2005 :** \$180,000

**2006 :** \$160,000

**2007 :** \$170,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Sydney

**Summary:**

The interaction of molecules with DNA, the molecule that controls genetic information, is fundamental to drug design, diagnosis of disease and the environment. DNA-nanoshuttles are ring-shaped molecules that thread onto DNA and shuttle from one end to the other. This threading interaction is without precedent and hence DNA-nanoshuttles have significant potential applications in all areas of medicine, biotechnology and nanotechnology that involve DNA interactions. This research may lead to the design of new diagnostics and applications that will benefit the Australian community, and will provide excellent training of researchers in skills required for employment in the biotechnology and pharmaceutical fields.

**DP0556288** Prof PA Robinson

**Title:** **Quantitative Brain Dynamics**

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Sydney

**Summary:**

This proposal will benefit Australia through unique and fundamental contributions to understanding brain dynamics via the development of innovative approaches and technologies. It will contribute to the national priority goals of Breakthrough Science, Frontier Technologies, and Promoting an Innovation Culture and Economy. Science outcomes will include improved understanding and probing of brain self-organization, dynamics, and function, including unique contributions to understanding alertness and the foundations of vision. These outcomes will be applied to develop new technologies for brain imaging and monitoring.

**DP0558069** Dr PA Russell

**Title:** **A History of Manners: Savagery and Civility in Colonial Australia**

**2005 :** \$40,000

**2006 :** \$20,000

**2007 :** \$40,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

The lessons of the past are vital to Australia's future. In the twenty-first century, Australia faces the urgent need to communicate across cultural barriers, and to acknowledge and respect divergent codes of conduct and manners. The history of manners in nineteenth-century Australia helps us to come to terms with our contested past by illuminating the complexities of a colonising culture, and the difficulties of adapting codes of conduct to the needs of a young, disparate and ever-changing society. Exploring the limitations of Australian elitism and egalitarianism, it opens the way for diverse and inclusive understandings of identity and national character.

**DP0557450** Prof M Sankey; Dr FJ Fornasiero; Dr JN West-Sooby; Prof Dr MJ Jangoux

**Title:** **The Baudin Legacy: A New History of the French Scientific Voyage to Australia (1800-1804)**

**2005 :** \$140,000

**2006 :** \$110,000

**2007 :** \$100,000

**2008 :** \$57,157

**2009 :** \$85,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

More interested in the British stories of conquest and settlement, historians have largely neglected an important episode in Australian history, the French scientific expedition to New Holland (1800-1804), led by Nicolas Baudin and commissioned by Bonaparte. As well as making Australians aware of the diversity of their past, and thereby contributing in our multi-cultural society to debates concerning national identity, the project will add significantly to knowledge of early encounters between the Europeans and Aborigines, and to the scientific history of our continent. The Franco-Australian nature of the project will have the particular benefit of strengthening and creating social and collaborative links between Australia and France.

**DP0560190** Dr BF Scholz

**Title:** **Compilation Techniques for Embedded Systems**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** The University of Sydney

**Summary:**

Highly optimising compiler tools are becoming an important part of the software development process for embedded systems. This project will provide Australia with core technology in the area of tools for embedded systems. It will allow safer embedded systems in mission-critical applications. In addition, the Australian Industry will benefit from a substantially growing embedded systems market where tools are a pre-requisite for a cost-aware and safe software development. The industry interested in embedded system tools are: Telecom/Datacom, Consumer Electronics, Industrial Automation, Retail Automation, Office Automation, Military/Aerospace, Automotive, Information Automation, Medical Devices.

**DP0560079** Dr JL Shields; Prof Dr A Frino; Dr M O'Donnell; Dr JM O'Brien

**Title:** **CEO Remuneration, Organisational Performance and Corporate Governance in Australian Listed Companies, 1998-2007: A Composite and Case-Study Analysis.**

**2005 :** \$80,000

**2006 :** \$65,000

**2007 :** \$65,000

**Category:** 3502 - BUSINESS AND MANAGEMENT

**Administering Institution:** The University of Sydney

**Summary:**

The project will make a major contribution to the theory and practice of executive-level human resource management in Australia and, hence, to the performance of Australian firms and the national economy. It will enhance practitioner understanding of the factors underlying the responsiveness of CEO remuneration to firm performance. It will strengthen awareness of the potential and limitations of CEO remuneration as a determinant of corporate performance. It will enrich understanding of context-specific 'best practice' methods of CEO remuneration design, administration and monitoring and will thus facilitate a more effective diffusion of such methods in Australian firms.

**DP0558332** Dr B Singh

**Title:** Mechanisms of heavy metals sequestration and immobilization by goethite in multi-element environments

**2005 :** \$100,000

**2006 :** \$98,000

**2007 :** \$100,000

**Category:** 3001 - SOIL AND WATER SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

The research project will achieve critical goals of protecting river and ground water, and soil environments from toxic waste emissions from abandoned mine sites and acid sulphate soils. It will help in formulating strategies to overcome the problems of environmentally significant heavy metals in contaminated soil environments.

**DP0558115** A/Prof GA Sluga

**Title:** Nation, Race, Rights and the New World Order, 1945-1966

**2005 :** \$112,379

**2006 :** \$20,000

**2007 :** \$92,630

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

Given the beleaguered status of international organisations, the postwar universal human rights agenda, and race relations, the history of the ideas of nation, race, and rights is ripe for an analysis that seeks to understand the formative post-Second World War period. This project examines the contribution to international discussions and legislation concerning rights and racism, made by representatives of a nation that continued to adhere to a policy of 'white Australia' after the Second World War. As a result it places the history of race and nationalism in Australia in a comparative and international context.

**DP0558518** A/Prof JC Small; Prof JP Carter

**Title:** The effect of tunnelling on existing rock bolts

**2005 :** \$91,984

**2006 :** \$93,000

**2007 :** \$101,265

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

As more underground facilities such as rail, road, sewerage and service tunnels are constructed in our major cities, more and more frequently new tunnels have to cross over or run alongside existing tunnels. As the roofs of tunnels are generally supported by rock bolts and lined with shotcrete, the support system can be damaged by the rock movements caused by the excavation of the new tunnel. Little research has been carried out on this problem, and so often expensive deviations have to be made to tunnels to avoid going near existing ones. The proposed research will provide numerical tools to allow prediction of loads induced into rock bolts by nearby tunnels, leading to more economical and safer tunnel design.

**DP0560207** Prof AW Snyder; Prof TR Bossomaier; Prof DJ Mitchell

**Title:** Teaching Software Agents to Play

**2005 :** \$83,000

**2006 :** \$75,000

**2007 :** \$74,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Sydney

**Summary:**

This project is fundamental to computational intelligence and human brain science. Both strongly impact on the community and the nation. They form the backbone of contemporary information science and are key to our National Research Priorities. This research is of great community benefit. Our results will enable everyone to rapidly search, analyse and interpret vast amounts of information that is irretrievable by current methods. They will also enliven interactive entertainment by spontaneously creating unique, tailor-made music. In sum, we are making a leap forward in the crucial area of collaborative intelligence.

**DP0557733** Mr Z Su

**Title:** Online Structural Health Monitoring (SHM) System Using Active Diagnostic Sensor Network

**2005 :** \$83,600

**2006 :** \$78,102

**2007 :** \$73,802

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING  
APD Mr Z Su

**Administering Institution:** The University of Sydney

**Summary:**

It is imperative to remain technological leading for Australian research community. But current lack of reliable technique in structural health monitoring in Australia is considerably impeding her competition with other developed countries in areas of forefront technology. Outcomes of the project will lead to an online structural health monitoring system incorporated with active diagnostic sensor network, related software and hardware, novel signal processing technique, and artificial intelligence algorithm-based damage identification scheme. Its successful applications in various industries, e.g. aerospace, maritime and civil, are expected to bring significant improvement in operation safety and great benefit in reducing maintenance cost.

DP0557526 Dr MB Thompson; Prof CR Murphy

**Title:** Evolution of viviparity in reptiles: the fundamental role of junctional complexes

**2005 :** \$120,000

**2006 :** \$100,000

**2007 :** \$100,000

**2008 :** \$100,000

**2009 :** \$100,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** The University of Sydney

**Summary:**

This project utilises unique Australian reptile fauna to understand global questions in fundamental biology. We will discover basic biological information on native species, which will be important in future conservation of Australian ecosystems and animals and ultimately in helping to maintain Australia's biodiversity. The project also provides training opportunities for graduate and undergraduate students in several different research methods that are widely applicable in the more general Australian workforce. Because the research work is genuinely cross-disciplinary research, its findings are applicable to both biological and medically oriented technologies.

DP0558112 A/Prof L Unsworth; Prof JR Martin; Dr CA Painter

**Title:** Image/text relations in narrative and information texts for children in print and electronic media: Multimodal text description for multiliteracies education.

**2005 :** \$90,000

**2006 :** \$50,000

**2007 :** \$40,000

**Category:** 3302 - CURRICULUM STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

This project will produce a new theory of the ways images and language interact to make meanings in electronic and traditional texts. The theory will be adapted to provide a new grammar of image/text relations that is accessible to students and teachers. It will enable the literacy teaching and learning required for today's multimodal texts to be based on an explicit systematic account of how different aspects of language and images are structured to make meanings. A grammar of image/text relations will facilitate consistency in literacy syllabus documents, more efficient teacher education in the literacies of multimodal texts, and more effective teaching of the literacies children need for the multimedia environment they live in.

DP0559166 Dr P Van Toorn

**Title:** Autobiography of a People: Aboriginal Writing in Queensland, 1890s-1930s

**2005 :** \$49,000

**2006 :** \$25,000

**2007 :** \$47,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

As the recent 'history wars' confirm, Australians today care deeply about the colonial past, because its legacies are 'all around us and within' (as Oodgeroo noted). This project advances knowledge and conceptual understanding in the key areas of colonial race relations, Indigenous self-representation, and Indigenous literacy. Aboriginal autobiography is an especially effective tool for stimulating the empathetic imagination, and bridging social, temporal and geographical distances between people. This research will strengthen the nation's social fabric by promoting inter-racial understanding, and by adding historical depth to present thinking about contemporary Aboriginal attitudes to literacy.

DP0559263 Prof B Vucetic

**Title:** Adaptive MIMO Signalling Techniques and Their Applications in Wireless Communications and Radar Systems

**2005 :** \$92,000

**2006 :** \$92,000

**2007 :** \$91,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Sydney

**Summary:**

The proposed project will contribute to theory, design and deployment of forthcoming wireless systems. The new technology will enable a breakthrough in available data rates leading to introduction of novel multimedia services. Indirectly, the project will impact implementation and penetration of wireless devices and services. In society will advanced wireless services remote home medical care, diagnosis and surgery will become common. Compact wireless devices attached to various objects, flora and fauna, will contribute to logistics efficiency, protecting global environment and preventing disasters. At a broader scale these developments will thus contribute to the overall quality of life.

DP0558810 Dr Y Wang

**Title:** From Local Stories to National Identity: Competing National Myths in Chinese Nativist Fiction

**2005 :** \$51,759

**2006 :** \$48,606

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

China's continuous and rapid economic upsurge means it will play an increasingly greater role globally but its influence in our region will even be greater. Understanding China is imperative for Australia, which can only be achieved through understanding the core Chinese social and cultural values. It is vital for Australian policy-makers to know how cultural identification within China functions and how the Chinese government uses culture (among other means) to hold the vastly different regions together. Cultural understanding demands an appreciation of literature, the importance of which in Chinese cultural life is often underestimated outside China.

**DP0556126** Prof GG Warr; Dr R Atkin

**Title:** **Surfactant Self-Assembly in Ionic Liquids**

**2005 :** \$90,000

**2006 :** \$90,000

**2007 :** \$80,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

APD Dr R Atkin

**Administering Institution:** The University of Sydney

**Summary:**

Room temperature ionic liquids have emerged recently as important environmentally-friendly solvents for synthesis, catalysis, and electrochemical applications. This project will generate significant new fundamental understanding, and train young researchers in the use of RTILs and advanced characterization techniques at honours, postgraduate and postdoctoral levels. The results of this project will enable the development of new technologies by adapting water-based surfactant technologies to a range of low-volatility RTILs. Examples include new mesoporous catalysts, nanostructured self-assembled scaffolds and composite materials, nanoparticle synthesis, novel lubricants and drug-delivery systems.

**DP0558571** Dr SB Williams; Dr AD Blair

**Title:** **Decision making and mission planning for Unmanned Underwater Vehicles**

**2005 :** \$85,000

**2006 :** \$71,000

**2007 :** \$75,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Sydney

**Summary:**

The work specifically addresses the National Research Priorities in sustainable use of Australia's biodiversity, techniques for transforming Australian industry and Safeguarding Australia. Without a thorough understanding of processes that affect the state of health of our oceans they will continue to be affected by natural phenomena and stresses caused by human activity. A more comprehensive understanding of these natural systems and the interplay with human activities is therefore essential.

**DP0556464** Prof PJ Wilson; Prof EG Csapo

**Title:** **Accounting for the Ancient Theatre: a new social and economic history of Classical Greek drama**

**2005 :** \$100,000

**2006 :** \$88,000

**2007 :** \$85,000

**2008 :** \$85,000

**2009 :** \$100,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Sydney

**Summary:**

This project will significantly advance our understanding of the Classical theatre, an institution at the fountainhead of the European tradition that continues to form a major element in Australia's cultural and historical heritage. The undertaking of such an ambitious project in this field on Australian soil will greatly enhance the international profile of Australian humanities research, and serve as a proud counterweight to the regrettable tendency that sees Australian-trained scholars conduct such research outside the country. It will have particular resonance for the prominent Italian and Greek communities in Australia in its exploration of a key element of their cultural heritage which has now also become a truly global phenomenon.

**DP0559237** Dr C Yan; Ms HY Liu

**Title:** **Development of deformation-failure-mechanism based parameters for design of microstructured optical fibre and photonics assembly**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$50,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

Australia has exceptional quality and depth in photon science research, with a demonstrated capacity to found and grow commercial ventures. However, the optimal design of interconnections in a photonic package is severely restricted by a lack of detailed knowledge of their deformation and failure mechanisms. The proposed study will use novel techniques to create a basis for mechanism-based deformation and failure models that will then be used to improve the design and lifetime of new type microstructured optical fibres and adhesive assemblies, expanding and enhancing Australia's capacity in the areas.

DP0559137 Prof L Ye; Dr A Afaghi-Khatibi; Dr X Wang

**Title:** On-line structural integrity assessment of advanced composite airframe with sensor network

**2005 :** \$130,000

**2006 :** \$115,000

**2007 :** \$120,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Sydney

**Summary:**

The project addresses frontier technologies that lead to solutions to one of the critical key issues forming the Australian community - online integrity/safety assessment of structures or asset including aircraft, ships, buildings and bridges. The community benefits significantly if potential disaster due to occurrence of damage associated with those structures can be prevented - the ultimate aim of researchers for decades. It is imperative that Australian industries remain technologically ahead of international competitors. Outcomes of the project will lead to novel technologies for real-time structural health monitoring and integrity assessment, bringing significant improvement in operation safety and driving down maintenance cost.

DP0559471 Dr Y You; A/Prof RD Muller; Dr CJ Poulsen; Dr J Ribbe

**Title:** Simulating the evolution of the Southern Ocean and Australia's Palaeo-environment over 40 million years

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** The University of Sydney

**Summary:**

Our project falls in the first national research priority: an environmentally sustainable Australia and meets two of its primary goals, understanding environmental change and the evolution of biodiversity, and responding to climate change and variability. Our models will represent a major step forward in differentiating between natural processes and anthropological input to present global climate change and will address quantitatively how Australia changed from a continent rich in freshwater to the driest inhabited continent throughout the last 40 million years.

DP0558543 Dr I Zarudi

**Title:** Surface Polymorphism of Hard Brittle Materials

**2005 :** \$35,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

The knowledge gained from this project will be of great value in creating components of hard brittle materials with enhanced properties and expanded margins of application. The outcome will have impact on the ultra-precision manufacturing giving a competitive edge to the Australian fabrication industry. The fundamental knowledge gained from this project has the potential to facilitate the development of new devices and techniques such as those required for bio-medical, photonic and electronic technologies.

DP0558950 Prof L Zhang; Dr W Cheong

**Title:** Nanotribology of Carbon Nanotube Reinforced Composites: The Processing-Microstructure-Property Principles and Technology

**2005 :** \$130,000

**2006 :** \$125,000

**2007 :** \$130,000

**Category:** 2903 - MANUFACTURING ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

The nanotribology science for carbon nanotube reinforced composites has not been established and industry found that published methods were not usable. This project will make a major step forward on the theoretical development and offer an innovative technology to enable industry to determine optimal manufacturing conditions. The success of research will greatly enhance Australia's international standing and sharpen the competitive edge of Australian industry. Meanwhile, the project will strengthen Australia's international links and provide an interdisciplinary opportunity for junior researchers to develop their skills in one of the most important areas in the century.

DP0556300 Dr Q Zhang

**Title:** Novel biodegradable starch/clay nanocomposites with enhanced strength and moisture resistance

**2005 :** \$35,000

**2006 :** \$30,000

**2007 :** \$30,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** The University of Sydney

**Summary:**

The outcomes of the project will make an important contribution to a new technology of biodegradable polymer nanocomposites based on natural starch and clay. The project has direct environmental benefit due to the complete biodegradation of the resulting starch/clay nanocomposites which will be able to replace some non-biodegradable polymers in packaging and disposable bags, cups and boxes, etc. The reduction in use of non-biodegradable polymers will be helpful to solve the 'white pollution' and improve our living environments. This study will result in huge economic benefits for the national agriculture and plastic industries since Australia has a large starch production, and will enable Australia to be at the leading edge in this area.

**DP0557909** Dr B Zhou; Prof J Dongarra; Prof RP Brent

**Title:** **Grid Computing for Phylogenetic Analysis**

**2005 :** \$93,000

**2006 :** \$83,000

**2007 :** \$83,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** The University of Sydney

**Summary:**

This interdisciplinary project relates to information technology and bioinformatics, which both can be classified as Frontier Technology in the priority areas outlined by the ARC. Grid computing and using the state-of-art IT technologies to solve grand challenging problems in phylogenetic analysis are forefront research topics in information technology and bioinformatics. The analytical results and new technologies obtained in this project will certainly have significant implications in the relevant areas. New platforms and software developed could have commercial value. It is of great significance that Australia maintains its pioneering position and international reputation in research in Grid computing and its applications.

**DP0557945** Dr H Zhu; Prof Dr EF Vansant; Prof Dr J Zhao; Prof Dr X Gao

**Title:** **Reactions of Nanoparticles of Metal Oxides and Hydrrous Oxides and their Applications in Photocatalysts and Electrode Materials**

**2005 :** \$130,000

**2006 :** \$100,000

**2007 :** \$130,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Sydney

**Summary:**

Australia is a world-leading producer of raw materials of many metallic elements, most of which are exported at low-values. This project will yield important knowledge in new synthetic techniques for making nanostructures of metal oxides. These tiny particles already have a large worldwide market, but the discovery of particles with superior properties or new applications could lead to new industries and high-value exports. This project aims to devise novel photocatalysts for solar energy conversion and environmental protection, and electrode materials for lithium batteries. It will contribute to the overall competitiveness and productivity of Australian R&D by advancing scientific knowledge and training young researchers.

**DP0559724** Dr H Zhu; Dr H Wang; Dr KR Ratinac

**Title:** **Meshes of Oxide Nanofibres for Next-Generation Ceramic Membranes**

**2005 :** \$90,000

**2006 :** \$83,000

**2007 :** \$85,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Sydney

**Summary:**

Our next-generation ceramic membranes will increase the speed and efficiency of present industrial separations as well as expanding into a variety of new separations, thereby transforming many Australian industries. Exports of this new technology also will generate significant national benefits. Application of these new membranes to removing pollutants and pathogens from water and/or air will bring significant community benefits globally, addressing such crucial issues as low-cost provision of clean drinking water. Additionally, understanding the cutting-edge science associated with the mechanisms of nanofibre growth and the assembly of nanofibre meshes is highly valuable, making an important contribution to Australia's knowledge-economy.

## **University of Technology, Sydney**

**DP0559145** Dr C Bajada

**Title:** **The Dynamics Shaping Underground Economic Behaviour**

**2005 :** \$55,892

**2006 :** \$58,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** University of Technology, Sydney

**Summary:**

Tax evasion and the underground economy have recently become a topical issue in Australia. The underground economy is said to exist when a person either fails to declare cash earnings or overstates consumption expenditure in order to minimise their tax paying obligations. This current project will undertake the first international analysis of the behaviour of those participating in the underground economy and how these individuals respond to changes in taxes and economic opportunities. The results will contribute to future decisions that may affect tax policy, tax audit programs and taxpayer compliance initiative strategies, particularly those affecting Australia.

**DP0558913** A/Prof B Ben-Nissan; Prof RZ LeGeros

**Title:** Formation of bone-like materials for bone repair and regeneration

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** University of Technology, Sydney

**Summary:**

A successful outcome for this project would lead to the production and application of new bone-like calcium phosphate materials. Enhanced bioactivity of this material would lead to higher but controlled rates of calcium phosphate release. An understanding of the formation process of these materials and the controlled release of calcium phosphates has the potential to slow the development of metabolic diseases such as osteoporosis. The WHO reports that osteoporosis is the second largest health care problem world-wide. In 2002, 44 million people in the USA were estimated to be at risk. This and similar figures in Australia and around the world emphasize the urgency of understanding and appropriately combating weak bone degenerative diseases.

**DP0560005** Dr DJ Booth

**Title:** The mechanisms of settlement success in coral reef fishes

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** University of Technology, Sydney

**Summary:**

Most marine fishes, including commercial species, produce larvae that disperse in the open ocean. The short period during which these larval fishes leave the open water and take up residence on adult benthic habitat (settlement) is critical in determining the success of the population, but is poorly understood. Settling larvae differ in their physical attributes, including body size and physiological condition, both of which affect their vulnerability to predators and their ability to compete for food and grow. By looking closely at this short life history stage, we hope to better understand how the supply of offshore larvae controls the production of marine fishes, including commercial fisheries.

**DP0557940** Prof A Craig; Dr Y Tran

**Title:** Enhancing the independence of the severely disabled: Improving the detection rates of an EEG based brain computer interface (BCI)

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** University of Technology, Sydney

**Summary:**

Severe disability costs the Australian economy and society billions of dollars each year and the population of severely disabled is steadily increasing. Also, disability results in impairments that can traumatically alter a person's life. The outcomes of this project will result in substantial national benefits by (i) optimising technology that will greatly improve the life of the disabled by enhancing their ability to control their environment, (ii) situating Australia in the forefront of disability technology research and development, and (iii) enhancing the development of knowledge in research training students in the biomedical area.

**DP0557819** Prof JP Dalton; Dr CM Stack; Dr L Brinen

**Title:** Functional and structural diversity of the cathepsin L peptidase from the human blood fluke *Schistosoma mansoni*

**2005 :** \$95,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 3204 - MEDICAL MICROBIOLOGY

**Administering Institution:** University of Technology, Sydney

**Summary:**

Peptidases are enzymes that are important in many infectious and physiological disease states. For example, they are used by infectious pathogens to enter human tissues and survive inside their bodies. The same type of enzymes also contribute to tissue damage in many pathological processes in humans such as cancer, arthritis and osteoporosis. There is an urgent need to define their structure and properties so that we can employ rational approaches to develop new drugs that can combat these diseases and ailments.

**DP0557168** Prof JK Debenham; A/Prof SJ Simoff; Prof C Sierra

**Title:** **The Curious Negotiator -- committing only to that which is maximally non-committal.**

**2005 :** \$96,000

**2006 :** \$91,000

**2007 :** \$91,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** University of Technology, Sydney

**Summary:**

Despite the hype surrounding electronic business-to-business commerce, little business is conducted completely automatically as yet due to the complexity of the issues being negotiated and by the high value of the deals involved. Sophisticated and reliable negotiation technology is required to address this shortcoming. This project looks beyond electronic business to informed negotiation in a broad sense. It will create reliable automatic negotiators for which information is a strategic weapon. It will build systems to extract reliable market information. The whole project is embedded in electronic institutions that foreshadow the electronic markets of tomorrow.

**DP0557154** Prof TS Dillon; Dr J Lu; Dr G Zhang

**Title:** **Generalizing Multi-level Decision Support Handling Multi-objectives, Multi-followers and Uncertainty for Critical Resource Planning**

**2005 :** \$111,363

**2006 :** \$106,051

**2007 :** \$129,937

**2008 :** \$106,051

**2009 :** \$106,051

**Category:** 2801 - INFORMATION SYSTEMS

QEII Dr G Zhang

**Administering Institution:** University of Technology, Sydney

**Summary:**

The proposed multi-level optimisation techniques and fuzzy multi-objective multi-follower multi-level decision support system can be used widely in government and industries of Australia to reduce decision blindness, improve decision effectiveness, and therefore has the potential to increase the competitiveness of organizations. Many organizations in Australia are decentralized and have a hierarchical structure. The proposed techniques are extremely effective for such kinds of organizations in critical planning, management and policy making, including tourism resource planning, water resource management, financial planning, healthcare planning, land-use planning, production planning, transportation planning, and power market planning.

**DP0559695** Prof D Eamus; Dr M Williams

**Title:** **Measuring tree water use and calculating stand water use**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2704 - BOTANY

**Administering Institution:** University of Technology, Sydney

**Summary:**

The national benefit of this project is significant. Woodlands and forests transpire vast amounts of water into the atmosphere and this water is thus lost to human consumptive use. Given large variation in rainfall between years and between seasons, it is vital that water and catchment resource managers are able to estimate how much water is lost through trees. This allows estimation of the amount of water available for irrigation, drinking, other industrial uses or maintaining ecosystem health. This project will be the first to generate a mechanistic understanding thereby allowing estimates of water use across a range of woody ecosystems in Australia.

**DP0559161** Dr C Feng

**Title:** **Democrats within the Chinese Communist Party and China's Democratic Future: The Case of Li Shenzhi**

**2005 :** \$30,000

**2006 :** \$30,000

**2007 :** \$30,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** University of Technology, Sydney

**Summary:**

A major nuclear power with ambitions for regional predominance, China is home to one fifth of the world's population, the world's fastest-growing economy since the 1980s, one of the few surviving communist regimes, and Australia's third-largest trading partner. Whether China will democratise is central to international peace and stability and to any assessment of the future of world politics and international order. The project will make conceptual and empirical advances in the study of intellectual life and political trends in China and help Australian government and public bodies achieve a greater understanding of the political process in that country.

**DP0558875** A/Prof MJ Ford; Prof MB Cortie; Dr M Zareie; Prof JD Gale; Dr C Ton-That

**Title:** **Exploiting the properties of gold nanoparticles for nanolithography using visible wavelengths**

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** University of Technology, Sydney

**Summary:**

The next generation of nano-devices, such as biosensors and molecular electronics, will require nanopatterning as part of the production process. Conventional optical lithographies cannot provide sufficient resolution, and alternative techniques, such as e-beam lithographies are expensive. This project aims to demonstrate a solution to this problem with obvious commercial benefit. It is the first time a multidisciplinary team has made such a concerted effort to understand the unusual science of gold nanoparticles and will strengthen Australia's already considerable reputation in this field.

**DP0555935** Prof DS Goodman; Dr Y Lu

**Title:** **Germany in China: Colonial Interactions, Qingdao 1897-1914**

**2005 :** \$130,000

**2006 :** \$130,000

**2007 :** \$150,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** University of Technology, Sydney

**Summary:**

The project will assist in increasing Australia's knowledge base about both colonialism in general and social change in China; to add to Australia's international reputation as a major center of research on China; and to provide additional information on local development in Qingdao, a major growth area in East China, that assists those engaged in government and business relations.

**DP0560143** Dr SP Gudergan; Dr JL Johnston

**Title:** **Public-Private-Partnership Governance and Performance: An Empirical Assessment**

**2005 :** \$40,000

**2006 :** \$40,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** University of Technology, Sydney

**Summary:**

While Australia's rural and regional communities require improved infrastructure services at reduced costs and higher quality; infrastructure costs are significant and governments' funds are insufficient to meet demand. Public-private-partnerships (PPPs), if they work successfully, can be the key to meet this demand. As PPPs reduce the financial investment that governments need to make, the greater the opportunity for considered infrastructure development, if the PPPs are successful and meet their intended financial and social objectives. Thus, a better understanding of the performance outcomes of different governance mechanisms in PPPs can result in less expensive and better infrastructure services for Australia's communities.

**DP0556537** Dr Y Guo

**Title:** **Openness in China under the WTO Regime: the Case of Dingzhou**

**2005 :** \$40,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** University of Technology, Sydney

**Summary:**

The project will contribute to a better understanding in Australia of openness in local China, in particular, and sociopolitical change in China and the globalization process in general. In doing so, it will add to Australia's international reputation as a major centre of research on China and as a leader in research socio-political change at the local level. It is also likely to benefit bilateral trade by providing useful information to those in Australia who wish to do business in China, especially in small cities like Dingzhou and rural areas.

**DP0559405** Dr QP Ha; Dr J Li; Prof B Samali

**Title:** **Development of Robust Control Systems for Magneto-Rheological Fluid-Based Smart Structures**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2903 - MANUFACTURING ENGINEERING

**Administering Institution:** University of Technology, Sydney

**Summary:**

Possessing the ability to withstand such destructive dynamic loading as gusty winds, fierce waves, and earthquakes, the smart structures of the future will enjoy the unprecedented safety and comfort bringing to their occupants and contents. This will directly benefit Australians. The development of the smart structure technology will also give domestic consultants the ability to compete internationally, resulting in obvious economic dividends and advantages benefiting Australia. Moreover, a successful effort leading to a major breakthrough of the important area of seismic protection research will have a significant impact far beyond the border of this country.

**DP0558122** Dr BP Kelaher

**Title:** **A new approach to understanding community variation in marine soft-sediments**

**2005 :** \$65,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** University of Technology, Sydney

**Summary:**

Sustainable management of Australia's rich coastal biodiversity requires an mechanistic understanding of soft-sediment systems, as these dominate the benthic environment of our Exclusive Economic Zone. This project will substantially enhance our fundamental knowledge of soft-sediment systems by determining major processes responsible for variation in benthic community structure. This research will improve sustainable management of estuaries by (i) increasing the cost-effectiveness of detecting environmental change, (ii) determining any negative effects of changing detrital resources, and (iii) documenting soft-sediment species currently present in Botany Bay, which will aid in the early detection of invasive pests.

**DP0559770** Dr BP Kelaher; Dr DJ Booth

**Title:** **Trophic cascades in Australian seagrasses: linking nutrients to survival and growth of commercially-important fishes**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** University of Technology, Sydney

**Summary:**

Despite its high conservation status and importance to commercial and recreational fisheries, seagrass is still declining in Australian waters. By investigating a trophic cascade that links nutrient pollution to the growth and survivorship of seagrass and commercially-important juvenile fishes, our study fills knowledge gaps crucial for improved future management of seagrass habitats. The primary outcome of this study will be a model that can predict how changes in nutrient pollution will influence population dynamics of commercially-important fish species supported by seagrass. This information has, therefore, direct relevance to managers of estuarine and coastal environments at all levels of government - local, state and federal.

**DP0559836** Prof DB Lowe; A/Prof D Zowghi

**Title:** **Supporting co-evolution of business processes and Web systems**

**2005 :** \$132,000

**2006 :** \$90,000

**2007 :** \$91,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** University of Technology, Sydney

**Summary:**

This research will provide significant benefit to the Australian Internet and e-commerce industries (valued by the ABS as in excess of \$11b/year). It will result in improved products that better satisfy specific business needs (and hence improved competitiveness in a global market). Development cycles will shorten (as the likelihood of redevelopment decreases) and costs of development will fall. Finally, the models and tools to be developed will facilitate the transition of traditional organisations into the new economy, as the outcomes of this research will provide a transparent cost-effective approach for identifying and clarifying the evolving business domain and the requirements of companies.

**DP0559213** Dr J Lu; Dr G Zhang

**Title:** **Uncertain Information Processing for Situation Awareness and Dynamic Decision-Making in Emergency Management**

**2005 :** \$61,270

**2006 :** \$63,519

**2007 :** \$70,768

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** University of Technology, Sydney

**Summary:**

The Australian national counter-terrorism committee indicates that Australia should have a strong intelligence-led prevention and preparedness to support Australia on risk management, emergency services and maintaining capabilities to manage various types of terrorist attacks. The proposed situation awareness support technique can be used to develop situation analysis software systems or directly support Australia government agencies and industries to correctly assess a situation, increase awareness for crisis problems, and therefore improve emergency management and decision-making effectiveness, in particular, for avoiding disaster problems in the first place and preparing plans for those that undoubtedly will occur.

**DP0559371** Dr AW Mitchell; Dr S Pearson; Prof A Pennycook

**Title:** **Local Noise: Indigenising Hip hop in Australasia**

**2005 :** \$70,000

**2006 :** \$68,000

**2007 :** \$80,000

**Category:** 4101 - PERFORMING ARTS

**Administering Institution:** University of Technology, Sydney

**Summary:**

The research will lead to an increase in public understanding of the cultural, linguistic, social and pedagogical importance of hip hop culture in general, and particularly among youth of indigenous, Pacific and non-Anglo background in Australasia. Particular emphasis will be placed on the empowering aspects of hip hop as a means of asserting confidence among youth from indigenous and migrant backgrounds, and the educational applications of hip hop, providing new material for multicultural and indigenous programs in schools, along with fostering the employment of hip hop artists in schools and community centres to teach, disadvantaged young people.

**DP0558978** Prof S Muecke; Dr KM Schlunke

**Title:** Voyages of Myth: Captain Cook in the Popular Australian Imagination

**2005 :** \$80,363

**2006 :** \$78,000

**2007 :** \$30,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** University of Technology, Sydney

**Summary:**

The approaches and writings that will be produced from this project can be taken up by national institutions such as museums and libraries and used as a vehicle to promote a different kind of national debate beyond fact or fiction or even right and wrong. Our outcomes should influence the collection design of national archives and suggest original and incisive frameworks for staging national displays of identity and the past. Providing a contemporary account of how Cook was and is currently understood qualitatively by a cross section of Australians will provide a powerful set of national connections between an iconic historical figure and the everyday world.

**DP0559396** A/Prof GM Nicholson; A/Prof KW Broady; Dr S Valenzuela; Dr PG Hains; A/Prof WC Hodgson; Prof GF King

**Title:** Identifying novel insecticides and their targets: probing Australian arachnid venoms

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 3205 - PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

**Administering Institution:** University of Technology, Sydney

**Summary:**

Insect pests destroy an estimated 2-3 billion dollars of crops in Australia. Insect pests also are responsible for the transmission of many new and re-emerging human, animal and plant diseases threatening health, wellbeing and prosperity. Current insecticides are severely limited by toxicity and/or insect resistance, and some are undergoing use cancellation overseas. Thus there is an urgent need to develop safer and more specific insecticides that are effective against disease vectors and agricultural pest insects, as well as to identify new insecticide targets. This research has a multi-million dollar potential benefit to agricultural, health and pest control sectors

**DP0559879** Prof E Platen; Prof A Novikov; Dr E Schlogl

**Title:** A New Integrated Approach to Managing Risk in Financial Markets

**2005 :** \$92,000

**2006 :** \$87,000

**2007 :** \$86,000

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** University of Technology, Sydney

**Summary:**

Managing financial risks more safely, efficiently, and over longer time horizons is of particular importance in Australia, where - through superannuation - nearly everyone is exposed to the ups and downs of the financial markets. To name a specific example, the project will provide the technology to manage the risk of long-term return guarantees for superannuation funds. More generally, results of the project will allow regulatory authorities to accurately judge the risk profile of financial institutions, insurance companies and funds. The new generation of quantitative financial methods will benefit both Australian financial institutions and sectors of Australia's IT industry developing innovative risk management software.

**DP0558946** A/Prof PJ Ralph; Prof M Kuehl

**Title:** When corals bleach, what is the weakest photosynthetic link?

**2005 :** \$58,000

**2006 :** \$38,000

**2007 :** \$38,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** University of Technology, Sydney

**Summary:**

Despite dire warning of the imminent impact (< 50 y) of climate change of coral reefs, we still do not understand the fundamental processes of coral bleaching. This project will enhance future management of Australia's extensive coral reef ecosystems by providing details on critical gaps in our knowledge. This will feed directly into several layers of management agencies for policy development and risk assessment. Managing our reefs in an ecologically sustainable manner is vital to the future economic, social and cultural prosperity of Australia. The economic importance of healthy and biodiverse coral reefs is pivotal to both the tourism and fisheries-based economies of Queensland (\$2.4 b/y).

**DP0559567** Dr ST Smith

**Title:** Retrofit of Reinforced Concrete Beam-Column Connections with Fibre Reinforced Polymer (FRP)

**2005 :** \$100,000

**2006 :** \$93,000

**2007 :** \$90,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** University of Technology, Sydney

**Summary:**

Effective retrofitting of structurally deficient reinforced concrete structures with fibre reinforced polymers (FRPs) will improve the safety of Australian infrastructure resulting in both social and economic benefits. Avoidance of structure collapse by retrofitting will provide obvious social benefits and minimisation of infrastructure damage will provide economic benefits to both the public and private sector. Engineering confidence in designing FRP retrofitting measures will also be enhanced. Local engineering expert knowledge in retrofitting will be a valuable technology to export to our seismically vulnerable international neighbours thus creating revenue and establishing Australia as a world leader in the retrofitting field.

**DP0559491** Dr I Vanni

**Title:** Contact zones: activism, art and media in Italy, 1994-2006

**2005 :** \$72,000

**2006 :** \$60,000

**2007 :** \$95,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** University of Technology, Sydney

**Summary:**

This project will generate knowledge about recent activism, social change and contemporary art practices in Italy; it will add to Australia's international reputation as a centre of research on contemporary Italy; it will assist in facilitating cultural relations between Australia and Italy as already established in cultural and scientific bilateral agreements.

**DP0560077** Dr N Zhang

**Title:** Investigation into on-road vehicle rollovers using a combined rigid and flexible multibody model

**2005 :** \$75,000

**2006 :** \$73,000

**2007 :** \$75,000

**Category:** 2904 - AUTOMOTIVE ENGINEERING

**Administering Institution:** University of Technology, Sydney

**Summary:**

Rollover propensity is one of the major safety indicators of vehicles. In-depth understanding of the causes and mechanisms of vehicle rollovers and the availability of advanced design and simulation tools will greatly assist the automotive industry in improving vehicle safety and consequently enhance the industry's competitiveness in the international marketplace. The developed knowledge would also benefit aeronautical, ship building and military industries which are generally well-equipped to absorb new technology and seek a competitive edge. The wide community would benefit by potentially reduced death rates and fatal injuries caused by rollover crashes, and through increased employment in industry.

**DP0559536** Dr S Zhang

**Title:** Ontology-Based Group Pattern Discovery Systems for Mining Multiple Data Sources

**2005 :** \$55,000

**2006 :** \$55,000

**2007 :** \$55,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** University of Technology, Sydney

**Summary:**

This project will aim at the frontier technologies development for practical techniques in the context of real multiple-data-source mining systems, including stock data and e-business data analysis. It will bring Australian individuals and organizations (i) high quality information from multiple data sources and (ii) automatically pattern discovery systems for tackling the multiple data source problem. This will lead to greatly enhance the international competition of Australian companies and significantly reduce investing risks.

## University of Western Sydney

**DP0557783** Prof KJ Anderson

**Title:** The Humanities beyond Humanism: Race, Nature and the Human in Australia from Enlightenment to Federation

**2005 :** \$45,000

**2006 :** \$45,000

**2007 :** \$45,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** University of Western Sydney

**Summary:**

This Project injects much needed specificity into the emotive and circular logic of racism that characterises accounts of settler/indigenous history in Australia. In so far as Australia's Aboriginal people defied enlightenment/colonial ideas about humans as separate from nature, they shook the very foundations of western humanism. In crediting Aboriginal people with this impact on European knowledge and self-regard, the Project carries forward the critique of Australia's settlement from a fresh perspective. It challenges the persistent tendency of Australians to write Aborigines into nature, and forces a novel revision in thought about what it means to be 'properly human'.

**DP0559667** Prof IM Ang

**Title:** **Cultural Research for the 21st Century: Building Cultural Intelligence for a Complex World**

**2005 :** \$168,378

**2006 :** \$168,365

**2007 :** \$162,670

**2008 :** \$117,547

**2009 :** \$120,343

**Category:** 4203 - CULTURAL STUDIES

APF Prof IM Ang

**Administering Institution:** University of Western Sydney

**Summary:**

This project will advance our knowledge of the complex cultural challenges facing 21st century Australia, and how these challenges can be addressed through engaged cultural research. It will promote cultural innovation by enabling public institutions to develop effective responses to the increasing complexity of their operating environments, especially in light of society's proliferating cultural diversity. The project will expand the national innovation system by building the capacity of cultural researchers (and humanities and social science researchers more generally) to conduct collaborative and interdisciplinary research that contributes to the solution of important social and cultural problems.

**DP0559856** Dr J Buchholz

**Title:** **A computational auditory model based on (human) binaural suppression of reflections in complex environments.**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** University of Western Sydney

**Summary:**

The research carried out throughout this project aims at understanding fundamental auditory mechanisms, which are essential for the human being to communicate successfully in natural environments. The derived results could be of high importance for various speech processing applications (e.g., Telecommunication Systems, Hearing Aids, Automatic Speech Recognizers), which have severe difficulties to function in such natural environments. Hence, this research might be of considerable economic and social benefit to Australia. Furthermore, this research presents a highly interdisciplinary approach, and thus provides a solid platform for interdisciplinary training of students.

**DP0558698** Prof DK Burnham; Prof K Sekiyama

**Title:** **The How and Why of Auditory-Visual Speech Perception: Affective and Articulatory Factors in Japanese and English Language Infants and Children**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** University of Western Sydney

**Summary:**

When we talk to babies certain aspects of our face and voice change compared with when we talk to adults. In this project we investigate the nature of the changes mothers make to their face and voice when talking to infants, the emotional or language-based purpose of these changes, and how infants and schoolchildren perceive these changes. Our previous studies show that visual information is used more by English than Japanese language speakers, so these studies are investigated with both these language groups. The results will inform us more about language learning, hearing aid use, and speech recognition by machines.

**DP0555910** Prof JW Cairney

**Title:** **Exploring the genetic and functional diversity nexus in ericoid mycorrhizal and related symbioses**

**2005 :** \$100,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** University of Western Sydney

**Summary:**

Epacrids are important components of the Australian flora and several are considered threatened, yet we know relatively little regarding the importance of ericoid mycorrhizal fungal diversity to their survival. The proposed work will provide essential information on the functional significance of ericoid mycorrhizal endophyte diversity in the growth and survival of epacrids. It will further lead to improved propagation of epacrids and better informed decisions for sustainable management of Australian native vegetation.

**DP0560139** Dr AJ Carruthers

**Title:** **Intercommunal and Translocal Space in Fairfield: Tracking Indochinese Australian Lives**

**2005 :** \$81,000

**2006 :** \$72,000

**2007 :** \$70,000

**Category:** 3703 - ANTHROPOLOGY

APD Dr AJ Carruthers

**Administering Institution:** University of Western Sydney

**Summary:**

While providing important socio-cultural information about Lao, Cambodian and Vietnamese communities in western Sydney, this project takes an innovative approach to the study of 'minority' communities in multicultural societies. By locating itself at the points of contact between communities, the proposed research recognises that subjects are often members of multiple social groups, and that they shift back and forth across their boundaries. Such a perspective enables one to avoid the fallacy of locating 'the multicultural' in minority subjects/cultures, and thus 'multicultural problems' within particular 'problem communities'. Rather, it situates the multicultural in the interstices between 'mainstream' and 'minority' Australia.

**DP0559922** Prof RJ Cooper; Prof GG Madden; Dr MI Nadiri

**Title:** **Modelling the APEC Digital Divide**

**2005 :** \$28,000

**2006 :** \$28,000

**2007 :** \$28,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** University of Western Sydney

**Summary:**

Study of private sector motivation for the uptake of ICT is helpful in formulating regulatory and commercial responses to foster growth of competitive information-using and information-producing industries. The project will help clarify the relative benefits of production and use of ICT. Additionally, in an APEC context, analysis of the digital divide will inform policy appropriate to enhancing Australia's contribution to the region. The general purpose information technology of the Internet network is fast evolving into the enabling technology of choice for innovation and creative applications of a platform for communication and electronic transactions.

**DP0557388** Prof ES Fung

**Title:** **Assimilating Modernity: The Harmonisation of Liberal, Socialist and Conservative Thought in Modern China, 1921-1949**

**2005 :** \$36,210

**2006 :** \$36,365

**2007 :** \$37,814

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** University of Western Sydney

**Summary:**

The project will enable Australian policy makers to understand the way in which Chinese intellectuals grappled with the issue of modernity and questions about liberalism, socialism and conservatism in the recent past. This is important because the Chinese elites are tackling similar issues today as they face the challenges of globalisation. Knowing the role of China's public intellectuals and their way of thinking, both past and present, is critical to a further strengthening of Australia's relations with China. The project will benefit the wider community as Australians interact and deal with the Chinese intellectually and culturally, as well as in trade, politics, diplomacy and tourism.

**DP0558622** Prof RI Hodge; Dr Gd Coronado; Dr F Duarte; Dr G Teal

**Title:** **Cross-cultural 'larrikins' in a Neo-liberal world: ideology and myth in postmodern Australia, Mexico and Brazil**

**2005 :** \$65,000

**2006 :** \$46,000

**2007 :** \$70,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** University of Western Sydney

**Summary:**

This project will help to re-frame the Ozzie 'larrikin' as a cross-cultural mediator, a complex, inclusive figure able to draw together the many strands of multicultural Australia. At the same time it will help Australian business in Latin America by pointing out misleading assumptions about culture in management training, proposing in their stead a more flexible, better-informed and thoroughly contemporary approach, through which Australian business people can be more sensitive and effective, economically successful, and ambassadors for their country.

**DP0559134** Dr C Kitamura; Prof WG Noble; A/Prof S Purdy; Dr HA Dillon; Dr T Ching

**Title:** **SPECTRAL TILT: DO INFANTS KNOW WHAT'S GOOD FOR THEM?**

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** University of Western Sydney

**Summary:**

This project falls within the National Research Priorities, giving children 'a healthy start to life'. The research is important economically because it will lay the groundwork for the informed design of hearing aid frequency responses based on empirical research, and give infants the opportunity to be fitted with hearing aids amplified for infants, not adults as is the current unsatisfactory practice. Moreover, the cross fertilisation of methods and knowledge that the collaborators bring to this grant should provide outcomes that will help maintain attention on Australia as a site of cutting edge research into hearing impairment, hearing aid development and use.

**DP0556084** Prof HW Marsh; Dr AJ Martin; Prof DM McInerney

**Title:** **Maximising Real Educational Achievement - The REACH Project: Integrating Motivation and Self-concept to Optimise Students' Academic Outcomes at School**

**2005 :** \$105,000

**2006 :** \$85,000

**2007 :** \$95,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** University of Western Sydney

**Summary:**

The OECD reports that academic motivation and self-concept underlie young people's educational success, affect their long-term health and wellbeing, and also impact on economic outcomes at a national level. Through enhancing students' academic motivation and self-concept, the Real Educational Achievement (REACH) Project will develop and sustain achievement that encompasses not only academic grades but also enhanced engagement, satisfaction in learning, attendance, participation, and aspirations. REACH will guide and support young Australians to achieve to their potential and through this Australian society as a whole will gain substantial educational, economic, labour market, health, and social benefits.

**DP0559830** Dr BM Neilson; Prof C Franceschi; Dr G Lamura

**Title:** **Anti-Ageing Devices: On the Cultural Politics of Staying Young in a Globalised World**

**2005 :** \$68,539

**2006 :** \$59,000

**2007 :** \$60,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** University of Western Sydney

**Summary:**

This project explores the proximity of the promotional materials of anti-ageing entrepreneurs to the 'healthy ageing' policies central to Australia's strategies for the governance of later life. Little is known about how these initiatives are received at the users' end. By approaching 'healthy ageing' campaigns as part of a continuum of images and forces that reconfigure the popular understanding of the life course, the project seeks to inform the long-term policy debate regarding the healthcare of Australia's ageing population. Addressing ARC priority goals 'Ageing well, ageing productively' and 'Preventative health,' the study will be of interest and use to policy makers, industry, advocacy groups, consumers, and the wider community.

**DP0559731** Dr AJ Uhlmann

**Title:** **The Image of Thought: Literature as a way of thinking**

**2005 :** \$25,000

**2006 :** \$25,000

**2007 :** \$30,360

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** University of Western Sydney

**Summary:**

The idea that the arts offer important ways of thinking has, to an extent, recently fallen from view. A failure to recognise the value of the arts as distinct modes of thought, which challenge us to think and feel, impoverishes the community. Scholarly activity can build foundations upon which renewed recognition of this value becomes possible. So too, academics have a duty to communicate with the general community. To this end, this project will include the endeavour to produce newspaper reviews propagating ideas developed through scholarship, and the promotion of the role of literature through the organization of public forums.

**DP0558831** Prof JM Ussher; Dr J Perz; Prof C Lee; Prof P Nicolson; Ms K James

**Title:** **An examination of the development, experience and construction of premenstrual symptoms: A comparative study of relationship types and contexts**

**2005 :** \$88,000

**2006 :** \$80,000

**2007 :** \$70,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** University of Western Sydney

**Summary:**

Of 9,689 Australian women recently surveyed nationally, 33% reported moderate or severe premenstrual symptoms (PMS). To date, there has been no detailed examination of this debilitation, or the factors associated with it. This research study will do this, helping health-care providers understand the development, experience and construction of PMS in the context of close family relationships. This will provide a framework for prevention and support programs, thereby reducing PMS, and the physical and psychological distress associated with it. This will lead to improved psychological wellbeing and quality of life for women and their families, a priority area for the ARC.

**DP0559592** A/Prof Y Zhang; A/Prof MA Orgun; Dr AC Nayak; Dr Y Mu; Dr F Bao

**Title:** Knowledge Based Model Updating for the Correctness of Security Protocols

**2005 :** \$122,000

**2006 :** \$80,000

**2007 :** \$82,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** University of Western Sydney

**Summary:**

This project will fundamentally provide a new paradigm of the security protocol verification and modification. As such, it will significantly enhance Australia's already leading role in the cutting edge research on information security. By applying the new methodology and technology, Australian IT industry will be able to develop more secure communication systems in real world domains. With a very strong research team across different areas such as knowledge reasoning, temporal logics and information security, and a collaborative research training environment, this project will further enhance Australia's international reputation as a leader in computing and IT research.

## University of Wollongong

**DP0559893** Prof C Antons; A/Prof NP Stoianoff; A/Prof J Chen

**Title:** Intellectual Property enforcement and awareness building in China, Thailand and Indonesia

**2005 :** \$50,000

**2006 :** \$20,000

**2007 :** \$24,000

**Category:** 3901 - LAW

**Administering Institution:** University of Wollongong

**Summary:**

As a country with a significant intellectual property industry, Australia has a strong interest in intellectual property protection and enforcement. Australia has also an interest in reducing the amount of infringing material that is brought into the country. Apart from border control mechanisms, an obvious way to achieve this is to strengthen enforcement in the originating countries of this material. The project will inform the Australian government with regards to policy making for this area and facilitate the planning of effective cooperation programs with Asian countries.

**DP0557847** Prof JF Chicharo; Dr E Li; Dr J Xi; Prof Dr X Peng

**Title:** Multi-resolution phase measuring profilometry for dynamic 3D digital imaging

**2005 :** \$91,000

**2006 :** \$76,000

**2007 :** \$76,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** University of Wollongong

**Summary:**

Fast 3-D sensing is a key technology in many industrial application areas such as manufacturing, medical instrumentation, security systems and multimedia entertainment systems. The proposed project aims to develop a superior solution when compared to existing methods. Successful completion of this project will place Australia at the forefront in terms of this enabling technology as well establishing cutting edge expertise. This will potentially lead to significant commercial opportunities that can easily translate into new employment/manufacturing opportunities.

**DP0559769** Dr K Chin; Mr DD Lowe; Mr R Raad

**Title:** A Spatially-Aware RFID-enhanced Sensor Network

**2005 :** \$90,546

**2006 :** \$58,416

**2007 :** \$58,926

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** University of Wollongong

**Summary:**

Using radio frequency identity (RFID) tags to revolutionise sensor network technologies has the potential to have wide ranging impacts on many of Australia's key industries, including precision agriculture, health care and habitat monitoring (e.g., bush fires).

This fundamental research will create a new type of communication network that will have tremendous impact by allowing monitoring and tracking technologies to be deployed over large, infrastructure-free areas at nominal cost. By contributing to the solution of the cost and complexity problems that limit practical deployment of sensor networks, we hope help Australia become a global leader in realizing real-world benefits from information communication technologies.

**DP0558989** Dr AR Clarke

**Title:** Validation of a New Conceptual Model of ADHD based on Underlying Central Nervous System Dysfunction.

**2005 :** \$55,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

ADHD is a debilitating problem that affects 5% of children and approximately half as many adults. ADHD causes substantial problems at school and if untreated, predisposes the individual to increased drug and alcohol use, marital breakdown, criminal prosecution and psychiatric problems in later life. One problem is that we do not fully understand what are the causes of the disorder. This project will test the validity of several models of brain dysfunction in ADHD which have been influential in the literature, but poorly tested. Through better understanding of the basic underlying problems, more effective intervention can be developed.

**DP0557726** Prof RJ Dippenaar; Dr L Strezov; Dr DJ Phelan

**Title:** **Competitive nucleation and growth during rapid solidification of steel**

**2005 :** \$75,000

**2006 :** \$73,000

**2007 :** \$75,000

**Category:** 2913 - METALLURGY  
APD Dr DJ Phelan

**Administering Institution:** University of Wollongong

**Summary:**

This research will assist in maintaining Australia at the forefront of research into strip casting of steel. Fundamental understanding and new modelling capabilities will help to promote the take-up of this energy/emission/cost efficient revolutionary process. It will furthermore provide, through the development of a novel experimental technique, new research capabilities for Australian researchers in other fields such as rapid solidification of advanced materials, e.g. hard magnets and thermoelectric alloys.

**DP0556068** A/Prof SM Dodds; Dr RA Ankeny; Mr J Grossman; Prof FE Baylis; Dr J Downie

**Title:** **Big-Picture Bioethics: policy-making and liberal democracy**

**2005 :** \$105,140

**2006 :** \$69,511

**2007 :** \$78,799

**2008 :** \$86,208

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** University of Wollongong

**Summary:**

We live an era of rapid growth in biotechnology generating new and difficult ethical questions that need to be tackled by bioethicists and politicians. This project goes beyond typical approaches in bioethics to explore the 'big picture': how policies are generated in ethically-contentious domains. It is important to examine how the values of different stakeholders are reflected in such processes to ensure that they are in accordance with Australia's commitment to fostering a multicultural, pluralistic, democratic society. This project will produce practical recommendations for refining public consultation in healthcare policy-making through an examination of three relevant contentious case studies in Australia with comparison to Canada.

**DP0557257** A/Prof S Dolnicar; Prof JR Rossiter

**Title:** **Is brand image instability a measurement artifact?**

**2005 :** \$150,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 3502 - BUSINESS AND MANAGEMENT

**Administering Institution:** University of Wollongong

**Summary:**

If brand images are indeed unstable, then not only are private companies wasting their money on image campaigns but also government organisations are wasting public money on brand image campaigns such as the many conducted by the Australian Tourism Commission overseas, and by local governments, such as "Wollongong - city of innovation." Wouldn't you like to know whether your money is being well spent? A reasonably definitive assessment of the worthwhileness of public-funded brand image campaigns will be the main national and community benefit of this research.

**DP0557769** A/Prof S Dolnicar; Prof GI Crouch; Prof Dr JA Mazanec

**Title:** **Harnessing Eco-Friendly Markets to Protect our Natural Resources - Towards A Demand-Driven Paradigm of Sustainable Tourism**

**2005 :** \$45,000

**2006 :** \$65,000

**2007 :** \$50,000

**Category:** 3502 - BUSINESS AND MANAGEMENT

**Administering Institution:** University of Wollongong

**Summary:**

The tourism industry makes an important contribution to Australia's national revenues. However, the price the nation pays for tourism is excessive use of natural resources: we are selling the exploitation of our country. This project aims at finding, describing and attracting tourists with a basic interest in environmental protection to visit Australia. By doing so, tourism revenues can still be generated for the benefit of Australia while the environmental footprints left behind when the tourists fly back to their home countries can be reduced.

DP0556520 Dr M Dowton; Dr IT Riley

**Title:** The evolution of multipartite mitochondrial genomes in the cyst-forming nematodes

2005 : \$60,000

2006 : \$60,000

2007 : \$60,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

The cyst-forming nematodes are a serious pest of agricultural crops throughout the world, attacking cereal, root and legume crops. Although sporadically recorded in Australia, they have not become established here. This project will characterize unique sequences from the noncoding portion of the mitochondrial genome of a range of cyst-forming nematodes, facilitating the development of molecular diagnostic screening tools for these crop pests. This program will train a number of young scientists with skills in biotechnology, preparing them to join programs safeguarding our agricultural industries.

DP0556545 Dr M Dowton; Prof AD Austin; Dr MJ Sharkey; Asst Prof M Whiting

**Title:** Structural reorganization of the hymenopteran mitochondrial genome

2005 : \$60,000

2006 : \$60,000

2007 : \$60,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

This study will be the first detailed investigation of the evolution of mt genome reorganization, and as such it will identify the processes that shape the evolution of a molecule widely used to interpret phylogeny. A description of the processes that lead to mt genome reorganization will have a substantial impact on our understanding in two areas of mt biology; (1) the discovery of new molecular phenomena that impact on the organization and evolution of this genome, and (2) the interpretation of its phylogenetic content. It will establish our research group as a leader in the field of evolutionary genetics. Training of high quality students, with exposure to international researchers, will be a significant component of this program.

DP0557108 A/Prof HM Hasan; Dr KP Crawford; Dr DN Hart; Dr H Linger; Dr L Warne; Ms IM Ali

**Title:** Socio-technical determinants of agile, network-centric organisations

2005 : \$56,000

2006 : \$51,000

2007 : \$50,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** University of Wollongong

**Summary:**

Many companies provide value for customers by exploiting information and communication technology in support of networks of self-organising employee teams. Such network-centric approaches to organisational structure and function are becoming desired in diverse government organisations and societal settings. On one hand, the civil society is increasing reliant on virtual networks and online communities. On the other, the military's imperative to learn how to fight smarter in the information age heralds a fundamental shift from platform-centred warfare to a mode with diffuseness of command and control. The findings of this research will enable the potential benefits of network-centrism to be realised in these nationally critical areas.

DP0558405 A/Prof X Huang; Prof JF Chicharo

**Title:** High Capacity Multiple Access Interference Free Block Spread OFDMA System for Next Generation Mobile Communications

2005 : \$68,000

2006 : \$61,000

2007 : \$63,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** University of Wollongong

**Summary:**

Next generation broadband wireless/mobile communications is considered a critical component in the ICT industry sector of advanced national economies and their potential future growth. The proposed project will develop a superior solution when compared with existing methods in the sense that it will be characterised by higher capacity, more flexible signal format, lower complexity, more power efficient and better overall performance in fast fading channels. Successful completion of this project will place Australia at the forefront of this enabling technology as well establishing cutting edge expertise. This will lead to significant commercial opportunities that can easily translate into new employment/manufacturing opportunities.

DP0557448 A/Prof AJ Hulbert

**Title:** Investigating the "membrane pacemaker" theory of aging

2005 : \$75,000

2006 : \$70,000

2007 : \$70,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

All animals age and die but the basis of the aging process is still not completely understood. Recent Australian research into the basis of the metabolism in different animals has suggested that the fatty acid composition of biological membranes may be the final part of the puzzle. Understanding why different species have such different lifespans will give profound insight into the aging process. Because it is such a fundamental biological process, understanding how aging occurs and what determines lifespan will have obvious benefits to understanding the basis of many aging-associated diseases. Understanding the role of dietary fats in influencing lifespan will also be of benefit to the community, both national and international.

**DP0559048** Dr SJ Johnstone

**Title:** **Disinhibition in Attention-deficit Hyperactivity Disorder: A behavioural and psychophysiological investigation.**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

This project will provide much-needed information about optimal workload rates and effort levels, and the influence of external expectations, for those with ADHD, with immediate implications in remediation and educational settings. It will inform subsequent applied research, leading to better diagnosis and treatment, resulting in better societal outcomes for those with ADHD. Long-term outcomes may reduce the significant financial burden placed on families and the Australian government and taxpayer by the increased use of hospital services and higher medical costs for children with ADHD, significantly increasing the likelihood of a healthy start to life for those directly, and indirectly, effected.

**DP0557407** Dr NB Jones; Prof DJ Jacob; Dr RM Mitchell; Mr MD Fromm; Dr SW Wood; Dr DP Edwards

**Title:** **Biomass Burning Emissions - An Innovative Technique for Assessing Global Climate Impacts**

**2005 :** \$162,000

**2006 :** \$160,000

**2007 :** \$150,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** University of Wollongong

**Summary:**

This proposal will significantly improve our understanding of the impacts of biomass burning on climate and environmental change leading to better predictive powers and more informed political and economic responses to issues such as Australian compliance with international protocols dealing with global climate change (Kyoto). Further, it will help the development of Australian expertise in global chemical transport modelling not currently addressed by other Australian research programs.

**DP0558125** A/Prof SC Jones; Prof LC Tapsell; Dr PG WILLIAMS

**Title:** **Healthy eating campaigns: perceptions of the message and messenger**

**2005 :** \$48,000

**2006 :** \$65,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** University of Wollongong

**Summary:**

This project will be a means to evaluate the likely effectiveness of some of the resolutions of the NSW Childhood Obesity Summit aimed at the commercial food industry and the media. The project will provide information for the food industry on consumers' perceptions of their credibility as a source of information about healthy eating. This will inform the development of communication campaigns, as well as provide guidance on development and marketing of 'healthier' brand extensions. The project will also have considerable benefit for public health. The findings will be relevant to government and non-government health promotion organisations considering the effectiveness of social marketing campaigns in association with food companies.

**DP0558360** Dr W Li; Dr H Du

**Title:** **Manipulation of Biological Particles Using Dielectrophoresis**

**2005 :** \$100,000

**2006 :** \$68,000

**2007 :** \$70,000

**Category:** 2901 - INDUSTRIAL BIOTECHNOLOGY AND FOOD SCIENCES

**Administering Institution:** University of Wollongong

**Summary:**

Dielectrophoretic manipulation and separation of particles has numerous biological and medical applications, e.g. identification and characterisation of individual cells, purification of cell subpopulations from mixture suspensions, etc. This research project aims to develop a high-efficiency and low-cost DEP device for bio-particle manipulation. It will contribute significantly to the advancements in the field of biological Micro-Electrical-Mechanical-Systems (MEMS) and nanotechnology. Industry will benefit from the expertise on micro/nano-structures and micro/nano-manufacturing achieved by this project.

**DP0557368** Dr LT Lyons; Dr MT Ford

**Title:** In the shadow of Singapore: The limits of transnationalism in Insular Riau

**2005 :** \$98,500

**2006 :** \$84,000

**2007 :** \$54,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

This project will contribute to the process of safeguarding Australia, through a better understanding of our nearest neighbours. An enhanced understanding of nationalism and regionalism in Southeast Asia is central to the maintenance of effective bilateral and multilateral relations between Australia and its near neighbours. Cross-border tension between our ASEAN neighbours is potentially a problem for Australia, and thus of political and economic concern to all Australians.

**DP0557370** Dr LT Lyons; Dr T Devasahayam

**Title:** Trans/national activism: Organizing for Domestic Worker Rights in Southeast Asia

**2005 :** \$100,000

**2006 :** \$75,000

**2007 :** \$75,000

**2008 :** \$75,000

**Category:** 3705 - DEMOGRAPHY

APD Dr T Devasahayam

**Administering Institution:** University of Wollongong

**Summary:**

This project will contribute to the identified national priority, Safeguarding Australia, by providing a better understanding of the issues surrounding labour migration, including the capacity of NGOs and state governments to address the needs and rights of labour migrants in Southeast Asia. By expanding our understanding of the possibilities for democratisation within the region and contributing to theoretical developments on the relationship between state and civil society, this research will also contribute to the national interest in influencing institutional reform and democratic transition in Asia.

**DP0557662** A/Prof RA Markey; A/Prof GE Patmore

**Title:** Historical Patterns of Non-Union Employee Representation in Australian Workplaces 1914-96

**2005 :** \$65,000

**2006 :** \$60,000

**2007 :** \$30,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** University of Wollongong

**Summary:**

The project uses historical data to provide clear direction for public policy in the development of frontier technology for employment relations infrastructure at the workplace level. This infrastructure would support micro-economic reform, maximisation of workplace efficiency, the enhancement of employee job satisfaction, as well as offering means to close the representation gap that has emerged with the decline in trade union membership. By using historical data policy development will be informed by Australian experience of success and failures in this area.

**DP0557396** A/Prof GC Melleuish; Dr AR Buck

**Title:** Debating Democracy: Political Rhetoric in New South Wales 1856-1890

**2005 :** \$60,000

**2006 :** \$20,000

**2007 :** \$33,928

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** University of Wollongong

**Summary:**

This project will highlight the innovative nature of democracy in colonial Australia, by establishing the nature of the relationship between political ideas, political language and political practice in one of the first liberal democracies of the modern world. In so doing it will enable a new and detailed picture to emerge of the type of political society that liberalism and democracy created in colonial Australia. As the first comprehensive study of political rhetoric in Australian history, this project will facilitate a new understanding of the distinctiveness of Australian political language and Australian political culture.

**DP0558176** Dr DW Mercer

**Title:** Science, Litigation and the Public Accountability of Vertically Integrated Expertise

**2005 :** \$30,000

**2006 :** \$30,000

**Category:** 3706 - HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE

**Administering Institution:** University of Wollongong

**Summary:**

The impetus for this research derives from concerns with tort law reform; the loss of public trust in science and legal process when expertise is perceived to be biased; the opportunity cost of inappropriate regulation from misunderstood expertise in litigation; and issues of social justice when regulators and courts disregard plaintiffs' legitimate claims because of a refusal to consider various forms of expertise. By offering a conceptually fresh look at science/law relations, the project will enrich public understanding of the management of controversial scientific issues by the legal system, and assist in the clearer framing of law reform and science policy.

**DP0558091** Dr AI Minett

**Title:** **Novel Carbon Nanotube Composite Materials: Elucidation of key properties for device development**

**2005 :** \$150,000

**2006 :** \$135,000

**2007 :** \$140,000

**2008 :** \$140,000

**2009 :** \$140,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

QEII Dr AI Minett

**Administering Institution:** University of Wollongong

**Summary:**

As the former co-director of CSIRO Nanotechnology indicated to the Sydney Morning Herald in 2003, 'Nanotechnology will lead us into a very different future.' The proposed research on nanomaterial interactions and biomolecular incorporation protocols will provide a foundation for future bioelectronic devices. Imagine healthcare of human diseases when nanocomponents enable the design of new platforms for devices that give point-of-care diagnosis, or the impact on the semiconductor industry with the creation of flexible electronics. Educational outreach is an important aim of the project, providing effective research training for early career researchers.

**DP0558042** Dr CV Murray-Wallace; Dr DS Kaufman; Dr P Hesse; Dr PJ Hearty; Prof RP Bourman; Dr AP Belperio

**Title:** **A one million year record of relative sea-level, climatic and environmental changes - Aeolianites of the southern Australian continental margin**

**2005 :** \$110,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

This project will (1) further refine two dating methods that will revolutionize Australia's capacity to date geological and archaeological events; (2) ensure that Australia remains in the forefront in applied geochronology and that a sufficient level of technical expertise remains within the country; (3) examine the sensitivity of coastal environments to rapid climate and sea-level changes; (4) increase public awareness of the scientific basis for the unique nature of Australia's coastal landscapes; and (5) may also assist in the exploration of strategically important minerals.

**DP0559867** Dr MM Olsson; Dr E Wapstra

**Title:** **Inbreeding and Amphibian Decline: from an Individual to a Global Perspective**

**2005 :** \$180,000

**2006 :** \$140,000

**2007 :** \$140,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** University of Wollongong

**Summary:**

Amphibian decline is not a phenomenon unique to overseas continents and countries. In the long line of research papers addressing this issue in the best science journals (e.g., Nature and Science), Australian frog decline has even been singled out for specific coverage. This project targets the interplay between habitat fragmentation, loss of genetic variation (inbreeding), and its effects on UV and pathogen resistance in a laboratory model system. It integrates three disciplines (immunobiology, evolutionary genetics, and conservation biology) to resolve fundamental aspects of the drastic, ongoing disappearance of the most significant ecological indicator taxa known today (amphibians).

**DP0557544** Dr AV Pan; Mr S Zhou; Dr Y Genenko; Prof TH Johansen

**Title:** **Development of new technology for coated conductors able to carry "over-critical" current densities**

**2005 :** \$120,000

**2006 :** \$115,000

**2007 :** \$100,000

**Category:** 2914 - MATERIALS ENGINEERING

APD Mr S Zhou

**Administering Institution:** University of Wollongong

**Summary:**

The superconductivity phenomenon has extremely attractive feature, that superconductors can carry non-dissipative currents, enabling us to reduce energy consumption by up to 50%. The new advanced method suggested in this project might give a new, fresh and inexpensive boost to not only domestic superconducting industry, but also worldwide. The development of new high performance superconductor technology would significantly promote fundamental understanding and knowledge of the poorly investigated "long-range" magnetic interaction between magnetic and superconducting materials. The University of Wollongong would lead the world research community in this practically important and scientifically intriguing area.

**DP0558446** Dr RG Roberts; Prof AR Chivas; Dr E Willerslev; Dr TF Higham; Dr CB Ramsey; Dr RM Bailey

**Title:** **Life and times of Beringian biota from luminescence and radiocarbon dating of sedimentary DNA: chronologies for palaeoenvironmental and archaeological archives**

**2005 :** \$180,000

**2006 :** \$160,000

**2007 :** \$150,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** University of Wollongong

**Summary:**

This study will yield important new data on the time of entry of humans into a previously uninhabited continent (North America) and the record of subsequent human-environment interactions. The same broad issues apply to Australia, so understanding the sequence and causes of events in Beringia will provide insights into human disruption of the Australian ecosystem. The development of improved techniques in palaeogenetics and geochronology will benefit researchers worldwide, increase the capacity for commercial services, and enhance Australia's international standing in cutting edge science. We will train high-quality graduate students and create new collaborative initiatives and opportunities for research, exchange, training and education.

**DP0558490** Prof R Safavi-Naini; Prof PR Wild

**Title:** **Timeless digital signature for self-organising groups**

**2005 :** \$93,632

**2006 :** \$93,000

**2007 :** \$92,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** University of Wollongong

**Summary:**

Working, socialising, establishing commercial and government institutions on the Internet, is rapidly becoming a common way of life. Digital signatures are the main mechanism for providing authentication and accountability for electronic transactions, and are indispensable in securing electronic exchange and collaboration. Existing digital signatures only provide security for a limited time period and cannot be used when long term security is required. This project will provide the required foundations and construction for building a timeless 'trustworthy cyberspace' and will enable deployment of a wider range of advanced information technology and telecommunication services.

**DP0557085** Dr AI Schaefer; Dr SJ Khan; Prof M Elimelech

**Title:** **Adsorption and Removal of Trace Organic Compounds by Membrane Processes used in Water Treatment and Wastewater Recycling**

**2005 :** \$120,000

**2006 :** \$98,000

**2007 :** \$90,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** University of Wollongong

**Summary:**

Recycling of municipal wastewaters is of growing importance as a resource-conservation and environmental-protection measure in Australia. A major impediment to increased rates of water recycling is a lack of knowledge regarding the presence, fate and removal of key trace organic compounds. Among these key contaminants are pharmaceutically active compounds (PhACs) and steroid hormones. This research will lead to a thorough understanding of the mechanisms involved with the removal of these compounds by membrane treatment applications. Major benefits will be enhanced ability to undertake risk management and a lowering of costs associated with full-scale water treatment applications.

**DP0559878** Dr AI Schaefer; Prof B Van der Bruggen

**Title:** **Impact of Fouling on Retention of Contaminants in Electrodialysis for Brackish Water and Wastewater Applications**

**2005 :** \$100,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** University of Wollongong

**Summary:**

Water desalination and water recycling are both of utmost importance in the current global water crisis. Reverse osmosis is a commonly used process in both areas but this process has two main limitations (1) it is limited in water recovery by the concentration of salts, and (2) it produces a relatively large amount of concentrates that require disposal. Using electrodialysis to treat such concentrates will decrease the salinity problem caused by disposal and also increase the water efficiency of the treatment process. In this research project the potential performance limitations fouling and micropollutant removal will be investigated and hence the performance improved.

**DP0557895** A/Prof GM Spinks; Prof HR Brown

**Title:** **Single molecule actuators.**

**2005 :** \$95,000

**2006 :** \$75,000

**2007 :** \$80,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** University of Wollongong

**Summary:**

The study of actuation processes in single molecules will lead to the development of improved advanced materials for Australian industry and, ultimately, to the more futuristic and exciting nanotechnologies. The research will improve our understanding of how polymer artificial muscles function, so that these materials can be further developed to meet the demand from industry. Applications include biomedical devices, robotic applicators and various machine parts. In addition, the research will also contribute to one of the greatest promises of nanotechnology: the development of molecular machines. We will demonstrate the mechanical forces and movements possible from single molecules so that the design of useful nano-machines can begin.

**DP0557493** Dr W Susilo; Dr Y Mu; Dr F Zhang

**Title:** **Short Signatures: Tools for Securing Digital Transactions, and Their Applications**

**2005 :** \$112,000

**2006 :** \$80,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** University of Wollongong

**Summary:**

The expected result of this project will be frontier technologies that are essential in applications and services, eg. transactions over mobile devices, whose acceptance will be dependent on users' assurance about their security in the Cyber world. The result will also contribute to maintaining Australia's leading position in the telecommunication and information technology industries, which is well recognised by the government increasing funding levels. Using provably secure short signature schemes in the Internet world will ultimately contribute to lowering costs, increasing productivity and therefore, a more competitive economy. The project will produce high quality graduates by generating research opportunities for students.

**DP0557412** Prof S Ville; A/Prof D Merrett

**Title:** **Business Profitability and Long Term Industrial Change in Twentieth-Century Australia**

**2005 :** \$35,000

**2006 :** \$35,000

**Category:** 3403 - ECONOMIC HISTORY AND HISTORY OF ECONOMIC THOUGHT

**Administering Institution:** University of Wollongong

**Summary:**

This project will establish Australia as a pioneer in longitudinal research into business profitability in terms of assembling new data and its use to analyse the relationship of profitability with capital formation and structural change in the economy. It will extend our knowledge of long-term returns to equity investment, a category of savings and pension funding now common to most Australians, and contribute to our understanding of Australia's comparative business performance in light of current debates regarding the alleged limited global competitiveness and corporate governance shortcomings of leading Australian corporations.

**DP0559629** Prof GG Wallace; Dr J Chen; Dr GF Swiegers

**Title:** **Supported Molecular Catalysts for Methanol Oxidation and Other Reactions**

**2005 :** \$129,000

**2006 :** \$116,000

**2007 :** \$116,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** University of Wollongong

**Summary:**

Knowledge arising from these fundamental studies has the potential to place Australia at the forefront of this important area of materials science and catalysis. We expect to make discoveries that will be useful not only in the area of catalysts for the direct methanol fuel cell, but also in systematising and developing the whole field of bio-mimetic supported electrocatalysts. Relevant findings in these exciting areas will be relayed to researchers and commercialised where appropriate. This multidisciplinary project will also provide an excellent environment for research training.

**DP0559891** Dr G Wang; Dr KK Konstantinov; Prof Dr J Ahn; Dr XQ Yang; Dr Z Xiao

**Title:** **Synthesis of nanowires and application as nanosensors for chemical and biological detections**

**2005 :** \$80,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** University of Wollongong

**Summary:**

This project is expected to bring significant scientific, economic and social benefits. We will develop a number of techniques for the controlled growth of nanowires and making functional nanoscale systems such as nanosensors. The nanosensors will have important applications in chemistry and biology. Some chemical species can be detected by nanosensors on molecular scale. The nanosensors could be used for early diagnostics of cancer disease, detection of viruses, and genomic DNA screening. The nanosensors could also provide a molecular tool for probing living cells without destroying them, through which we can track life within cells in real time.

**DP0558753** Dr X Wang

**Title:** **Exploration for new materials for spintronics**

**2005 :** \$210,000

**2006 :** \$210,000

**2007 :** \$210,000

**2008 :** \$120,000

**2009 :** \$120,000

**Category:** 2914 - MATERIALS ENGINEERING

QEII Dr X Wang

**Administering Institution:** University of Wollongong

**Summary:**

The scope for use of spintronic materials in practical applications will be enormous and there will be a huge market for spintronic devices. In fact, giant magnetoresistance spintronic materials are already used in practical applications such as magnetic recording and storage devices. The success of this project will certainly lead to a discovery of novel magnetic semiconductor spintronic materials and better understanding of spin dependent magnetic interactions. It will enhance the international competitiveness and export power of Australian industry in the areas of information technology, quantum computing, magnetic recording and magneto-electronics.

**DP0557925** A/Prof TA Wysocki; Dr BJ Wysocki

**Title:** **Diversity Improvements in Ultra-Wide Band Communications**

**2005 :** \$65,000

**2006 :** \$65,000

**2007 :** \$65,000

**Category:** 2805 - DATA FORMAT

**Administering Institution:** University of Wollongong

**Summary:**

The proposed project will facilitate development of new frontier technologies that will most likely form the basis for future optimal usage of bandwidth. It will strengthen Australia's role in the advancement of communication technology for the future. Through involvement in the project, the PhD, Masters, and Honours graduates will acquire knowledge and the skills in widely applicable advanced mathematical theory and methods for the analysis and design of communication systems. The project will also serve to build new international links and extend existing ones through active involvement of overseas researchers.

## Victoria

### Deakin University

**DP0557175** Prof CA Adams; Reader RL Burritt; Dr G Frost

**Title:** **Environmental Management Systems, reporting systems, stakeholder engagement processes and environmental performance in Australian companies**

**2005 :** \$35,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 3501 - ACCOUNTING, AUDITING AND ACCOUNTABILITY

**Administering Institution:** Deakin University

**Summary:**

The achievement of an environmentally sustainable Australia requires improved environmental performance of Australian companies which have significant environmental impacts. This work will lead to improved environmental performance, more effective stakeholder engagement and accountability and reporting systems along with better environmental management systems. This in turn will reduce environmental impacts, create more responsive corporate cultures and increase the competitive advantage of Australian industry.

**DP0557358** Prof CM Bradford; A/Prof W Ommundsen

**Title:** **Building cultural citizenship: Multiculturalism and children's literature**

**2005 :** \$80,000

**2006 :** \$63,000

**2007 :** \$62,000

**2008 :** \$62,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** Deakin University

**Summary:**

This project will generate new knowledge - theoretical, methodological and pedagogical - through its interdisciplinary approach, which brings critical and cultural theories to bear on Australian children's literature from 1990 to 2003, and specifically on how this literature represents and advocates cultural values and meanings concerning migration, citizenship, multiculturalism and community relations. It will result in the first major study of the production and reception of multicultural literature for Australian children, and will make an important contribution to pedagogy by informing the fields of primary, secondary and tertiary education through the concepts it develops and the teaching resources it produces.

**DP0559251** A/Prof Y Chen

**Title:** **Exploiting Database Technologies for the Visualization and Analysis of Measured and Simulated Plant Structures in Bioinformatics**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** Deakin University

**Summary:**

The project will contribute to both bioinformatics and database research at both the national and international levels, although this project is specifically focusing on plant architecture but it has great potential other fields such as solving computationally difficult problems of branching in nature such as DNA and crystal related research. The results of this research can be applied to all kinds of plants such as rice, cotton, rose etc.

**DP0557583** Prof AM Goscinski; Dr JJ Silcock; Dr MJ Hobbs; Dr RA Dew

**Title:** **Self Discovery, Self Configuration and Self Healing of Enterprise Grids**

**2005 :** \$81,000

**2006 :** \$81,000

**2007 :** \$81,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** Deakin University

**Summary:**

Firstly, the project will assist the elevation of grid computing into mainstream computing, and by this provide a direct response to some problems identified by the working party on the Australia's ICT research and research training. Secondly, our country is an excellent consumer of IT technology. But, it needs software artifacts that could be sold. A set of proposed services will be a saleable commodity of great commercial value. A software company that will develop its commercial version could be set up. Thirdly, the project will help Early Career Researchers in gaining an experience necessary to carry out independent research and assist in training new researchers: Postdocs, PhDs and Masters.

**DP0556370** Dr AJ Mussap; Prof MP McCabe; Dr LA Ricciardelli

**Title:** **Body image instability, disordered eating and muscle dysmorphia**

**2005 :** \$45,000

**2006 :** \$45,000

**2007 :** \$45,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Deakin University

**Summary:**

Body image is a serious public health issue. Dissatisfaction with body shape promotes disordered eating in females who fast and purge to lose weight, and muscle dysmorphia in males who over-exercise and use steroids to gain muscle. We will test the idea that these psychological disorders stem from an unstable body image. Our research will reveal the fundamental risk factors associated with disordered eating and muscle dysmorphia and allow us to identify at-risk individuals on the basis of their body image instability. It will also predict patients' amenability to treatments that target body image, thereby improving outcomes for these individuals.

**DP0555903** Prof S Nahavandi; Dr HM Trinh

**Title:** **Parallel-Link Mechanism Control using new Concept and Techniques**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2903 - MANUFACTURING ENGINEERING

**Administering Institution:** Deakin University

**Summary:**

The new knowledge and techniques, as a result of this research project, will have direct relevance to many Australian industries. In particular, they provide opportunities to improve Australia's competitiveness through innovations for the manufacturing sector. For this sector, increasing global competition and tariff reductions pose serious challenges to its continuing international competitiveness. There is an urgent need to develop cost effective innovative products. The outcomes of this research will produce a faster, more accurate, cheaper and optimally controlled parallel-link robot than currently available.

**DP0556130** Dr T Toop; Dr JA Donald; Dr MD Powell; Dr Y Takei

**Title:** **Natriuretic peptide hormones and the stress response of fish**

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** Deakin University

**Summary:**

There are two main benefits of our research to Australia. Firstly, the team that we have assembled have international reputations, and include scientists from overseas. This team will be led by Australian Institutions and will put Australian science in the forefront of a competitive field, internationally. Secondly, our research examines questions that are critical in our understanding of how animals respond to stressful events. The response to stress, if excessive, leads to ill-health in both humans and other animals. Our research examines new connections between stress and fish biology, which could lead to discoveries that are valuable in managing stress and health in wild and farmed fishes.

**DP0556845** Prof X Wang; Dr WB Fraser; Dr Z Tang

**Title:** **Modelling the stability and efficiency of ring spinning**

**2005 :** \$76,522

**2006 :** \$69,000

**2007 :** \$71,322

**Category:** 2903 - MANUFACTURING ENGINEERING

APD Dr Z Tang

**Administering Institution:** Deakin University

**Summary:**

This research will benefit the animal fibre industry, particularly the multi-billion dollar wool industry. Low spinning efficiency adds a significant cost to the conversion of animal fibres into textile products, which reduces the competitive position of these natural fibres. The proposed research will lead to improvement in the efficiency of ring spinning. It has been estimated that a 1% improvement in spinning efficiency will add about \$16 million to the wool industry alone.

**DP0556297** Dr AC Ward; Dr SE Nicholson

**Title:** **Socs proteins in development and disease**

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3210 - CLINICAL SCIENCES

**Administering Institution:** Deakin University

**Summary:**

Socs proteins are a component of a pathway that is central to a range of developmental processes, including embryonic development. In addition, there is evidence that these proteins are perturbed in several disorders. This Project will enhance our understanding of the Socs proteins and their role in disease, and ultimately provide an opportunity to identify new therapeutic strategies.

## La Trobe University

**DP0557166** Prof AY Aikhenvald; Prof RM Dixon; Prof L Seki

**Title:** **Grammars in contact**

**2005 :** \$87,000

**2006 :** \$55,000

**2007 :** \$65,500

**Category:** 4201 - LANGUAGE STUDIES

**Administering Institution:** La Trobe University

**Summary:**

The project plans a significant contribution to the study of relationships between languages. It will advance our understanding of our region and the world, fostering cross-cultural communication, to overcome potential miscommunication resulting from different language backgrounds in multicultural and multilingual Australia. This project will enhance study of endangered languages, contributing to the preservation of cultural and linguistic diversity and fortifying the reputation of Australia as a 'knowledge nation'. It will strengthen the training of young scholars, future leaders of the Australian linguistic scene, and offer technological and methodological advances for recording and managing data on language relationships.

**DP0556114** A/Prof RT Brady

**Title:** **An Exploration of the Ramifications of the Re-conceptualization of Entailment**

**2005 :** \$30,360

**2006 :** \$25,180

**2007 :** \$50,360

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** La Trobe University

**Summary:**

By revamping the field of deductive logic, the project will enhance the already solid international reputation Australia has in this area. The level of innovation in the work would set an example to other researchers and help to promote innovation in Australia. The project will provide more meaningful and accurate applications of logic in computer science, philosophy and mathematics, and engender smarter use of information. There would also be benefits to the teaching of logic in Australia, with the development of sharper analytical skills in students, and the project would lay the groundwork for a textbook on the new logic.

**DP0556553** A/Prof B Carr; A/Prof S Niblo

**Title:** **Mexico 1940 to 2004: Nation and Regions in an Era of Globalisation**

**2005 :** \$38,870

**2006 :** \$38,870

**2007 :** \$38,870

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** La Trobe University

**Summary:**

The outcome of the project will be a major book. A related initiative is the design and maintenance of an interactive website devoted to contemporary Mexico. This will provide scholars, journalists, business and international agencies with a ready source of information on contemporary Mexico. Many issues that Australia has faced have also been encountered in Mexico's relations with the global economy and especially with the United States including: immigration, national security, debt, defense of cultural identity and national sovereignty.

**DP0557588** A/Prof HR Clarke; Prof P Bardsley

**Title:** **Harm-minimisation policies and the economics of controlling illicit drug use**

**2005 :** \$135,000

**2006 :** \$120,000

**2007 :** \$120,000

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** La Trobe University

**Summary:**

The use of illicit drugs and its consequences are of major concern in Australia. Policies seeking to directly curb illicit drug use have met with mixed success and, over time, pressure has been placed on policymakers to switch toward increased reliance on harm-minimisation policies. This switch can generate adverse incentive effects by reducing the user costs of illicit drug use which acts to increase illicit drug use. Cost-effectively mitigating these adverse incentive effects can improve the effectiveness of policy by promoting harm- minimisation without seriously sacrificing drug use abstinence objectives.

**DP0557369** Dr MG Conde; Prof PL Dyson

**Title:** **A new instrument to observe the three-dimensional structure of wind and temperature disturbances at and above Earth's polar mesopause**

**2005 :** \$160,000

**2006 :** \$90,000

**2007 :** \$85,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** La Trobe University

**Summary:**

Expected benefits include:

- Improved ability to observe, understand, and predict space weather impacts on Australia's communications, navigation, and surveillance capabilities;
- Support for specific Australian programs such as JORN with improved real-time specifications of ionospheric conditions in our sector;
- Establishing Australia's leadership of a powerful new technique for atmospheric remote sensing;
- Placing Australia at the center of international collaborative efforts to develop this technique;
- Conducting leading edge research and student training in photonics, which is highly valued by industry;
- Supporting Australia's presence and territorial claims in Antarctica.

**DP0556794** Prof DA De Vaus

**Title:** **Living Alone in Australia Project (LAAP)**

**2005 :** \$90,000

**2006 :** \$90,000

**2007 :** \$70,000

**2008 :** \$100,000

**2009 :** \$30,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** La Trobe University

**Summary:**

This study investigates one aspect of the changing nature of Australia's social fabric. It asks whether the sharp rise in living alone reflects a breakdown in Australia's social fabric or simply marks a change in the way in which the fabric is woven. Living alone has important implications for social policy, service provision and housing. But before these implications are identified we need a much better understanding of who lives alone and what living alone means for people in terms of their social ties. By understanding the causes and consequences of the increasing popularity of living alone the study will help identify those who are at 'risk' and thus assist with effective targeting of supports and interventions.

**DP0557465** Dr MG Flood

**Title:** **Young Heterosexual Men's Sexual Relations: Contributions to sexual and reproductive health**

**2005 :** \$70,219

**2006 :** \$80,597

**2007 :** \$67,494

**Category:** 3799 - OTHER STUDIES IN HUMAN SOCIETY

APD Dr MG Flood

**Administering Institution:** La Trobe University

**Summary:**

Young people face a disproportionate burden of Australia's sexual and reproductive health problems. Young heterosexual men's sexual behaviour places both themselves and women at risk, as a wealth of quantitative data has documented. Yet we know little about how young heterosexual men themselves understand their sexual and social relations with women, nor about the social factors shaping such involvements. In providing such data, this project will enrich the effective promotion of sexual and reproductive health, particularly among Australia's youth. This research will make a significant contribution to the booming international scholarship on men's sexual and reproductive health, and will complement similar studies in the US and UK.

**DP0556926** A/Prof AJ Hammerton

**Title:** **The British Diaspora in the Modern World: A Social History of British Migration and Transnational Networks since the 1960s.**

**2005 :** \$60,000

**2006 :** \$70,000

**2007 :** \$43,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** La Trobe University

**Summary:**

As a migrant nation Australia has a vital interest in maintaining informed discussion of the diverse and overlapping historical threads that contribute to national make-up and identity. The substantial British contribution to this process in the later 20th century, and the wider shift in migration processes it illuminates, has been significantly understated in migration research. This project undertakes a timely exploration of British-Australians' experience, and their wider mobility, as many migrants adopt a more continuous pattern of movement. Understanding the complex threads of different migrant cultures' adaptation and 'belonging' will be valuable for policy-makers and for public and academic debate.

**DP0556283** Dr KB Holmes; Dr SK Martin

**Title:** **Growing Australian: domesticating native plants**

**2005 :** \$42,000

**2006 :** \$37,000

**2007 :** \$70,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** La Trobe University

**Summary:**

This project is a pioneering study of the history and meanings of growing Australian native plants. It asserts the importance of the garden in ensuring an environmentally sustainable future and argues that in order to promote more environmentally responsible gardening practices, the history of Australian cultural attitudes towards native gardens must be understood, as must the ongoing resistance to gardening with native plants. The project will advance the national and international debate from one concerned with 'native plant vs exotic' and 'indigenous plant vs weed' to one in which the cultural ideas invested in different gardening practices can be recognised and new ways of imagining and transforming gardening practice established.

**DP0557630** Prof NJ Hoogenraad; Dr D Wang

**Title:** **Regulation of Mitochondrial Biogenesis**

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** La Trobe University

**Summary:**

This project brings together two disciplines, biochemistry and computer science, that have a great potential synergy in the nascent field of bioinformatics. It will provide an excellent training ground for research students who will develop a set of unique and valuable skills. It will also provide information on the process of ageing as this process is associated with a loss in bioenergetic function and other conditions such as diabetes, obesity and cardiovascular disease in which mitochondrial oxidative metabolism is implicated.

**DP0556771** Dr SE Lawrence; Ms JL Lennon; Dr AM Brooks

**Title:** Life on the Edge: Pre-Gold Rush Settlement in South Gippsland, Victoria

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY

APD Dr AM Brooks

**Administering Institution:** La Trobe University

**Summary:**

The project will contribute materialist perspectives to the understanding of the development of the Port Phillip Colony. The project provides a thematic, contextual study as called for in the National Cultural Heritage Forum's 'Vision for Australia's Cultural Heritage' and required to support the new national heritage legislation. The project exemplifies the 'whole environment' approach identified in the present review of the Victorian Heritage Strategy by providing interpretations of setting, context, and broader cultural landscapes. The project will contribute to the enhancement of regional tourism product content by increasing the knowledge of one of the key heritage assets of the region.

**DP0557299** Dr HM Lee

**Title:** Pacific futures and second generation transnationalism: a Tongan case study

**2005 :** \$67,000

**2006 :** \$75,000

**2007 :** \$37,000

**Category:** 3703 - ANTHROPOLOGY

**Administering Institution:** La Trobe University

**Summary:**

As Australia considers its role in the Pacific it is imperative to understand the changing transnational ties of Pacific Islanders. A decline in ties such as remittances will have far-reaching implications for vulnerable Island economies and societies, and this study of 'second generation' Tongans will assess the extent to which transnational ties are likely to persist. Australia is Tonga's primary provider of development cooperation, and a decline in these ties will impact on this relationship. The project will contribute to planning for Australia's future relationship with Tonga and the Pacific region in areas such as aid, migration and security.

**DP0557687** Dr NJ Mitchell

**Title:** Calls and constraints: do male frogs signal direct benefits?

**2005 :** \$100,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 2706 - PHYSIOLOGY

APD Dr NJ Mitchell

**Administering Institution:** La Trobe University

**Summary:**

There is international concern over recent declines and disappearances of many species of amphibians. Australia is a hotspot for declines, but causes of declines remain enigmatic. Approximately one quarter of Australia's 230 amphibian species breed in terrestrial situations, but processes such as salinity, wetland and urban developments and climate change are altering the hydrology of our landscape, and preventing the flood events necessary for the completion of the lifecycle of many species. This research has important conservation implications because it examines the effects of variable moisture regimes on the physiology and reproductive behaviours of terrestrial breeding frogs.

**DP0557734** Prof DR Phillips; Dr SM Cutts

**Title:** Anticancer drug development: Enhancing the anticancer activity of mitoxantrone

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 3203 - MEDICAL BIOCHEMISTRY AND CLINICAL CHEMISTRY

**Administering Institution:** La Trobe University

**Summary:**

Many cancer sufferers may benefit from this work if we are able to develop more active derivatives of mitoxantrone, or develop procedures to inhibit the repair of DNA lesions induced by mitoxantrone. This may result in therapies with improved response, reduced drug dosage and/or reduced side-effects. Because this work may result in one or more patents, and possibly commercialisation with Australian (and overseas) pharmaceutical companies, there are potential commercial benefits to Australia. The "discovery" aspect of this work may also identify other cellular responses to mitoxantrone (ie specific genes which are re-expressed) and this may also reveal new targets to further enhance the activity of this drug.

**DP0556248** Dr JG Pitkethly

**Title:** The theory of natural dualities: old questions, new techniques

**2005 :** \$75,775

**2006 :** \$75,675

**2007 :** \$73,392

**Category:** 2301 - MATHEMATICS

APD Dr JG Pitkethly

**Administering Institution:** La Trobe University

**Summary:**

Natural dualities provide a powerful toolkit in algebra and logic, which form part of the formal language that underpins modern advances in information technology. This project will help to define the limits of where the toolkit can be applied, and where it can be applied in a user-friendly way. The project will enable Australia's La Trobe University to maintain its place as a world leader in the theory of natural dualities, and to attract leading mathematicians and talented students from Australia and overseas.

**DP0559083** Prof R Quispel; Prof RI McLachlan; Prof A Iserles; Prof B Leimkuhler; Prof H Munthe-Kaas; Dr M Sofroniou; Dr EL Mansfield

**Title:** **Geometric Integration**

**2005 :** \$78,000

**2006 :** \$69,000

**2007 :** \$72,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** La Trobe University

**Summary:**

This project gives an important boost to Australia's strength in the niche area of geometric numerical integration, in the face of strong international competition. It gathers 7 world experts from 5 countries to create new computer programs to improve calculations in dynamics, with applications ranging from astronomy, physics, chemistry, biology, and meteorology to finance. It strengthens Australia's links with the mathematical software industry, and will lead to world-class graduates and research training.

**DP0556450** Dr A Ravenscroft

**Title:** **Whiteness: writing, reading, race**

**2005 :** \$75,000

**2006 :** \$35,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** La Trobe University

**Summary:**

The national and community benefits of this project lie in the contribution it will make to the wider work of Australian reconciliation through its analyses of writing as one of the important meeting grounds between white and Aboriginal Australians. By analysing the race relations of writing culture, the project will contribute to the important work of understanding white-Indigenous relations in contemporary postcolonial Australia.

**DP0557291** Prof S Reilly; Prof M Onslow; Dr A Packman; A/Prof EL Bavin; Prof M Prior; A/Prof MA Wake; Dr PA Eadie

**Title:** **A study of early stuttering**

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$87,000

**2008 :** \$28,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** La Trobe University

**Summary:**

Stuttering affects 1 in 20 Australian children. Stuttering disrupts and prevents normal verbal communication, significantly interferes with social interaction and can affect the attainment of educational and occupational potential. Australia leads the world in stuttering research. This innovative study will document the onset of stuttering and describe its progression, an area that is not well described or understood. This project will contribute new knowledge about the onset of stuttering thereby benefiting children worldwide and their families. It will inform clinical practice and improve the evidence underpinning the advice given to parents of children who stutter.

**DP0557646** Prof RJ Seviour

**Title:** **A novel process for removing phosphorus microbiologically from wastewater**

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** La Trobe University

**Summary:**

Australia is a water limited continent, and its rivers and lakes are priceless assets, but because of climatic conditions, these are especially sensitive to blooms of 'blue green algae'. Some are highly toxic, and water containing them is unsuitable for most purposes. Current technology for P removal requires constructing complex plant configurations, and most of these operate unpredictably and unreliably. This project will develop and fully evaluate a revolutionarily different alternative with a fully aerobic system, capable of being added onto the end of a conventional treatment plant, making protection of rivers and streams simpler and more feasible.

DP0557494 Dr CM Sgro

**Title:** Breaking selective constraints: is Hsp90 a capacitor of evolutionary change?

**2005 :** \$130,000

**2006 :** \$130,000

**2007 :** \$130,000

**2008 :** \$130,000

**2009 :** \$130,000

**Category:** 2702 - GENETICS

ARF Dr CM Sgro

**Administering Institution:** La Trobe University

**Summary:**

Gene action and expression can be modulated by genetic mechanisms. If a general mechanism controlling gene expression exists that can be easily manipulated it has the potential to allow animal and plant breeders to quickly produce and select for new characters of agricultural importance without relying on transgenics and long-term breeding programs. It would also assist in the development of tools for identifying and detecting genes that increase susceptibility to human diseases, such as cancer, that are only expressed under certain conditions environmental. I intend to determine whether the protein Hsp90 represents a general mechanism controlling gene expression.

DP0557181 A/Prof EH Wertheim; Prof SJ Paxton; Dr H Skouteris; Prof J Milgrom

**Title:** Body image concerns during pregnancy and the post-partum: What are the predictors and

**2005 :** \$45,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** La Trobe University

**Summary:**

This research will address ARC Research Priority Area 2: promoting the health and wellbeing of mothers, and also supporting mothers' abilities to give their children a healthy start to life. We will assess the response of Australian women to body changes during pregnancy and the postpartum in order to determine whether findings overseas are applicable and can be enhanced in Australian women. In addition, given that at least one in 10 pregnant women will develop post-partum depression, a thorough understanding of early warning signs of risk for post-natal depression is necessary to relieve the suffering of many Australian women.

## Monash University

DP0557486 A/Prof M Aguilar; A/Prof P Perlmutter; A/Prof AI Smith

**Title:** The design and synthesis of angiotensin converting enzyme-2 (ACE2) inhibitors

**2005 :** \$150,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** Monash University

**Summary:**

A vast number of current drugs on the market are inhibitors of enzymes whose action needs to be controlled in order to treat many conditions. This proposal will apply our new approaches to the design of enzyme inhibitors with superior therapeutic action. The benefits of this research reside in new treatments for a range of cardiovascular diseases (the 3rd largest cause of mortality in Australia) and provide a platform for new biotech companies to be formed in Australia.

DP0559387 Dr S Akbarzadeh

**Title:** Islamic Perceptions of Justice in International Relations

**2005 :** \$55,000

**2006 :** \$65,000

**2007 :** \$63,019

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** Monash University

**Summary:**

This research moves beyond the conventional view of Islam and the West dichotomy and explores the middle ground. It explores the potential for redressing Muslim grievances through the existing international system by examining the sources of these grievances. It contextualises Islamic activism within time and space and, by implication, facilitates the formulation of relevant policy responses. As a result, this project contributes to a de-ideologised view of the Muslim experience and the building of bridges to cross the imagined schism between Islam and the West.

DP0557757 A/Prof BM Attwood

**Title:** A matter of history: possession, colonialism and Batman's treaties

**2005 :** \$32,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Monash University

**Summary:**

Australia continues to be possessed by its dispossession of the Aboriginal owners of this country. Settler Australians declare the past is past but dispossession continues to be a matter of history in another sense. By considering the only treaty ever made between settlers and Aborigines, this research investigates why Aboriginal rights to land were denied by the governments in Australia, and what histories settlers and Aborigines have told to legitimise their rights to that land. Since the moral basis of any nation lies in true stories, this research seeks to advance a truer history than the ones we have.

**DP0556145** Dr J Beardall; Dr P Neale; Prof M Giordano

**Title:** **Effects of global climate change on marine phytoplankton: interactions between UV radiation and elevated atmospheric carbon dioxide levels.**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2704 - BOTANY

**Administering Institution:** Monash University

**Summary:**

Global climate change is one of the most significant ecological challenges for the 21st Century. Phytoplankton contribute over 45% of the planet's annual net primary production and form the basis of most aquatic food chains. Conversely, some phytoplankton are toxic and cause problems in marine and fresh waters. Climate change can potentially disrupt aquatic foodchains by its impact on primary production by phytoplankton or stimulating growth of potentially toxic forms. Our project will investigate the combined impact of increasing carbon dioxide and ultraviolet light on phytoplankton and thereby help climate modellers assess the impact of climate change on aquatic ecosystems and particularly on the nation's and the world's fisheries.

**DP0556559** Dr J Beardall; Dr BR Wood

**Title:** **New approaches to measuring the composition and nutrient status of single phytoplankton cells.**

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Monash University

**Summary:**

Phytoplankton support 90% of aquatic food webs, and are responsible for nearly half of global primary productivity. Conversely, blooms of some phytoplankton, often associated with excess nutrients, can cause major environmental problems, including fish kills and risks to human health. However, current methods for determining the nutrient status of phytoplankton are time consuming and ignore the complexity of responses of different species in mixed populations. This project will develop new, rapid, ways of examining the nutrient condition of individual algal cells, which will be of considerable use to the water industry as well as to our understanding of aquatic ecology.

**DP0557484** Dr RT Boer

**Title:** **Political Myth and the Bible: Critical Theory, Politics and the Problem of Mythic Narrative in the Bible**

**2005 :** \$40,000

**2006 :** \$37,000

**2007 :** \$37,000

**Category:** 4402 - RELIGION AND RELIGIOUS TRADITIONS

**Administering Institution:** Monash University

**Summary:**

Along with cultural studies and postcolonial theory, Australia is emerging as a significant international location for innovative biblical studies (the international conference at Monash in 2001, new e-journal The Bible and Critical Theory, and the Bible and Critical Theory Seminar). The project would establish Australia further in this role. The specific concern with contemporary politics in relation to both Israel and Australia has a direct bearing on current debates and policy concerning religion, culture, politics and education. Issues include the influence of 'Israel' as a political fantasy for Australia, the continued role of the Bible, and implications for Australian attitudes in relation to Islam and Islamic countries.

**DP0558744** Dr A Bouazza

**Title:** **Experimental and theoretical analysis of gas leakage rate through composite landfill covers due to geomembrane defects**

**2005 :** \$60,000

**2006 :** \$48,000

**2007 :** \$60,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** Monash University

**Summary:**

The Australian Greenhouse Office indicated that waste emissions contributed 3.1% of net national emissions in 2001 with methane emissions from landfills accounting for 92% of total methane emissions from the waste sector, despite an increase in methane recovered from solid waste. It pointed out that the recent changes in waste management practices did not have an impact on reported methane emission levels and there is need to undertake a range of activities to reduce emissions from waste management activities. This project will address specifically the above issue by providing a new method of analysis to predict gas leakage rate and allow engineers to propose solutions to mitigate gas escapes.

**DP0558237** Dr PL Breuer

**Title:** **A fundamental study of the simultaneous gold dissolution during the alkaline oxidation of sulfide containing refractory gold ores and concentrates.**

**2005 :** \$83,830

**2006 :** \$71,000

**2007 :** \$78,110

**Category:** 2907 - RESOURCES ENGINEERING

**Administering Institution:** Monash University

**Summary:**

The gold industry is Australia's second largest export earner and therefore is immensely important to the Australian economy. The proposed project aims to develop an environmentally acceptable process for treating gold containing sulfidic ores and concentrates that are not amenable to conventional cyanidation. This would provide an enormous benefit to both the Australian gold industry and the Australian environment. A successful outcome in the research project would also lead to export earnings emanating from technology transfer and enhance Australia's reputation for high quality research and academic endeavours.

**DP0557341** Dr MW Brodie

**Title:** **Transportation and Transformation: How Local Conditions Changed Traditional Ideas into Modern**

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$40,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Monash University

**Summary:**

Knowledge of how ideas make, and are changed by, their 'journey' from place to place and over time is vital for a better understanding of our region and the world. The focus in this study on the influences acting upon the development of attitudes can give us a new perspective on our similarities and differences with other postcolonial societies. This study, through its comparative work with Britain, will also provide a much clearer picture of the influences upon Australia's political and social development and allow us to understand more effectively how 'local' and 'imported' ideas have melded together to form our national characteristics.

**DP0558233** Dr M- Carano

**Title:** **Novel Scanning Electrochemical Microscopy applications in molecular, supramolecular electrochemistry and biological systems**

**2005 :** \$120,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

APD Dr M- Carano

**Administering Institution:** Monash University

**Summary:**

Improved understanding of chemical reactivity in natural and artificial molecular systems and acquisition of a wider perspective of electron transfer processes are two important challenges in chemistry and biology. Through this well defined research project, the CI, jointly with the host facility, has the skills to achieve valuable new insights. This project will expand Australia's knowledge base and research capability and open new scenarios for frontier technologies and advanced materials. This project will introduce the SECM methods into Australia. The foreseen benefits include technology exchange and contribution to fundamental and applied science.

**DP0556721** Dr DJ Clancy

**Title:** **Testing the free radical theory of aging: do indicators of oxidative damage predict lifespan?**

**2005 :** \$39,000

**Category:** 2799 - OTHER BIOLOGICAL SCIENCES

**Administering Institution:** Monash University

**Summary:**

Because of the Free Radical Theory of Aging, many millions of dollars are spent around the world on dietary antioxidants of unproven efficacy. Many millions of research dollars are spent providing support for this theory but few studies test it rigorously. The first major benefit of this research is worldwide; to refute, or to substantially enhance and focus the current support for the Free Radical Theory. This should help to rationalise and direct funding supplied to these areas. The second benefit is for Australia: aging is a fruitful area for research because of the high general public interest and for training because of its multidisciplinary nature, and funding in Australia is very low by international standards.

**DP0558885** Prof CR Cocklin; Prof GA Wilson

**Title:** **From Productivism to Multifunctionality? Agri-environmental Governance in Australia and the United Kingdom**

**2005 :** \$80,000

**2006 :** \$55,000

**2007 :** \$55,000

**Category:** 3704 - HUMAN GEOGRAPHY

**Administering Institution:** Monash University

**Summary:**

This project is concerned with the policy debate surrounding the governance of farming and natural resource management. It addresses the question of whether Australia can combine a liberalised economy with a shift from highly intensive, 'productivist' agriculture towards more sustainable land management and viable rural communities. The research will contribute to an understanding of the concept of 'multifunctionality', which has policy implications for agriculture, trade and international relations.

**DP0558562** Dr ML Cole

**Title:** **Group 13 Mixed Halide-Hydride and Rare Earth Complexes - New Selective Chiral Hydridic or Low Valent Reducing Agents**

**2005 :** \$120,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** Monash University

**Summary:**

This project will make a landmark contribution to two areas of metalohydride chemistry. Both studies will utilise and develop metals that have traditionally been mined and exported from these shores while concurrently imported as value added products at vastly inflated cost. This research will identify knock-on applications in order to stem this financial bias. The new paths to rare earth (= Ln) hydrides will have broad industrial appeal, particularly for new materials, where, like similar group 13 materials, they may be used in the deposition of Ln films or even as precursors to superconducting solids. It is anticipated industrial collaboration will ensue. Australia will be promoted as a developer and innovator of frontier technologies.

**DP0557737** A/Prof WD Cook; Prof HJ Sautereau; Dr A Tcharkhtchi

**Title:** **Blends of reactive plasticizers with thermoplastic composites for improved processing and properties**

**2005 :** \$130,000

**2006 :** \$105,000

**2007 :** \$105,000

**2008 :** \$90,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** Monash University

**Summary:**

This proposal is directed at novel methods of enhancing the processibility, properties and applications of polymers and should have a significant economic impact on the \$7 billion commodity polymer market for Australian polymer producers and polymer converters. The project would also extend the research opportunities of students and researchers in the rapidly growing fields of nano-composites and reactive polymer processing.

**DP0558168** A/Prof IF Copland; Dr IW Mabbett; Dr AB Roy; Mr MN Groves

**Title:** **Religion and Governance in India, c.1000-2000 CE**

**2005 :** \$88,000

**2006 :** \$91,000

**2007 :** \$64,000

**2008 :** \$55,000

**Category:** 4402 - RELIGION AND RELIGIOUS TRADITIONS

**Administering Institution:** Monash University

**Summary:**

This project will add significantly to the fund of Australian knowledge about the most important country in our region. It will feed into the continuing debate in this country on the proper balance between secularism and 'multiculturalism'. It will enhance our international scholarly reputation. By illuminating ways in which Indian governments have managed to mediate and contain social tensions produced by warring fundamentalisms, it will assist our policy-makers in identifying aspects of Australian communal life at risk of expropriation by zealots linked to overseas terrorist networks, thereby adding to our security.

**DP0557255** Dr CH Davies; Dr E Pereloma; Prof PD Hodgson; Dr RY Lapovok; Prof YS Estrin

**Title:** **MICROFORMING: effects of microstructural scale on metal formability**

**2005 :** \$140,000

**2006 :** \$135,000

**2007 :** \$140,000

**Category:** 2913 - METALLURGY

**Administering Institution:** Monash University

**Summary:**

Microforming is a rapidly growing industry, and already enjoys considerable activity in Germany, Japan, the US, and Korea, all of which are major trading partners of Australia. This project couples fundamental insight into the effects of microstructural and geometric scale with the frontier technology of microforming. Thus, the project will place Australian researchers at the frontier of microforming research, with the capacity to be involved in shaping the industry. In the course of this work, new process routes will be developed, new materials may be created, and new opportunities will certainly emerge.

DP0557876 Dr HM Faulkner

**Title:** Moving-beam phase retrieval - a route to better microscopy!

**2005 :** \$68,260

**2006 :** \$67,494

**2007 :** \$67,494

**Category:** 2404 - OPTICAL PHYSICS

APD Dr HM Faulkner

**Administering Institution:** Monash University

**Summary:**

This research will benefit the nation by improving the quality of x-ray diffraction and electron microscopy techniques available to Australian scientists. It will make it possible to examine microscopic structures in more detail and therefore gain more information about the atomic positions in these structures. This will greatly benefit research that depends on finding the structure of very small objects. Such research areas include nanomaterials, biological engineering, medical science and materials science. The work is also expected to have industrial applications and to make an important contribution to the development of the synchrotron science industry in Australia.

DP0557670 Dr RS Fensham

**Title:** Transnational and cross-cultural choreographies: the politics of cultural transmission in Australian dance, 1970 - 2000

**2005 :** \$55,000

**2006 :** \$75,000

**2007 :** \$40,000

**Category:** 4101 - PERFORMING ARTS

**Administering Institution:** Monash University

**Summary:**

This project will highlight the rich cultural diversity of Australian dance and choreography. Its methodology will facilitate critical debate about cross-cultural dynamics in the performing arts with national and international dance artists and cultural scholars. The research outcomes will give a distinctively Australian focus to international dance studies and generate new knowledges about the recent cultural history of Australian dance. And they will give global prominence to the unique transnational influences that shape Australian culture. As a result, the project will shift dance studies in Australia from an embryonic field of scholarly interest to a significant field of cultural research.

DP0558890 Prof M Fleer; Prof RF Gunstone

**Title:** The sociocultural construction of early childhood science learning: Learning of scientific concepts within situated playful encounters in early childhood contexts

**2005 :** \$35,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 3302 - CURRICULUM STUDIES

**Administering Institution:** Monash University

**Summary:**

As a result of large-scale international and intensive neuroscientific research, it is now widely recognized that the early childhood period is one of the most critical periods of a child's development and education. Quality educational input within the first five years of a child's life has been shown to have sustained long term social and emotional outcomes, and to result in improved educational opportunities and life chances for all children. Gaining a better understanding about how scientific learning can be organized within playful early childhood contexts would lead to more appropriate models for science teaching for Australian early childhood teachers, more science being taught, and a more scientific literate population.

DP0557869 A/Prof DT Garrioch

**Title:** The growth of toleration in a cosmopolitan society: Protestants in eighteenth-century Paris

**2005 :** \$60,000

**2006 :** \$45,000

**2007 :** \$60,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Monash University

**Summary:**

In an international context in which religious conflict appears to be increasing, and an Australia where religious diversity is growing, understanding the historical and cultural roots of toleration is vital. This project will reinforce Australia's reputation for innovative and independent work in French and urban history, both areas where Australian scholars are well known internationally.

DP0557875 A/Prof RC Gerster

**Title:** Six Inch Rule: A Cultural Study of the Australian Occupation of Japan, 1946-1952

**2005 :** \$42,481

**2006 :** \$24,288

**2007 :** \$24,288

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** Monash University

**Summary:**

This research into a neglected episode in the Australian experience of Japan represents a major advance in understandings of Austral/Asian relationships. In establishing the Occupation of Japan as a crucial development in post-war Australian international relations, the project will be immensely beneficial to the broad discipline of Australian geopolitics, particularly with respect to the ideologies and practices of foreign occupation as reflections of national culture. The projected monograph will demonstrably add to the body of public knowledge of our cultural engagement with Japan, and illuminate an acknowledged area of Australian self-definition - the experience of overseas military service.

**DP0558763** Dr I Gold; Dr M Chirimuuta

**Title:** **The Epistemology of Colour Vision**

**2005 :** \$67,494

**2006 :** \$67,494

**2007 :** \$67,494

**Category:** 3803 - COGNITIVE SCIENCE  
APD Dr M Chirimuuta

**Administering Institution:** Monash University

**Summary:**

This project will advance knowledge on the important traditional philosophical topic of colour and colour perception by drawing both on philosophical and scientific sources. The problem of colour is one to which Australian philosophy has made seminal contribution. For this reason, this project will continue to develop an Australian expertise in the area and help to make Australia a world centre of research in the area.

**DP0558117** Dr KM Gray; Prof BJ Tonge; Prof SL Einfeld

**Title:** **Continuity and change in the development of young children with autism**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$55,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Monash University

**Summary:**

Autism is a severe condition affecting social interaction, communication, behaviour and interests. Parents of children with autism experience high levels of stress associated with the burden of caring. There is a high societal cost associated with the care of people with autism. Research shows outcome in autism is poor, but that early intervention may improve outcome. This project will identify specific early precursors of autism which predict outcome. This will allow the development of targeted intervention to give children the best possible start in life and improve longterm outcome. Improvement to the outcome of people with autism will considerably reduce parental and family burden and cost to the community.

**DP0557382** Dr AL Harris; Prof JG Wyn

**Title:** **Youth civic participation and social connection in post-industrial society: a comparative analysis**

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** Monash University

**Summary:**

The project generates important new knowledge about youth civic participation and will develop more effective indicators for contemporary meanings of citizenship and connection that are relevant to young people today. It will make a direct contribution to youth, education and welfare policies on issues of youth participation and connection, helping to shape a timely and responsive approach on the part of policy makers, service providers and programme designers. The project will also contribute significantly to the development of ongoing international collaborations between researchers in Australia and Europe, and to the research training of the next generation.

**DP0558433** Dr MN Harris; Dr X Zhao; Prof WE Griffiths

**Title:** **Analysis of Drug Consumption in Australia Using New Microeconomic Techniques for Unit Record**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** Monash University

**Summary:**

The consumption of licit and illicit recreational drugs and its adverse health, social and economic effects are everyday topics in Australian society. Much debate has surrounded government drug policies implemented through education, legislation and taxation. This study will provide comprehensive empirical knowledge of Australians' consumption of alcohol, tobacco, prescription drugs for non-medical purpose, and illicit drugs such as heroin and cocaine. It will help identify social, economic and demographic determinants of drug consumption, information which is invaluable for targeting drug policies and education programs. New microeconomic techniques will also be developed that have wide application in other fields.

**DP0558404** Dr M Hau

**Title:** **High Performance in Elite Sports: A Cultural History of Medicine, Psychology, and Society during the Weimar Republic and Nazism, 1918-1945**

**2005 :** \$35,000

**2006 :** \$25,000

**Category:** 3706 - HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE

**Administering Institution:** Monash University

**Summary:**

Australia has long had an excellent international reputation for innovative research on European history. This research project will expand that reputation by providing cutting-edge research into a new field that is just beginning to be developed.

The project brings together research in sport with research into the history of science and medicine that will allow Australia to participate in major international debates in all of these fields. It examines the social and cultural significance of sports using Germany as a case study. A sports conscious and performance oriented society like Australia would certainly benefit from insights about the relationship between sports and performance management in a different time and place.

**DP0555897** Prof K Hourigan; Prof WP Anderson; Dr RG Evans; A/Prof MC Thompson; Dr KM Denton; Prof M Kawahashi; Dr GJ Sheard

**Title:** **Fluid Dynamics of Circulation: Focus on the Kidney**

**2005 :** \$140,000

**2006 :** \$98,000

**2007 :** \$100,000

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

APD Dr GJ Sheard

**Administering Institution:** Monash University

**Summary:**

In Australia, about 30% of adults have hypertension, a major risk factor for heart disease, accounting for about 40% of all deaths. Problems in renal circulation are likely factors leading to hypertension. A detailed understanding of the renal circulation, of whose hydraulic characteristics we have limited knowledge, is required before we can cure or prevent hypertension. We will determine how the size, structure and geometry of the blood vessels influence the function of the kidney. This will lead to predictive models to aid the design and interpretation of physiological studies and the combat of hypertension. It will also help in the ongoing development of bioartificial kidneys to replace present dialysis systems.

**DP0557517** Dr CR Hutchinson

**Title:** **The Coupling of Plasticity, Microstructure and Phase Transformations in the Design of Novel Magnesium Alloys for the Automotive Industry**

**2005 :** \$75,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2913 - METALLURGY

**Administering Institution:** Monash University

**Summary:**

The desire to reduce the weight of automobiles due to legislative requirements on fuel emissions and to reduce overall fuel consumption is the driving force behind research into the development of new Mg-based alloys to replace the heavier steel and Al-alloy components in automobiles. Given the enormous worldwide transportation market and the environmental and legislative motivation for reducing fuel emissions, the development of new Mg-based alloys capable of meeting this demand from automotive manufacturers represents both a potentially large economic advantage to the country of development as well as helping to address the environmental concern about fuel emissions.

**DP0557172** Dr FH In; Prof RW Faff

**Title:** **A Wavelet Multiscaling Approach to Multifactor Asset Pricing Models**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$23,294

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** Monash University

**Summary:**

Risk and return are two fundamental concepts underlying business decisions involving \$millions daily. Even for publicly listed companies risk is difficult to measure, particularly when the time dimension over which decisions are being made is ill-defined - potentially leading to sub-optimal decisions. This project focuses on the time scale question by developing an innovative methodology (based on wavelet multiscaling) that improves our understanding of risk and return. The project will help enhance risk control, and provide improved tools and knowledge to aid formation of superior globally diversified portfolios over different time scales - thereby delivering considerable long-term economic benefits.

**DP0557561** Dr HR Irving; Dr DM Cahill; Dr CA Gehring

**Title:** **Plant Protein Signalling Networks**

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2704 - BOTANY

**Administering Institution:** Monash University

**Summary:**

We will assess the functional role of PNP (novel plant protein hormones) at a biochemical, molecular and cellular level. Importantly, as stresses from climatic extremes are increasing, this will lead to new insights and critical appreciation of the processes plants use to regulate their water status. Since water and solute status underpins the regulation of plant growth and development, these findings will have a major impact on both agriculture and horticulture in Australia. The new insights that we gain can be used to directly accelerate progress towards the development of plants with improved drought and salinity tolerance that will lead to better crop and pasture productivity under harsh Australian conditions.

**DP0556492** Prof DE Jesson; Dr U Denker; A/Prof BF Usher; Dr KM Pavlov; A/Prof MJ Morgan

**Title:** Exploring the Dynamics of Nanostructure Self-Organisation during Compound Semiconductor Epitaxy

**2005 :** \$140,000

**2006 :** \$125,000

**2007 :** \$125,000

**Category:** 2914 - MATERIALS ENGINEERING

APD Dr U Denker

**Administering Institution:** Monash University

**Summary:**

The application of LEEM to GaAs and InAs will be a world first, positioning Australia at the forefront of nanoscale self-organisation, leading to important international recognition and publicity. The spectacular movies obtained will revolutionise our basic understanding of compound semiconductor self-organisation and facilitate an improved control over nanostructure fabrication using MBE. This will generate entirely new device structures relevant to the frontier technologies of photonics and quantum information processing. The project will provide high level training for post-graduate and honours students in nanoscale characterisation and synchrotron science.

**DP0559183** Dr S Joseph; Prof JM Waincymer; Prof D Kinley

**Title:** The World Trade Organization and Human Rights

**2005 :** \$85,000

**2006 :** \$65,000

**2007 :** \$90,000

**Category:** 3903 - JUSTICE AND LEGAL STUDIES

**Administering Institution:** Monash University

**Summary:**

The expansion of a liberalised trade regime has special importance for a trade-dependent small economy such as that of Australia. Yet this process within the WTO, particularly after the Cancun Ministerial meeting, has stalled. This inertia has in part been caused by tensions arising from the WTO/human rights debate. There is therefore an urgent need for cutting edge, thorough, balanced research on that topic. Furthermore, the investigation of the attitudes of Australia's neighbours to the human rights/trade debate will aid friendly relations and contribute to the promotion of global security, which is enhanced by the promotion of a just global economic system. Australia also benefits by being a world leader in this crucial debate.

**DP0557989** A/Prof PC Junk; Dr PC Andrews; A/Prof M Silberstein; Dr S Midgley

**Title:** Development of non-iodinated, non ionic, water-soluble metal based compounds for clinical administration as radiographic contrast media.

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** Monash University

**Summary:**

Every year Australia spends more than \$50 million on importing radiographic contrast media, in an international market worth more than \$1 billion pa. Existing iodine based agents, which currently cause major adverse reactions in 1% of the population, could be replaced by new metal based imaging media which provide both enhanced contrast and greater patient safety and comfort. Even a small fraction of the international market would generate millions of dollars in overseas income from a range of potential sources, including licensing/royalties to export by a local start-up company, and expansion of rare earth mining in Australia.

**DP0558625** Prof FW Kent

**Title:** Lorenzo de Medici and Renaissance Italy

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$76,989

**2008 :** \$75,000

**2009 :** \$75,000

**Category:** 4301 - HISTORICAL STUDIES

APF Prof FW Kent

**Administering Institution:** Monash University

**Summary:**

By providing a scholarly study of Lorenzo de' Medici, and bringing to conclusion the critical edition of his correspondence (a collaborative enterprise by several eminent research institutions in the UK, USA and Italy), this project makes a major Australian contribution to a classic research field of high international prestige, and helps ensure the continued strength of teaching and research in Italian Renaissance and early modern European history in Australia. This period, and Lorenzo, continue to intrigue the general reading public throughout the world, and broadly to disseminate specialist research on these themes, as this project also proposes, is to contribute to the maintenance of a lively and critical contemporary culture.

**DP0556444** Prof DA Kingsford Smith; Dr CM Williamson; Prof S Bottomley

**Title:** **One Day, We'll All Invest This Way! Regulating Online Investment.**

**2005 :** \$85,000  
**2006 :** \$100,000  
**2007 :** \$100,000

**Category:** 3901 - LAW

**Administering Institution:** Monash University

**Summary:**

This project will provide policy recommendations to promote national research priority 3: particularly goals 4 & 5. It will do this by using good regulation to increase the safety of online investing services. It will bring to Australia international expertise not available here, crucial to good regulation of online investing. If investors trust this mostly beneficial technology it will further Australians' prosperity through investment e.g. for retirement. Competitive advantage through good regulation will bring overseas investors to Australia through the Internet. It will consolidate its role as a financial centre. With 51% of adults owning shares, this research could save Australians more than \$1.6 billion per annum!

**DP0556313** Dr SJ Langford; Prof KP Ghigino; Dr JG Shapter; Prof JT Hupp

**Title:** **Porphyrin-Based Supramolecular Assemblies and Arrays II: Model Systems for the Construction of Photosynthetic Mimics and Devices**

**2005 :** \$150,000  
**2006 :** \$130,000  
**2007 :** \$130,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** Monash University

**Summary:**

Solar cells that convert light to electricity are an excellent solution to bringing energy to remote locations with abundant sunlight. This research proposal aims to provide an intellectual grounding in the development of molecular systems and supramolecular arrays that are capable of such solar energy conversion (photovoltaics & artificial photosynthesis) or that have potential applications in photonics. Developments in this project may also lead to breakthroughs in areas such as nano-scale computing and cleaner and more sustainable energy production.

**DP0555966** Prof JJ Loughran

**Title:** **Knowledge to enhance Science Teaching and Learning: Pursuing scholarship through explicitly enacting expert science teachers' pedagogical content knowledge.**

**2005 :** \$70,000  
**2006 :** \$65,000  
**2007 :** \$65,000

**Category:** 3303 - PROFESSIONAL DEVELOPMENT OF TEACHERS

**Administering Institution:** Monash University

**Summary:**

This research will enhance understandings of science teaching and learning allowing science teachers to share their knowledge in meaningful ways. In teacher preparation this will be particularly valuable by 'fast-tracking' learning about teaching science and minimize the process of the next generation of teachers feeling as though they are rediscovering that which is already known by experienced teachers of science. In articulating science teachers' knowledge, enhanced valuing their knowledge and skills of practice will occur. Such outcomes will place understanding of science teaching and learning at the forefront of teacher professionalism and positively impact work on professional standards in teaching.

**DP0557416** Prof AH Lynch; Prof AP Kershaw; Prof NJ Tapper; Prof GH Miller; Dr W Wu

**Title:** **Climate, Vegetation and Fire in the Australian Paleomonsoon: An investigation using paleodata synthesis, contemporary observations and model experiments**

**2005 :** \$100,000  
**2006 :** \$90,000  
**2007 :** \$90,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** Monash University

**Summary:**

This investigation of the history and development of the Australian monsoon will provide much needed information for the prediction of future climatic changes in the Australasian region and beyond. Furthermore, our work will elucidate the impact of current north Australian fire regimes on the strength of the Australian monsoon that is so critical to the environment and economy of the north Australian region, a region that produces wealth for Australia out of proportion to its population. The work has important policy implications for water and fire management in Northern Australia and is significant to aboriginals, pastoralists and other community groups.

DP0556855 Dr A Marsh

**Title:** Contemporary Australian Photography 1980 to the present

**2005 :** \$42,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 4102 - VISUAL ARTS AND CRAFTS

**Administering Institution:** Monash University

**Summary:**

Contemporary Australian art photography has burgeoned over the last 25 years but there is no dedicated book length study in the field. This project will fill this gap by putting Australian photography on an international scholarly agenda, which will generate more scholarship on Australian work. It will have enormous national and community benefit for Australian artists, curators and dealers and the general public who are keenly interested in photography.

DP0557023 Dr J McCulloch; Prof R McQueen; Dr SJ Pickering; Mr J Tham; Dr DP Wright-Neville

**Title:** Combating the financing of terrorism: enhancing security or compromising civil rights and democracy?

**2005 :** \$52,235

**2006 :** \$40,000

**2007 :** \$30,360

**Category:** 3904 - LAW ENFORCEMENT

**Administering Institution:** Monash University

**Summary:**

To enhance security without compromising civil rights and democracy is a key challenge facing government in Australia and internationally. Legislative and policy developments related to combating the financing of terrorism are at the forefront of attempts to safeguard Australia from terrorism. The research will bring new knowledge to these policy and legislative developments; stimulate debate, provide important insights to government, law enforcement, and financial regulators; and give voice to communities, organisations, and individuals directly affected. The project will assist in ensuring that government measures meet the challenge of being effective without unduly compromising civil rights or democracy.

DP0556421 Dr D McNaughton; Dr HG Kjaergaard

**Title:** Vibrational Spectroscopy and Imaging from Interstellar Dust to Life

**2005 :** \$185,000

**2006 :** \$115,000

**2007 :** \$135,000

**2008 :** \$60,000

**2009 :** \$60,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

APF Dr D McNaughton

**Administering Institution:** Monash University

**Summary:**

The outcome of this project will result in a more thorough understanding of the role of water in the atmosphere and in the Greenhouse effect, and will provide information leading to more accurate modelling of Global warming. The results will also lead to new insights into interstellar chemistry, the chemistry of cometary dust and the origins of life.

DP0555959 Dr CJ Mews; Prof JN Crossley; Dr CJ Williams

**Title:** Experience versus authority: science, musical theory and observation in Grocheo's De Musica and intellectual upheaval in the 13th century.

**2005 :** \$70,000

**2006 :** \$47,000

**2007 :** \$52,000

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** Monash University

**Summary:**

The project will help break down disciplinary divisions between those interested in medieval musicology, the history of science and the history of ideas by bringing together specialists from all three domains. The production of an interdisciplinary monograph devoted to an upheaval in thinking in 13th century Europe, in which experience challenged arguments from authority, will deepen awareness of the interconnectedness of the musical, scientific and intellectual traditions inherited by Western culture. It will also encourage international recognition of the innovative capacity of Australian scholars to engage in interdisciplinary research, and provide an opportunity to nurture early career and postgraduate researchers within this country.

DP0557786 Prof AJ Milner; Prof AE Benjamin; Prof IM Buchanan; Dr RT Boer; Dr CE Rigby

**Title:** Demanding the Impossible: Utopianism in Philosophy, Literature and Science Fiction

**2005 :** \$160,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** Monash University

**Summary:**

In a society like ours, which is subject to more or less continuous and often rapid social change, the question of how to imagine the future is of paramount importance. The study of how better and worse futures have been imagined for Australia, and how they still continue to be imagined, is therefore a central research question for the humanities in this country. More specifically, one of the key themes in our research will be the relationship between culture, ecology and utopia or dystopia. Much of our work will be quite deliberately oriented towards the future possibilities for an ecologically sustainable society.

**DP0557482** Prof JJ Monaghan; Prof HE Huppert

**Title:** The propagation of gravity currents over complex terrain

**2005 :** \$45,000

**2006 :** \$50,000

**2007 :** \$55,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** Monash University

**Summary:**

Dust storms, volcanic eruptions, rivers rushing sediment into lakes and seas, and spillages of toxic liquids and gases, are all examples of environmental problems that can occur, and when they do, they threaten both wild life and human communities. This project involves research that will provide quantitative understanding of key processes in these problems from which reliable software will be built to predict their consequences. The software will produce an animation of dust containing fluids moving over a landscape of arbitrary complexity.

**DP0557218** Prof Y Ng

**Title:** Increasing Returns and Economic Efficiency

**2005 :** \$85,542

**2006 :** \$80,000

**2007 :** \$90,717

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** Monash University

**Summary:**

The project attempts to increase the international profile of Australian research by extending the analysis of the challenging issues of economic efficiency in the presence of increasing returns. The proposed analysis takes account of both allocational efficiency and organizational efficiency. It will integrate the Dixit-Stiglitz model of the traditional analysis with the Yang-Ng-Shi model of the new framework to provide a more realistic analysis that allows for increasing returns in both home and firm/market production. This conceptual extension constitutes an advance that is of analytical value and will also be relevant for the formulation of public economic policy in the Australian setting and also more generally.

**DP0558153** Prof CT Nyland; Prof SW Marginson; Dr GG Ramia; Mr M Gallagher

**Title:** The Social and Economic Security of International Students in the Global Education Market

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** Monash University

**Summary:**

Social and economic security is a prime factor in decisions by international students to select Australia as a study destination. It is also central to the long term trajectory of Australian exports. In the international education market security issues have assumed greater importance and urgency in that through 2003 Australian universities lost half of their prior price advantage vis a vis US universities via appreciation of the Australian dollar. Given that the educational product itself is little different to that of the USA and the UK, differentiation on the basis of student security is likely to be crucial. Yet so far there has been no academic research on student security, and a limited policy focus only on selected aspects.

**DP0558943** Dr HC Parkinson

**Title:** Do depolarizing currents in the endothelium evoke contraction of vascular smooth muscle?

**2005 :** \$130,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 3206 - MEDICAL PHYSIOLOGY

**Administering Institution:** Monash University

**Summary:**

Establishment of our concept involving a novel constricting influence in blood vessels will have two major benefits. First, it will keep Australian research at the leading edge in blood vessel research and thus maintain a very high international profile for Australian science. Second, our concept represents a whole new field of therapeutic potential for treating a range of vascular diseases involving excessive constriction of blood vessels. The development and manufacture of drugs in Australia would contribute to the national economy, and their consumption could improve the quality of life for those suffering from vascular diseases amenable to treatment by such drugs, likely to include pre-eclampsia, diabetes, hypertension.

**DP0556840** Dr KM Pavlov; Dr DM Paganin

**Title:** **New quantitative methods in X-ray imaging using crystal optics**

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** Monash University

**Summary:**

This project will enhance Australian science's international leadership in the area of x-ray imaging. This powerful type of X-ray imaging, which makes use of optical elements made of perfect crystals, is specially tailored to image samples which are invisible to conventional x-ray techniques. Such "extended x-ray vision" is extremely important for imaging in medicine, biology and materials science. Furthermore, we will train x-ray scientists of tomorrow, whose expertise will allow Australia to capitalize on its investment in the Australian Synchrotron.

**DP0556446** Prof CT Probyn

**Title:** **Print Manager: Jonathan Swift and Anglo-Irish Print Culture 1680-1750**

**2005 :** \$35,000

**2006 :** \$35,000

**2007 :** \$30,360

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** Monash University

**Summary:**

In Swift studies Australia has both a leading position and a key group of internationally recognised scholars (David Woolley at Perth, Harold Love at Monash, Ian Higgins at ANU, Robert Phiddian at Flinders, myself at Monash). Monash also has the internationally significant Swift Collection of manuscripts, books and associated material, all of the digital databases and microfilms, and is the leading centre for Swift research and eighteenth-century literary research in Australia. This project will enhance Australian strength in and contribution to the world-wide study of Swift and his work, deepen Australian awareness of its Anglo-Irish colonial heritage, and reveal new dimensions to its Irish-Australian heritage.

**DP0558793** Prof MJ Reeder; Dr SR Clarke; Dr DJ Low; Dr GJ Holland; Prof RK Smith

**Title:** **Predicting Organized Tropical Convection**

**2005 :** \$300,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** Monash University

**Summary:**

The project will yield understanding of practical value to forecasters, not only in Australia, but also elsewhere in the tropics. Forecasting the occurrence and behaviour of the deep convective lines, which are important rain-producing systems, is a very significant problem for the northern Australia.

**DP0556095** Prof MJ Rhodes; Dr C Li; Prof AW Weimer

**Title:** **Fluidised bed nanoparticle reactors for gas-solid catalytic reactions**

**2005 :** \$200,000

**2006 :** \$98,000

**2007 :** \$100,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** Monash University

**Summary:**

This is a "frontier technologies" (nanotechnology) project and promises to open up new opportunities for exciting development in molecular engineering. Catalytic gas-solid reactions are among the most important reactions in chemical industry and energy industry. The novel fluidised bed nanoparticle catalytic reactor is expected to have many important advantages over the conventional porous supported catalyst system. These reactors promise to minimise the waste product generation from chemical and energy industries and so offer great benefit for the environment. Young researchers involved in the project will be equipped with knowledge at the forefront of nanotechnology, enabling them to contribute to Australia's new, high technology future.

**DP0556098** Prof MJ Rhodes; Prof J Soria; Dr C Li; Dr DR Honnery; Dr A Ooi; Prof AV Bridgwater

**Title:** **Bio-oil from woody biomass - a sustainable fuel for Australia**

**2005 :** \$220,000

**2006 :** \$165,000

**2007 :** \$190,000

**2008 :** \$180,000

**2009 :** \$180,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** Monash University

**Summary:**

At present many alternative energy supply systems suffer from factors like high costs, inefficiency and in some cases inappropriate application of immature technology and so are unsustainable. To overcome these problems, this research proposes the development of an integrated biomass solution to energy supply as well as dry land salinity. By doing so a sustainable and cost effective industry can be developed. Furthermore, if such an industry is based on advances in Australian research and development, exporting this to other countries with similar problems, will further enhance its economic and social benefit to Australia.

**DP0558611** Dr J Rich

**Title:** Testing for Age Discrimination in Hiring in the Australian Labour Market

**2005 :** \$41,608

**2006 :** \$39,865

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** Monash University

**Summary:**

This project will raise awareness in the community of the extent, or lack thereof, of age discrimination in the Australian labour market. This is particularly important as no other investigations of this nature have been made. The findings will provide a valuable and important complement to the surveys of employer's attitudes towards older workers. There will be policy implications for the structure and operation of anti-discrimination legislation in Australia. The technique of using written applications to apply for jobs can highlight deficiencies in the current legislation and ways in which the legislation can be modified to make it more effective.

**DP0555880** Prof LW Russell

**Title:** Negotiated Encounters: Native peoples and cross cultural engagements in the early Australian and New Zealand maritime enterprises 1790-1850.

**2005 :** \$20,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Monash University

**Summary:**

"Negotiated Encounters" will provide new accounts and interpretations of Australian and New Zealand colonial history. The main focus is on the race relations and cross-cultural encounters in the early maritime industries of sealing and whaling. A key element of the project will be an exploration of the notion of shared history and how relationships form(ed) between Indigenous and non-Indigenous in the colonial period. This project will contribute to contemporary debates on the importance of history, trans-Tasman National identity and the meaning of the past.

**DP0558463** A/Prof JG Sanjayan

**Title:** Development of an Alkali Activated Slag based Construction Material for High Fire Risk Infrastructures

**2005 :** \$92,000

**2006 :** \$90,000

**2007 :** \$98,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** Monash University

**Summary:**

This project will develop an alkali-activated slag (AAS) based construction material for tunnel construction. In tunnels, conventional concretes are likely to 'spall' in a hydrocarbon fire accident, possibly resulting in a tunnel collapse. The project is set to develop a spalling-resistant AAS as an alternative to conventional Portland cement, which is responsible for 6.5 million tons of greenhouse gas emissions in Australia per year, whereas AAS is based on slag, an industrial waste product. The project also seeks to provide better understanding of the spalling phenomenon so that the engineers can design fireproofing for conventional concrete tunnels with confidence.

**DP0558184** Prof PJ Scammells; Dr BL Flynn

**Title:** Allosteric Enhancers: Leads for the Therapy of Cardiovascular Disease

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$90,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** Monash University

**Summary:**

Cardiovascular disease (CVD - heart, stroke and blood vessel disease) kills more people each year than cancer, AIDS and traffic accidents combined. Coronary heart disease (CHD), followed by stroke, is the largest single cause of death in Australia. Allosteric enhancers are particularly attractive drug targets for the prevention of CVD due to their ability to limit injury associated with ischaemic tissue trauma selectively in tissues where adenosine is elevated. Whilst the development of drugs that protect against heart attack and stroke is a difficult and long term objective, any advances toward this goal would clearly be of great benefit to the community.

DP0556945 A/Prof IA Snyder

**Title:** Being digital in school, home and community: investigating the implications of young people's engagement with ICT for education

2005 : \$85,000  
2006 : \$75,000  
2007 : \$70,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** Monash University

**Summary:**

Understanding more about young people's use of ICT at home, at school and in the community has major potential to contribute to the improvement of education. Data on young people's everyday digital literacy practices will point the way to the strategic targeting of government investment in ICT. These data will assist schools in designing their missions, trajectories and curricula. They will also interest parents, employers, community groups and the public at large. If well publicised, the study will generate pressure for more and better understanding of how to integrate the use of ICT into education programs in the future.

DP0557306 Dr MW Spitzer; Prof DR Irvine; A/Prof M Rosa

**Title:** Processing of social communication calls in primate auditory cortex

2005 : \$40,000  
2006 : \$40,000  
2007 : \$40,000

**Category:** 3207 - NEUROSCIENCES

**Administering Institution:** Monash University

**Summary:**

This research will advance our understanding of the brain mechanisms involved in perception of sound. This will help to understand disorders of speech and hearing following brain damage and may assist in efforts to develop better hearing aids, as well as other speech recognition technologies. In addition, we will develop a primate for studying processing of sound in the brain that will be useful in future research to develop improved cochlear implants.

DP0557529 Dr G Sun; Prof Y Ng

**Title:** Valuing Life and Time in the Knowledge Economy

2005 : \$29,155  
2006 : \$29,826

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** Monash University

**Summary:**

This project will help increase the international profile of Australia scholarship in a burgeoning research area of increasing importance: valuation of life, time and health with particular emphasis on the effects of aging and the accumulation of knowledge. It will generate new insights and important welfare and policy implications, which are especially of interest to a knowledge economy like Australia, in which the demographic profile is experiencing a fundamental shift toward unprecedentedly high percentage of the aged population.

DP0556472 A/Prof AI Taylor; Prof SF Macintyre; Ms CM Young; Ms AH Clark

**Title:** A comparative study of history education in Australia and Canada, examining the relationship between school history and broader historical debates.

2005 : \$78,000  
2006 : \$78,000  
2007 : \$80,000

**Category:** 3302 - CURRICULUM STUDIES  
APD Ms AH Clark

**Administering Institution:** Monash University

**Summary:**

Debates on history and history teaching in both nations have oscillated back and forth in a way that has generated more heat than light, frequently placing undue and unprofessional curriculum pressure on teachers of history at all levels. This project will produce an exhaustive and research-based assessment of what kinds of histories are being taught in schools and how they are being taught at a time when good history teaching is regarded as a vital political and cultural asset. The results will be outlined in a way that will lead to informed discussion of the nature of this crucial discipline.

DP0557512 Dr G Tsolidis; Dr A Kostogriz

**Title:** Transnational literacies - diaspora, schooling and identity

2005 : \$30,000  
2006 : \$30,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** Monash University

**Summary:**

The need for transnational literacies - the capacity to function successfully within and between nations and cultures - is increasingly significant for multicultural Australia due to globalisation. The Greek-Australian community is used to explore schooling and its capacity to assist young Australians form productive cultural identities. This provides insights into a significant Australian community that will assist with the development of all ethnic communities. The project contributes to understandings of identity, learning and schooling. It reviews three decades of multicultural education and consolidates our national capacity to school for cultural difference and global citizenship.

**DP0557983** Prof JA Walter

**Title:** Political careers: a cohort analysis

**2005 :** \$35,000

**2006 :** \$30,360

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** Monash University

**Summary:**

The work of our MPs has influential effects on the lives of all of us. An informed citizenry deserves to have a close understanding of the nature of that work and of the people who undertake it. This research will provide that opportunity. Informed understanding could encourage greater esteem for politicians and more realistic expectations of what they can achieve in politics. For those aspiring to political careers, this comprehensive study will detail the potentials and the limitations of their intended course. Analysts of parliament and of social change will benefit from this case study in social history.

**DP0559370** Dr CG Warr

**Title:** Olfactory signal transduction in *Drosophila melanogaster*

**2005 :** \$95,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2702 - GENETICS

**Administering Institution:** Monash University

**Summary:**

This project will strengthen Australia's research capabilities in the areas of molecular neurobiology and neurogenetics. The project will equip students with the intellectual and technical skills needed to work in priority areas such as genomics and biotechnology, as well as in medical and agricultural research, and education. The research has possible long term applications in modifying the behaviour of insects of agricultural or medical importance. For example, by inhibiting the ability of insects to perceive specific odours it may ultimately be possible to prevent insects that carry disease from identifying target animals, or plant pests from locating their host plants.

**DP0556279** Prof GI Webb; Dr KB Korb; Dr K Ting

**Title:** Resource-bounded adaptive inference of accurate conditional probability estimates from data

**2005 :** \$90,000

**2006 :** \$76,000

**2007 :** \$81,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** Monash University

**Summary:**

This project will develop machine learning techniques with a valuable new capability: the ability to produce estimates of complex conditional probabilities to varying levels of expected accuracy depending upon the constraints of available computational resources. This will provide significant competitive advantage to developers of many types of online application by allowing them to maximise utilisation of available computational resources when making inferences from data, together with the flexibility to trade-off accuracy and computing resources during system design. Australia will also benefit by strengthening its machine learning expertise, which is central to many complex and intelligent systems and the booming data mining industry.

**DP0556409** Dr RF Weinberg; Dr K Regenauer-Lieb; Prof M Brown; Dr EW Sawyer; Prof RH Vernon; A/Prof WJ Collins

**Title:** The Early Stages of Granite Evolution: Extraction and Transport Through Ductile Crust

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** Monash University

**Summary:**

This research is aimed at understanding how the continents develop through several stages of rock melting. Rock melts deep in the continents to form granite magmas which rise, transporting to the upper crust important metals, such as gold, copper and tin, and heat producing elements such as uranium, thorium and potassium. This research proposal seeks to understand how granite melts form and rise transporting these all important elements, which control not only our wealth but also the stability of the continents we live in.

**DP0557844** Dr AG Wood

**Title:** Hemispheric asymmetry of motor and language representation: Effects of hand preference and mirror movements

**2005 :** \$50,000

**2006 :** \$50,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Monash University

**Summary:**

The neuroscience community has recently exploited advances in brain imaging to understand cerebral representation of many cognitive functions. The proposed study will expand our knowledge of brain-behaviour relationships, another key area of cognitive neuroscience research. Its successful funding and completion will increase Australia's standing as a major contributor to world research outcomes in this innovative and important field, and place Australia at its forefront. The investigator's access to advanced brain imaging and to the unique population of individuals with mirror movements, combined with expertise and experience in neuropsychology and brain imaging, places the research in an internationally competitive position.

**DP0557288** Dr X Xiong; A/Prof TR Finlayson

**Title:** Development of SmCo-based High Temperature Permanent Magnets: Microstructure and Coercivity Mechanism

**2005 :** \$75,000

**2006 :** \$73,000

**2007 :** \$75,000

**Category:** 2914 - MATERIALS ENGINEERING

APD Dr X Xiong

**Administering Institution:** Monash University

**Summary:**

This project is to develop high performance permanent magnets for elevated temperature applications. Microstructure and magnetic properties will be examined using atom probe, TEM, XRD and magnetometry. The specific atom probe is the state-of-the-art technique for the characterization of nanostructure and falls in the designated National Research Priority 3, PG2 Frontier Technologies (nanotechnology). The magnet alloys concerned are an example of Advanced Materials (NRP3, PG3), possessing the best performance amongst such functional materials. The expertise gained in the use of the atom probe technique in this project will have broader applications in the study of nanostructured materials and other metal alloy problems within Australia.

**DP0557570** Prof XV Yang; Dr CG Tombazos

**Title:** A Neo-Heckscher-Ohlin Model of Trade with Endogenous Production Patterns

**2005 :** \$45,000

**2006 :** \$37,639

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** Monash University

**Summary:**

The ongoing debate regarding the expected benefits of the recent trade agreement with the United States exemplifies that few aspects of international trade are well understood. Using inframarginal analysis, an approach developed by co-investigator 1, we expect to be able to advance our understanding in this field by producing what is arguably the most generalised model of trade. This will constitute an important accomplishment that is likely to attract both international academic interest and international research funds to Australian research. In addition, as our model will be calibrated on the basis of our domestic production characteristics, our work will shed light on the socially optimum trade policy directions for Australia.

**DP0558367** Prof X Zhao; Prof SH Rizkalla; Dr R Al-Mahaidi

**Title:** Debonding Failure in CFRP Strengthened Steel Structures

**2005 :** \$110,000

**2006 :** \$105,000

**2007 :** \$110,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** Monash University

**Summary:**

The research will make a breakthrough in understanding the bond characteristics between CFRP and steel. It will enhance the capacity of Australian researchers to participate in a new cutting-edge research area, and help create a vibrant new industry for strengthening steel structures. The project will contribute to improved cost efficiency and safety of steel structures thereby contributing to the socio-economic well being of Australia including road, offshore, building and mining industries. It will increase the international competitiveness of Australian steel industry and infrastructure maintenance capability. Australia will be better positioned in this region for potential technology transfer to Asian countries.

## RMIT University

**DP0560098** Prof MC Burry; Prof MJ Ostwald; A/Prof PJ Downton; A/Prof A Mina

**Title:** **Spatial Knowledge and the Built Environment: The Design Implications of Making, Processing and Digitally Prototyping Architectural Models**

**2005 :** \$101,455  
**2006 :** \$72,342  
**2007 :** \$75,000

**Category:** 3101 - ARCHITECTURE AND URBAN ENVIRONMENT

**Administering Institution:** RMIT University

### Summary:

The construction industry accounts for 6.7% of Australia's GDP. Beyond the more pragmatic economic benefits, however, lies the potential to influence the physical quality and appearance of our nation's building within an existing economic framework. The evaluation of differing modelling methods in design will have considerable implications for the way in which designing is carried out. It will lead to new kinds of computer strategies that will guide the direction of development of programs used in design modelling by showing that current tools do not properly facilitate certain kinds of design inquiry available by more traditionally established means.

**DP0557333** Prof M Kalantzis; Prof NJ Yelland; Dr W Cope

**Title:** **Pedagogies for eLearning: A Critical Analysis of Strategies for Effective Use of Information and Communications Technologies for Teaching and Learning**

**2005 :** \$60,000  
**2006 :** \$45,000  
**2007 :** \$45,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** RMIT University

### Summary:

This project will assess the potential benefits and weaknesses of 'elearning' in different subject areas and across a range of social settings (including socio-economic, gender and other critical aspects of learner diversity). It will trace the microdynamics of traditional classroom as contrasted with elearning, and develop models which most productively exploit the educational potentials of elearning. No such direct comparisons of teaching and learning has been made before. The results will inform the development of learning environments which most effectively contribute to the formation of fully enabled members of the emerging 'knowledge society'.

**DP0556439** Prof IK Snook; Dr SP Russo; Prof RJ Needs; Dr M Towler

**Title:** **Accurate quantum modeling of the van der Waals interaction and its application to molecular physisorption onto surfaces.**

**2005 :** \$100,000  
**2006 :** \$80,000  
**2007 :** \$100,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** RMIT University

### Summary:

Developing zero emission clean fuel technology for transportation and developing sensitive diagnostic markers for medical diagnosis will clearly benefit Australia. In both cases large technological challenges need to be overcome. This investigation will provide theoretical insight and understanding into the molecular processes which underpin these highly desirable technologies and aid scientists and engineers in their development. A further, more general, outcome will be an accurate and predictive methodology for investigating nanotechnology problems in any material where molecular physisorption is an important process.

**DP0557833** Prof CR Triggie

**Title:** **Novel sources of nitric oxide (NO) in cells: Implications for an endocrine role for NO.**

**2005 :** \$80,000  
**2006 :** \$70,000  
**2007 :** \$70,000

**Category:** 3206 - MEDICAL PHYSIOLOGY

**Administering Institution:** RMIT University

### Summary:

Communication between cells is essential for coordinating and controlling a healthy body. A key regulator and cell-communicating molecule is the gas, nitric oxide. Although nitric oxide is a simple substance we still do not fully understand all aspects of its cellular functions. It is assumed that nitric oxide is synthesised in the body and, after release, is rapidly metabolized and eliminated. Reductions in the levels of nitric oxide in the body are associated with several disease states and states of dysfunction including cardiovascular disease, diabetes and also impotence. Professor Triggie's study seeks to characterize how tissues may store nitric oxide, thus prolonging the life of nitric oxide, and how such stores are released.

**DP0556094** A/Prof JY Tu; Dr GH Yeoh; Prof G Park

**Title:** **THE DEVELOPMENT OF MECHANISTIC MODELS FOR BUBBLY FLOWS WITH HEAT AND MASS TRANSFER**

**2005 :** \$60,000  
**2006 :** \$58,000  
**2007 :** \$60,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** RMIT University

**Summary:**

Commercially available CFD computer codes are currently widely used in many Australian industrial sectors. It is clearly recognised that the state-of-the-art models for dealing with complex bubbly flows with/without heat and mass transfer in these computer codes require further developments and improvements. This research project will address the prevalent deficiency in many of these computer codes. It is anticipated that through this major development of new models capable of predicting a wide range of industrial bubbly flow problems and implementation thereafter in these computer codes, industries will experience significant benefits especially reduce time and costs in their design and production.

**DP0558916** A/Prof HE Williams; Dr A Turpin

**Title:** Using Past Queries for Fast and Accurate Web Searching

**2005 :** \$62,021

**2006 :** \$63,453

**2007 :** \$64,934

**2008 :** \$66,466

**2009 :** \$68,049

**Category:** 2801 - INFORMATION SYSTEMS

QEII Dr A Turpin

**Administering Institution:** RMIT University

**Summary:**

Searching the entire Internet, or a company web site, has become a vital task for modern organisations. While there has been significant research into improving search engines through using web pages themselves, very little attention has been paid to improving web search by exploiting the vast numbers of queries that users submit to search engines each day. This project will use state of the art compression and algorithmic techniques to improve the speed and accuracy of web search using data gleaned from millions of Internet queries (provided under agreement by Microsoft). Improving search engines will have a direct benefit to many Australian industries, and support the government's priority area of "smart information use".

**DP0558791** Prof X Yu; Prof Y Zheng; Prof G Chen

**Title:** Studying Discretisation Behaviours in Variable Structure Control Systems

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2903 - MANUFACTURING ENGINEERING

**Administering Institution:** RMIT University

**Summary:**

Variable structure control is a technology that helps build very simple and effective switching control devices for dealing with environmental uncertainties, which are widely used, for example, in industrial control systems/processes. The outcomes from this research will help the understanding of control performance deterioration due to discretisation and developing effective measures for protection from possible ill behaviours of these control devices. This research will place Australia in the forefront of the development of this new technology, resulting in enhanced reliability of control devices, improved productivity and cost saving for industries, and consequent improvement in quality of life.

**DP0559075** Dr CJ Ziguas; Dr GD McBurnie

**Title:** Governing International Trade in Higher Education: A Comparative Study of International Education Policy Development

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** RMIT University

**Summary:**

Australia is a major exporter of education, yet the cumulative social and economic impacts of large-scale commercial international education on our trading partners are not well researched. This project will assist in understanding the similarities and differences between Australian and other governments' objectives in relation to the growing international market in education, and the means governments use to regulate educational trade. This can help inform bilateral and multilateral relations between governments, educational institutions, educational peak bodies and other stakeholders.

## **Swinburne University of Technology**

**DP0557246** Prof TY Chen; Dr TH Tse

**Title:** Enhanced Random Testing - Towards Better Cost Effectiveness and Fault Detection Capabilities

**2005 :** \$66,000

**2006 :** \$61,000

**2007 :** \$66,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** Swinburne University of Technology

**Summary:**

Nowadays, software is pervasive and ubiquitous. It plays a significant role in the modern daily life of all kinds of people. The Australian software industry has bloomed in recent years. Our research results will improve the cost-effectiveness of software development, thereby will upgrade the nation's software productivity and quality. These factors are conducive to the export of software produced by Australians, helpful in raising our nation's competitive advantage in the software industry towards the goal of becoming a leading nation among the Asia-Pacific countries in the software industry.

**DP0559410** Dr RJ Croft

**Title:** **Comparison of Techniques for the Removal of Ocular Artefact from the Electroencephalogram: A Validation Study**

**2005 :** \$51,000

**2006 :** \$51,000

**Category:** 2999 - OTHER ENGINEERING AND TECHNOLOGY

**Administering Institution:** Swinburne University of Technology

**Summary:**

Although employed extensively for both research and clinical purposes, the utility of the electroencephalograph (EEG) is hampered by the contaminating effects of eye movements on these 'brain waves'. If it can be validated, the recent Australian development of a solution to this problem will mean that the EEG can be measured more quickly and accurately.

This purpose of this research is to perform this validation, and its success would mean both more efficient EEG recording for the country, as well as an enhanced scientific reputation.

**DP0558759** Prof M Gu; Dr JW Chon

**Title:** **Multi-dimensional optical data storage based on nanophotonics - the third generation optical data storage technology**

**2005 :** \$230,000

**2006 :** \$180,000

**2007 :** \$180,000

**2008 :** \$180,000

**2009 :** \$180,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** Swinburne University of Technology

**Summary:**

The key-sector in high tech markets has been the photonics industry over the last decade, and it will continue to revolutionise our ways of information storage, processing and transfer for the next 10 to 20 years. The current project of high-capacity Petabyte optical data storage, i.e the third generation optical data storage, will prove to be the key technological innovation in photonics (one of the National Research Priorities), which will not only meet the growing demands of the consumer market, but also continue to drive the industry and create new markets. This is in line with the Priority Goals set by the Minister for Education, Science and Training, as it will put Australia into the unique position in the information age.

**DP0556925** Dr L Hopkins

**Title:** **Community, Identity and Media Use: Understanding the Turkish Community in Australia**

**2005 :** \$68,000

**2006 :** \$68,000

**2007 :** \$68,000

**Category:** 4001 - JOURNALISM, COMMUNICATION AND MEDIA

APD Dr L Hopkins

**Administering Institution:** Swinburne University of Technology

**Summary:**

This project is of direct and immediate benefit to the Australian community through its investigation of the Turkish community, a small but important ethnic minority group, which constitutes one of Australia's longest established Muslim populations. The research will enhance understandings of the emerging use of new technologies among diasporic populations and investigate the effects of the proliferation of electronic means of communications amongst Islamic groups within a liberal, secular, Western democracy.

**DP0558597** Dr MF Lau

**Title:** **Fault-Based Test Case Generation for Software**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** Swinburne University of Technology

**Summary:**

This research explores ways to generate fault based test cases from specifications to verify software applications. This will help to enhance knowledge and skills on frontier software technologies for building and transforming Australian IT industries. The results provide knowledge, methodologies and technologies to software industry in Australia on building better quality software faster. In addition, it will help to reveal faults earlier in the development phase. Software companies in Australia can apply these techniques to improve their software development process and, hence, enhance the quality of their product. They can also adapt the knowledge to manage and enhance the quality of their outsourcing projects.

**DP0559949** Dr DT Liley

**Title:** Complexity in a mesoscopic model of brain dynamics

**2005 :** \$90,000

**2006 :** \$76,000

**2007 :** \$81,000

**Category:** 2499 - OTHER PHYSICAL SCIENCES

**Administering Institution:** Swinburne University of Technology

**Summary:**

Research into how the brain work remains at the frontier of human knowledge. We possess only the vaguest idea how the brain is able to generate memories, perceptions and behaviour. This research proposal concerns new approaches aimed at bridging this gap in our understanding by developing and studying detailed theories of the brain's electrical activity. The outcomes of this work will not only suggest improved diagnostic methods and treatments but contribute vital knowledge about how to control and predict the behaviour of complex systems.

**DP0557991** Prof RJ Sadus; A/Prof BD Todd

**Title:** Operating Mechanisms and Dynamics of Molecular Motors

**2005 :** \$86,000

**2006 :** \$86,000

**2007 :** \$86,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** Swinburne University of Technology

**Summary:**

This project will enhance the nation's expertise in nanotechnology which is emerging as an important enabling technology for the creation of sophisticated novel materials. It is in the national interest to be at the forefront of this field because of its great potential for economic advantage such as the creation of new valued-added export industries based on "bottom-up" fabrication.

## The University of Melbourne

**DP0559864** Prof M Aitkin

**Title:** Theory and applications of Bayesian and likelihood analyses for finite mixture, random effect and multinomial models

**2005 :** \$90,000

**2006 :** \$76,000

**2007 :** \$81,000

**Category:** 2302 - STATISTICS

**Administering Institution:** The University of Melbourne

**Summary:**

The expected outcomes of the project are: to establish the scientific value of modern Bayesian methods for statistical inference in a wider range of applications than previously available, to contribute to the greater unification of the current theories of statistical inference which are to some extent in conflict, and to provide a set of Bayesian analytic tools implemented in widely available, free and open-source statistical software.

**DP0558457** A/Prof CM Alder; Prof K Polk

**Title:** An investigation of two non-punitive crime control strategies for the illicit traffic in S.E. Asian antiquities

**2005 :** \$80,000

**2006 :** \$30,000

**2007 :** \$27,000

**Category:** 3904 - LAW ENFORCEMENT

**Administering Institution:** The University of Melbourne

**Summary:**

The preservation of cultural heritage is significant for the maintenance of national identity and security. The illegal plunder and international trafficking of cultural heritage, not infrequently linked with other international crime, is of national and regional concern. The response to the destruction of the Iraq Museum evidences the level of community concern. However, the nature of the illicit antiquities market means that traditional punitive crime control strategies are ineffective. The Australian government has participated in international efforts to develop new control strategies for this form of international crime. Focusing on the illicit market in SE Asian antiquities, this research investigates two non-punitive strategies.

**DP0557673** Dr P Ali; Dr GP Stapledon

**Title:** Corporate Governance and Institutional Investment in the Australian Financial Markets

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$30,000

**Category:** 3901 - LAW

**Administering Institution:** The University of Melbourne

**Summary:**

The financial markets play a vital role in Australian economic life. The majority of the assets of Australian superannuation funds and managed investment funds are financial products. This project will provide an comprehensive account of the different types of complex financial products available in Australia and an assessment of the corporate governance practices at Australian companies and Australian institutional investors in relation to their use of complex financial products. Through these outcomes, the project will contribute to a broader understanding of the Australian financial markets and the enhancement of corporate governance practices in Australia.

**DP0556192** A/Prof LJ Allen; Dr SJ Pennycook

**Title:** **Atomic resolution imaging and spectroscopy**

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Melbourne

**Summary:**

This project will enhance Australia's reputation in atomic resolution imaging, positioning Australia as a major contributor to significant world research outcomes in the physical sciences. It contributes to the quality of our culture through the advancement of knowledge through the solution of problems of high scientific merit, provides training at the postdoctoral level and will produce several PhD graduates of the highest quality. This project strengthens collaborative international links with one of the worlds leading research facilities located at the Oak Ridge National Laboratory. The potential practical applications of this work should lead to direct economic benefits to Australia.

**DP0557663** A/Prof NB Allen; Dr M Yucel

**Title:** **Investigating the social brain: The neural basis of the link between depressed mood and social cognition.**

**2005 :** \$85,000

**2006 :** \$70,000

**2007 :** \$60,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Mood and social relationships are amongst the most important determinants of well being, life functioning, and both mental and physical health. To understand how mood and social behaviour interact, this project will examine the brain mechanisms that are responsible for the impact of mood states on processing social threat stimuli (e.g., stimuli suggesting humiliation, rejection or defeat). This work will have important implications for understanding vulnerability to recurrent depression, where these processes have been implicated in previous research. The high prevalence of these disorders, and the high cost that they represent to society, makes basic research of this type vital at this time.

**DP0557781** Dr MV Arnold; Dr MR Gibbs

**Title:** **The Connected Home: probing the effects and affects of domesticated information and communication technologies**

**2005 :** \$39,133

**2006 :** \$24,356

**2007 :** \$29,934

**2008 :** \$23,918

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Australia is a major consumer of ICTs, and the contemporary Australian home now plays the role of 'communications node' in global as well as local networks. This project investigates the effective use of these domestic communications technologies, the affects of this use on the household, how information and communication technologies shape the home, and how the home shapes the technologies. The study's findings will provide important information to government and non-government agencies concerned with social connection in contemporary Australian suburbs, and will provide important information to communications service providers, and to designers and manufacturers of domestic ICTs.

**DP0558999** Prof AJ Baker; Prof J Smith

**Title:** **PHYSIOLOGICAL AND BIOCHEMICAL DISSECTION OF COBALT ACCUMULATION BY PLANTS**

**2005 :** \$130,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2704 - BOTANY

**Administering Institution:** The University of Melbourne

**Summary:**

Co is a valuable metal for the Australian economy. The project will advance phytomining of non-economic Co ores and also the phytoremediation of (60)Co-contaminated soils. It will assist development of phytotechnologies for Co, eg improvement of Co content of fodder crops for ruminants in Co-deficient areas. All these applications will benefit ARC's National Research Priorities Goal 1: an environmentally friendly Australia. Understanding Co uptake by accumulator species will also promote awareness, conservation and sustainable use of biodiversity in Australia. Outcomes will impact on Goal 3: frontier technologies, as the potential spin-off applications of Co-based phytotechnologies will fuel future environmental technologies in Australia.

DP0556977 Dr JR Barnett

**Title:** Climate Change and Security in the South Pacific

**2005 :** \$127,000

**2006 :** \$140,000

**2007 :** \$165,000

**2008 :** \$145,000

**2009 :** \$110,000

**Category:** 3704 - HUMAN GEOGRAPHY

ARF Dr JR Barnett

**Administering Institution:** The University of Melbourne

**Summary:**

Climate change is dangerous to many Pacific societies and countries, which will in turn generate problems for Australian aid, diplomatic, immigration and security policy. The practical benefits of this project will be improved understanding of the security risks that climate change poses; and knowledge about the capacity of, and ways to improve, the climate change and security institutions that are necessary to manage these risks. The intellectual benefits include the application of a novel, multi-scale and longitudinal approach of relevance to both climate impacts and environmental security research; the project will enhance Australia's reputation, and advance expertise, in both these fields.

DP0557497 A/Prof P Batterham; Dr C Robin; Dr MH Kohn; Dr D Petrov

**Title:** Using comparative genomics to identify genes responsible for adaptation to environmental toxins

**2005 :** \$110,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Melbourne

**Summary:**

The US National Human Genome Research Institute has committed to sequencing the genomes of ten different *Drosophila* (fly) species. We will search these genomes, and two others that are already available, for genes that allow flies to cope with environmental toxins found in the plants upon which they feed and breed. These same genes have the potential to degrade many of the insecticides used to control insect pests. Hence, this research will contribute to ongoing efforts to minimize the threat to agriculture posed by the insecticide resistance that frequently evolves in pest species.

DP0556900 Dr D Bennett; Dr L Kouvaras

**Title:** Postmodernism in contemporary Australian art-music: analysis and reappraisal

**2005 :** \$112,000

**2006 :** \$126,000

**2007 :** \$126,000

**Category:** 4101 - PERFORMING ARTS

**Administering Institution:** The University of Melbourne

**Summary:**

Art-music composition in Australia is vibrant and diverse but its relationship with current trends in other art practices has not been well understood, and music critics and educators have too often been dismissive of musical innovation of the postmodern kind. This project will be the first sustained analysis of the emergence and critical reception of postmodernism in Australian art-music, from the linked perspectives of musicology and cultural studies. It will produce the first thematic book on Australian art-music since Covell's 1968 'Australia's Music', providing a standard reference and valuable education resource for music critics, scholars and educators while locating Australia in current international debates about postmodern music

DP0556299 Dr EJ Bieske

**Title:** Towards a Microscopic Understanding of Anion Solvation

**2005 :** \$130,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Melbourne

**Summary:**

Atomic and molecular anions are ubiquitous components of oceans, rivers, lakes, and the atmosphere, and serve as key participants in natural and industrial chemical processes. In most situations ions are surrounded by a structured sheath of neutral solvent molecules which profoundly affects their physical and chemical properties. Currently, interactions between anions and solvent molecules are poorly understood. In this project we will use lasers to probe clusters consisting of just a few molecules attached to an anion, generating information that will enhance our ability to predict and control chemical processes involved in drug design, salination, atmospheric chemistry, and chemical waste remediation.

DP0557873 Dr JB Bishop

**Title:** Interpreting spoken Aboriginal English: the communicative role of intonation

**2005 :** \$85,000

**2006 :** \$85,000

**2007 :** \$67,494

**Category:** 3802 - LINGUISTICS

APD Dr JB Bishop

**Administering Institution:** The University of Melbourne

**Summary:**

This project will produce new knowledge about the ways Aboriginal English speakers use intonation (speech melody) to communicate meanings. This knowledge will improve our understanding of potential linguistic sources of miscommunication between speakers of Aboriginal English varieties and speakers of mainstream English. It will also contribute to an increased appreciation in Australia and abroad of the unique linguistic structures of Aboriginal English, which are reflective of the continuity and maintenance of the distinct cultural perspectives of Aboriginal Australians.

**DP0557836** Dr N Boland; Prof R Johnston

**Title:** **Maximizing Dimensional Efficiency With Minimal Cardinality Pattern Combinations**

**2005 :** \$90,000

**2006 :** \$76,000

**2007 :** \$81,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Melbourne

**Summary:**

Making optimal use of dimensional capacity is often fundamental to the efficiency of processes in science and industry. Many important applications use combinations of patterns to achieve this. For example, in paper and in steel manufacturing, reels are divided lengthwise into cutting patterns, combined so as to minimize waste. In medicine, radiation patterns are combined to effectively treat cancerous tumours. By addressing the common mathematical structure underlying pattern combination, this project will account for a hitherto neglected critical factor - the solution cardinality - making fully optimized solutions available for the first time to many applications in science and industry.

**DP0556120** Dr C Boskovic; Prof HU Guedel

**Title:** **Polynuclear Metal Complexes as Molecular Nanomagnets**

**2005 :** \$96,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Melbourne

**Summary:**

Computer hard drives and other devices use tiny particles of magnetic materials to store digital information. Technological advances require an increase in the density of information storage and therefore even smaller magnetic particles. This project has the potential to synthesise materials where a single molecule could act as the smallest possible unit of magnetic memory. The future application of these materials may provide an increase of three orders of magnitude in information storage density. In addition, they may find employment in quantum computers, which can perform calculations exponentially faster than conventional computers.

**DP0558131** Dr MM Brown

**Title:** **Crime, governance and the colonial state: a study of the Criminal Tribes Act 1871**

**2005 :** \$28,000

**2006 :** \$25,000

**2007 :** \$20,000

**Category:** 3999 - OTHER LAW, JUSTICE AND LAW ENFORCEMENT

**Administering Institution:** The University of Melbourne

**Summary:**

Today as in the nineteenth century governments struggle with the challenges posed by communities marginalised from mainstream social and economic life. In Australia Aboriginal and Torres Strait Island communities have been subject to such marginalisation and to the problems this brings, including crime. Through an analysis of British responses to native crime in India, this study will develop an analysis of strategies of governance directed or developed in response to the effects of social and economic marginalisation. The study will thus help to inform national debate on the apparent intransigence of crime in indigenous communities as well as raising questions about what are 'appropriate' and 'natural' responses to criminal conduct.

**DP0556709** Prof BJ Caldwell; Prof WR Mulford; Dr DM Gurr; Dr L Drysdale; Dr RS Swann

**Title:** **International comparative study of successful school leadership: Successful school leadership in**

**2005 :** \$85,000

**2006 :** \$45,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

There is renewed focus by government on education, facilitated by the move to a knowledge society and the realisation of the importance of good education to Australia's prosperity. School principals are key to how schools function. With an ageing principalship and a high principal retirement rate, there is renewed interest in developing current and future principals as evidenced by the establishment of the National Institute for Quality Learning and School Leadership. This research is about successful school principals and is part of an international effort to better understand school leadership, particularly that of schools that have undergone dramatic improvement. It holds the promise of transforming leadership preparation and support.

**DP0558537** A/Prof J Camakaris

**Title:** Gene Discovery and Functional Analysis of Copper Homeostasis Genes in Drosophila

**2005 :** \$120,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Copper is a vital nutrient required for the formation and maintenance of bones, blood vessels and the central nervous system, but copper is also potentially toxic when in excess. Homeostatic mechanisms are needed to maintain safe levels of copper in the body and disruptions to these mechanisms are associated with disorders such as Alzheimer's disease, heart disease and osteoporosis. We are investigating the regulation of a key copper pump, the Menkes protein, which helps control copper levels in the body and we are using the genetic advantages of the fruit fly Drosophila to discover new genes that regulate Menkes activity and therefore copper levels. These studies could lead to novel therapies for a range of copper-related disorders.

**DP0557707** A/Prof LA Cameron; Dr J Williams

**Title:** Health and Intergenerational Poverty in a Developing Country

**2005 :** \$60,000

**2006 :** \$65,000

**2007 :** \$50,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The University of Melbourne

**Summary:**

The alleviation of poverty is a major policy objective of the Indonesian government. As one of Indonesia's closest neighbours and allies, Australia has a special interest in the economic and social wellbeing of Indonesia. This interest is often expressed through financial aid and through the sharing of expertise. This research aims to contribute to this expertise by investigating whether health is a mechanism that transmits poverty across generations of Indonesians. Thus, this research contributes to a body of knowledge that informs development policy, leading to more effective use of aid funds and to a more prosperous and safe region.

**DP0558271** Dr JL Carey

**Title:** Promoting Whiteness: Race Science and the Making of the Middle-Class Woman in Australia, 1880-1940

**2005 :** \$63,000

**2006 :** \$63,000

**2007 :** \$57,000

**2008 :** \$54,000

**Category:** 4301 - HISTORICAL STUDIES

APD Dr JL Carey

**Administering Institution:** The University of Melbourne

**Summary:**

Many Australians remain confused about precisely how race relations operated and were defined in the early twentieth century. Since, elite women were central actors in promoting racial ideologies, this study will provide the a broad insight into precisely how racial ideologies came to permeate white Australian society and their importance for both national and individual identity. Such insights are of critical importance to understanding the impact of racial thought in the past, and its continuing effects, and thus for our ability to move beyond the current acrimonious debates over race within Australia and in within our region.

**DP0556609** Prof F Caruso; Prof TP Davis; Dr JF Quinn

**Title:** Controlled Macromolecular Architectures for Functional Nanomaterials Design

**2005 :** \$300,000

**2006 :** \$250,000

**2007 :** \$250,000

**2008 :** \$250,000

**2009 :** \$250,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

APD Dr JF Quinn

**Administering Institution:** The University of Melbourne

**Summary:**

The research involves an exciting and innovative collaboration between two internationally recognized Australian research groups, cementing Australia's position as a leading country for research in polymer science and nanotechnology. Advanced polymer chemistry will be used to make 'smart' polymers that can controllably respond to changes in their surroundings. These will then be assembled to form materials with dimensions of the order of millionths of millimeters - forming so-called "smart nanomaterials". The materials prepared are expected to find application in the agricultural and pharmaceutical sectors, contributing to the well-being of Australian citizens and the development of a robust Australian industry.

**DP0556629** Prof MS Chong; Dr A Ooi; Mr JP Monty

**Title:** Surface roughness and its effects on wall-bounded turbulence

**2005 :** \$100,000

**2006 :** \$73,000

**2007 :** \$75,000

**2008 :** \$55,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING  
APD Mr JP Monty

**Administering Institution:** The University of Melbourne

**Summary:**

Examples in engineering where turbulence is important are: wind tunnel model testing, numerical prediction of turbulent skin friction drag over an aircraft wing, turbulent forces and acoustic field around a submarine or a road vehicle, and the dispersion of pollutants in the atmosphere. Turbulence may also be beneficial, for example, in improving engine combustion and decreasing pollutant emissions. Hence this study will have national benefits in many scientific fields, for example, in fuel savings (economy and energy), stability of road vehicles (safety and health), noise generation and acoustic signatures of submarines (transforming defence technology and safeguarding Australia).

**DP0556420** Dr JH Chong-Gossard; Dr CA Tesoriero; Dr AJ Turner

**Title:** **Public and Private Lies: Retelling the clash of duty, power and sexual indulgence in the Roman imperial court**

**2005 :** \$60,000  
**2006 :** \$65,000  
**2007 :** \$65,000  
**2008 :** \$60,000

**Category:** 4202 - LITERATURE STUDIES  
APD Dr AJ Turner

**Administering Institution:** The University of Melbourne

**Summary:**

The Australian public has a genuine and demonstrable interest in Ancient World Studies. This project offers them insight into how the ancient world constructed its political scandals. It examines the interrelationship of private acts and public conduct during the height of the Roman empire, and how personal morality was perceived to affect capability to govern. It provides a case study for the assessment of similar scandals in the modern world. By reading ancient perspectives on 'sex,' 'power,' and 'privacy,' we better understand our world and the potential for miscommunication across cultures. The project also promotes co-operation between metropolitan and regional universities in sharing resources in a national collaborative project.

**DP0557360** A/Prof DJ Clarke; Prof F Leung

**Title:** **Responsibility for knowledge generation in Australian and Korean mathematics classrooms: Beyond the teacher-centred/student-centred dichotomy**

**2005 :** \$80,000  
**2006 :** \$75,000  
**2007 :** \$85,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

We need to reconcile the apparent differences in instructional practice between well-taught 'Asian' and well-taught 'Western' mathematics classrooms. If this can be achieved then best practice in one tradition can inform best practice in the other. An analytical approach based on the distribution of responsibility for knowledge generation is applied to well-taught classrooms in Australia and Korea in order to accommodate the effective practices of competent teachers in both traditions within the same explanatory framework. Only then will teachers in one tradition have access to effective practice in the other tradition in a form likely to sustain culturally-appropriate adaptation. The benefits to Australian schools will be considerable.

**DP0556747** A/Prof CS Cobbett; A/Prof J Camakaris

**Title:** **Mechanisms of zinc transport and homeostasis in the plant, Arabidopsis.**

**2005 :** \$110,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Melbourne

**Summary:**

Zinc-deficiency is one of the most widespread factors limiting crop production and affects many soils of south-east and south-west Australia. Certain zinc-efficient (ZE) crop cultivars are able to grow well under zinc deficient conditions but the genetic basis for ZE is not well understood. Using a model organism such as Arabidopsis to identify genes in plants that are important in zinc transport and homeostasis will ultimately allow us to assess whether the homologous genes in crop species are responsible for ZE. This may contribute to more rapid and directed strategies in breeding ZE crop cultivars.

**DP0556823** Prof M Considine

**Title:** **Creating Collaborative Advantage through Better Network Governance: A Comparative Study of New Institutions and Instruments.**

**2005 :** \$75,000  
**2006 :** \$50,000  
**2007 :** \$60,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** The University of Melbourne

**Summary:**

By harnessing the embedded resources of different government and service delivery organisations operating at community level, and by removing costly boundary problems between them, governments can address the needs of citizens in a more holistic and flexible manner. But to do this in a coherent way it is necessary to develop new institutional rules and organisational processes to allow agencies to collaborate without fear of reduced accountability or syphoning of public funds. The project will examine the structures and processes used in a selection of leading international cases in order to improve Australia's performance in gaining a collaborative advantage for citizens and agencies.

**DP0556710** Dr MS Cowen; Dr A Lawrence

**Title:** The central nucleus of the amygdala and alcohol-seeking behaviour

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3207 - NEUROSCIENCES

**Administering Institution:** The University of Melbourne

**Summary:**

Alcohol abuse and alcoholism is a significant problem in Australia (and throughout the world). However, pharmacological interventions remain limited due to our poor understanding of the neural networks underlying addictive processes. These experiments will explain how the positive rewarding and negative reinforcing aspects of alcohol are transduced within the brain. We believe that our research will facilitate the ability to treat alcoholism at a pharmacological level, enabling the continuation of abstinence or the prevention of relapse, while allowing other factors such as social support structure and coping skills to be developed for each individual, with flow-on social and economic benefits for society as a whole.

**DP0558002** A/Prof MA Davis; Dr RB Todd

**Title:** Regulation of nuclear localisation of the AreA transcription factor in *Aspergillus nidulans*

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Melbourne

**Summary:**

An understanding of the means by which the expression of genes is regulated is of fundamental significance. Changes in gene expression are central to the development, growth and viability of all cells and their response to environmental changes/stresses. This study uses the fungus *Aspergillus nidulans* as an excellent molecular genetic tool to investigate how a key regulatory protein controls gene expression in response to nitrogen starvation stress. Our understanding of these dynamic processes informs our approaches to the development of cancer therapies, to commercial biotechnology application and to control of human, plant and animal pathogens in which the infectious process is triggered by environmental stress.

**DP0558177** A/Prof HW Dick

**Title:** Systemic Corruption and Regime Change: State, Business and Political Elites in Indonesia and Implications for Governance Reform

**2005 :** \$65,000

**2006 :** \$53,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

The development of a stable, prosperous and democratic Indonesia is fundamental to Australia's long-term security. Systemic corruption has been identified as a fundamental impediment to such development and the Australian Government through AUSAID funds institutional reform programs. Yet formal law remains ineffective and corruption has continued to flourish, pointing to weaknesses of policy design. This project will explain how competing political elites systematically use the leverage of the state to redistribute resources within business and society and seek to identify the formal and informal rules that underpin such behaviour. Outcomes will be better models and more effective governance reforms.

**DP0557828** Dr AN Drinnan; Prof RS Hill; Dr S McLoughlin

**Title:** Fossil evidence for the evolution of Australia's modern vegetation

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2704 - BOTANY

**Administering Institution:** The University of Melbourne

**Summary:**

This project will provide Australian scientists and public with a better appreciation of the origins of our modern flora by providing evidence of landscape and community change over the past 40 million years, the nature of major extinction and diversification events and the response of the vegetation to climate change. The project will raise our understanding of the changing role of fire in the Australian landscape. It will also revise our understanding of the geological evolution of southeastern Australian basins and provide better genetic modelling of Victoria's brown coal deposits. Importantly, the project will provide postgraduate research training opportunities for a new generation of palaeobotanists and coal petrologists.

**DP0558265** Dr MA Elgar; A/Prof G Arnqvist

**Title:** Sexual conflict in Zeus Bugs

**2005 :** \$100,000

**2006 :** \$95,000

**2007 :** \$95,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Melbourne

**Summary:**

Australia is a leading nation in the field of evolutionary biology. This is in part due to the diverse and often bizarre plants and animals found on this continent. Our preliminary work on the Australian Zeus bug yielded exciting and fascinating results that created considerable national and international interest within the biological community and among the general population. The proposed project is likely to attract similar attention; will contribute to undergraduate research training and will ensure that Australia maintains its high profile and international reputation in the future.

**DP0557501** Dr J Evans

**Title:** Beyond the pale: Sovereignty, Law and Indigenous peoples

**2005 :** \$25,000

**2006 :** \$25,000

**2007 :** \$25,000

**Category:** 3903 - JUSTICE AND LEGAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

The project contributes to understanding inequality in law and practice. It expands knowledge of the colonial dimensions of sovereignty, demonstrating how excluding Indigenous peoples from the ordinary operations of both international and domestic law helped constitute and transform sovereignty and produce racialised identities in settler societies. The research provides a new, more comprehensive conceptual framework for analysing frontier practices, ameliorating the polarising effects of recent debates surrounding this historiography. As the war on terrorism has again seen the suspension of the law in certain circumstances, investigations into the strengths and limits of the rule of law are opportune and timely.

**DP0557540** Dr JM Fletcher; Prof AR Butcher

**Title:** An instrumental investigation of consonant sequences in a northern Australian language

**2005 :** \$80,000

**2006 :** \$55,000

**2007 :** \$55,000

**Category:** 3802 - LINGUISTICS

**Administering Institution:** The University of Melbourne

**Summary:**

Australian indigenous languages are of great interest, due in part to their unique phonetic structure relative to many other languages of the world. Most advances in speech science and phonetic theory are based on studies of English, or other European languages, yet an important goal of phonetic science is to account for speaking and listening processes that are deemed to be universal. Our proposal seeks to address key aspects of current phonetic theory and models of speech sound production, by providing data from an indigenous Australian language.

**DP0559273** Mr AP Flitney

**Title:** Quantum decoherence: A game-theoretic perspective

**2005 :** \$68,822

**2006 :** \$68,822

**2007 :** \$68,822

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

APD Mr AP Flitney

**Administering Institution:** The University of Melbourne

**Summary:**

Algorithms based on quantum computation have the ability to significantly speed up information processing compared to standard computers. The increase in computational power can have enormous impact on humankind and this project will help maintain Australia's position in the global forefront of this effort. This project focuses on the theoretical foundations of quantum computation and complements the efforts of several groups in Australia collaborating on the experimental design of quantum computers. The project will increase the fundamental understanding of how quantum information is processed in the presence of noise, which is necessary for the successful operation of quantum computers.

**DP0557307** Prof JB Furness

**Title:** The Properties of Enteric Reflexes Recorded in Vivo

**2005 :** \$79,000

**2006 :** \$79,000

**2007 :** \$79,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

The benefit of the work will be a clear understanding of how a key body system, the digestive system is controlled. This will bring a new understanding of how intestinal function is influenced by the food that we eat and also by medicinal compounds. In the longer term, it may lead to development of dietary programs that improve digestive health and to ways to test for adverse or beneficial effects of drugs on the intestine.

**DP0558150** Dr SJ Gallagher; A/Prof B McGowran; Dr GR Holdgate; Dr MW Wallace; Dr NF Exon

**Title:** Southern gateways - the icehouse cometh: Eocene to Oligocene evolution of southeast Australia

**2005 :** \$80,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

The 50 to 30 million years old strata of southeastern Australia have great economic importance for Australia. Most of the gas and oil extracted in the region comes from strata of this age. The research will lead to better age constraints on these reserves, thus enhancing petroleum prospectivity in the area. The global environment changes from 50 to 30 million years charted in this project will lead to a better understanding of the geological record of greenhouse-icehouse change. Knowledge of the nature of this change in the past is critical to predicting how our climate is going to behave in the future.

**DP0558287** Prof BJ Galligan; Dr JH Chesterman; Dr FL Morton

**Title:** The Politics of Rights: Australia in Comparative Perspective

**2005 :** \$75,000  
**2006 :** \$80,000  
**2007 :** \$70,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** The University of Melbourne

**Summary:**

Australia tends to be left out of comparative rights studies, and accounts of rights protection tend to be focused upon courts and legal rights. There is no comparative study available that shows how well Australia protects rights, nor does there exist a detailed national study that shows how rights are protected in Australia by parliamentary means and the political mediation of international rights norms. This project will deliver both, enabling a fuller understanding of Australian rights protection. It will also boost comparative knowledge of rights protection via political means.

**DP0556777** A/Prof DS Garden

**Title:** Droughts and Flooding Rains: El Nino and La Nina Events in Australia, New Zealand and the South Pacific 1865 - 1903

**2005 :** \$30,000  
**2006 :** \$30,000  
**2007 :** \$40,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

Historically in Australia and Oceania, droughts and flooding rains have been considered an aberration, but understanding is now emerging that they result from El Nino and La Nina episodes and should be perceived as and planned for as irregular but natural phenomena. This study will expand our knowledge and comprehension of their influence on environments, economies, cultures and national thinking in our human and environmental history in Australia and the South Pacific, thereby facilitating more appropriate attitudes and a better capacity to plan for and live within environmental realities.

**DP0557718** A/Prof ML Gee; Dr A Clayton; A/Prof EC Nice

**Title:** Probing membrane rafts using surface-selective multi-dimensional microscopy

**2005 :** \$150,000  
**2006 :** \$130,000  
**2007 :** \$130,000

**Category:** 2499 - OTHER PHYSICAL SCIENCES

**Administering Institution:** The University of Melbourne

**Summary:**

The results of this project will provide fundamental insights into the role played by domains in cell membranes in the regulation of membrane protein function. These insights will create new avenues in the biotechnology industry for development of novel therapeutics aimed at disruption of membrane protein-protein interactions that cause aberrant cell signalling in disease states such as cancer.

**DP0557635** Prof KD Gelder; Dr PJ Salzman

**Title:** Australian Fiction 1989 to 2005, and its National and Global Infrastructures

**2005 :** \$65,000  
**2006 :** \$30,000  
**2007 :** \$30,360

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

This project is a systematic analysis of Australian fiction published between 1989 and 2005: after the Australian Bicentenary and into the new millennium. It will look in particular at the relationship between national literary culture and globalisation. It examines the cultural, social, educational, political and economic aspects of this literary field, and accounts for its production and distribution, as well as the ways in which it is evaluated and put to use. It will be the first study of its kind, an analysis of contemporary Australian literary production in the fullest sense.

**DP0558604** Dr LC Godden; Ms MF Tehan

**Title:** **Managing Competing Claims to Land and Resources - Does Property Law Promote Sustainability ?**

**2005 :** \$70,000

**2006 :** \$40,000

**2007 :** \$70,000

**Category:** 3901 - LAW

**Administering Institution:** The University of Melbourne

**Summary:**

A key factor in promoting environmental sustainability is the resolution of competing claims to land and water resources in rural Australia. This project would examine the effectiveness of property law as the major model for resolving conflicts and regulating land and resources. Through overseas and Australian comparative research the project would provide an analysis of alternative legal and institutional models of relevance to land and resource management authorities, industry and community groups. It would support the resolution of competing claims through an examination of legal models, which may more effectively promote environmental sustainability.

**DP0558004** Prof T Goodwin; A/Prof R Rajan

**Title:** **The whisker sensory system: processing information about object features**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3207 - NEUROSCIENCES

**Administering Institution:** The University of Melbourne

**Summary:**

This is a new direction for research on the whisker sensory system and will put Australia at the forefront in this competitive area. Of particular significance, it will promote cross-fertilisation among three distinct disciplines - neuroscience, animal behaviour and computational neuroscience, with implications for robotics research as well. Should the robotics potential come to fruition, Australia will be in a prime position to make early inroads into an important technology-based commercial enterprise. The interdisciplinary approach has important ramifications for training Australian PhD students and postdoctoral fellows and for attracting overseas research fellows.

**DP0556117** Prof F Grieser; Dr M Ashokkumar; Dr GJ Price; Dr T Matula; Dr K Yasui

**Title:** **Control of acoustic cavitation in complex fluids**

**2005 :** \$120,000

**2006 :** \$110,000

**2007 :** \$115,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Melbourne

**Summary:**

The outcomes of this project will provide, for the first time, the knowledge needed to optimise sonochemical reactions and thus pave the way for the greater use of sonochemistry in commercial processes. There are several areas of commercial significance where sonochemical processes could be used, e.g., remediation of wastewater containing organic pollutants, destruction of biowastes, etc. We have established strong contacts with the Victorian EPA, Orica, Food Science Australia and are developing links with Nufarm and Comalco. Apart from the potential practical outcomes, we will establish stronger ties with our international collaborators as well as train/educate a number of tertiary level students, of general benefit to our community.

**DP0557431** Dr FS Haines; Dr AC Sutton

**Title:** **Never again? The nature and effectiveness of Australian regulatory responses to terrorism, the Esso Longford Explosion and the collapse of HIH Insurance.**

**2005 :** \$90,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3904 - LAW ENFORCEMENT

**Administering Institution:** The University of Melbourne

**Summary:**

Industrial disasters, terrorist attacks and corporate collapses create increased demands by Australians for safety and financial security. This project will trace the effects of three such events on regulatory frameworks and compliance efforts by our airports, ports and major hazard facilities. It will ascertain whether regulatory reform following disasters does increase protection for Australians, or whether multiple and competing demands mean that significant gaps are created. This work will be an invaluable resource for investigators, regulators and policymakers charged with preventing corporate disasters and terrorist attacks.

**DP0557611** Dr SV Hanly; Dr LL Andrew

**Title:** Control protocols for wireless networks

**2005 :** \$106,000

**2006 :** \$66,000

**2007 :** \$66,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Melbourne

**Summary:**

There is tremendous commercial potential in the development of wireless multi-hop and sensor networks. This project will help realize such networks, with commercial benefits for the network providers, and the customers that use them (low cost networking). Particular outcomes targeted for Australian needs include: 1) protocols allowing advanced telecommunications services to cover greater geographic areas with less infrastructure 2) improved reliability of local communication services in remote or rugged areas 3) protocols for sensor networks, allowing remote monitoring and control of many environmental factors.

**DP0555977** A/Prof A Harzing

**Title:** Babel in business: how language differences influence management in multinationals

**2005 :** \$75,000

**2006 :** \$55,000

**2007 :** \$55,000

**Category:** 3502 - BUSINESS AND MANAGEMENT

TR A/Prof A Harzing

**Administering Institution:** The University of Melbourne

**Summary:**

Management of cultural and language differences is crucial to successful international expansion, which for countries with small domestic markets, such as Australia, is imperative to prosper or even survive. The recommendations of this project with regard to managing language differences will therefore be of interest and benefit to Australian multinationals and Australian companies intending to internationalise. Its results are also expected to increase the perceived importance of improving Australians' foreign language skills. Learning languages enhances the ability to understand other people and their way of thinking. This project therefore indirectly address the national research priority 'Understanding our region and the world'

**DP0556602** Dr RL Hester

**Title:** Examining the relationship between error processing, cognitive control and emotion: a cognitive neuroscience approach

**2005 :** \$91,000

**2006 :** \$92,000

**2007 :** \$84,000

**Category:** 3801 - PSYCHOLOGY

APD Dr RL Hester

**Administering Institution:** The University of Melbourne

**Summary:**

The proposed research aims to contribute to current scientific thinking on how the processing of errors influences self-monitoring and cognitive performance. The ability to monitor one's cognitive performance deteriorates with normal ageing, and is particularly affected in a range of clinical conditions, where it is a reliable predictor of a poor prognostic outcome. This project aims to clarify understanding of the cognitive and neural processes underlying self-monitoring, as an important first step to improving rehabilitation and management methods for age-related impairments such as Alzheimer's disease, and prominent mental health conditions such as schizophrenia.

**DP0558477** Mr B Hill

**Title:** Basho's Men : Making Poetic Places; Harold Stewart's travelling in Japan/John Wolseley's texts from

**2005 :** \$82,000

**2006 :** \$74,000

**2007 :** \$74,000

**Category:** 4202 - LITERATURE STUDIES

APD Mr B Hill

**Administering Institution:** The University of Melbourne

**Summary:**

This project will produce three books, each an interdisciplinary study that will speak to students of landscape, poetry, religious studies and cultural history in Australia and Japan, and generally contribute to cross-cultural relations in the Asia Pacific region. Also, the project will enhance my teaching relations with foreign students, particularly Japanese students, at the Australian Centre, University of Melbourne.

**DP0558453** Prof LT Holmes

**Title:** The corruption-organised crime nexus in four European states, with particular reference to people

**2005 :** \$135,000

**2006 :** \$55,000

**2007 :** \$55,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** The University of Melbourne

**Summary:**

Considering its importance to Australia, too little research is being done here on Europe. The EU alone accounts for c.40% of Australia's trade. Yet most research on Europe undertaken here is either historical (pre-1945) and/or of individual countries. Relatively little is in the social sciences. One benefit of this project is that it ensures that comparative social science research on Europe is conducted in Australia. Second, Australia experiences many problems facing European states, albeit usually on a smaller scale. The potential benefits of learning vicariously from others' experiences are obvious. Third, this will enhance this country's expertise in this strategically important area.

**DP0558374** Dr BJ Howlett; Prof MC Pedras

**Title:** BIOSYNTHESIS OF A FUNGAL TOXIN AND ITS ROLE IN PLANT DISEASE

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Melbourne

**Summary:**

This project will determine how an important class of toxic molecules, epipolythiodioxopiperazines (EPTs), are made by fungi. Knowledge of the domains and actions of these genes in the biosynthetic pathway may lead to the ability to engineer secondary metabolites with altered specificity, and drugs that alleviate symptoms of secondary fungal toxicoses associated with leukemia, organ transplants and HIV AIDS. Also this project will also elucidate the role of an EPT, sirodesmin, in blackleg of canola, a disease that costs the Australian canola industry up to \$50 million in losses annually. Outcomes of this project may lead to novel blackleg disease control strategies.

**DP0557507** Dr ST Huntington

**Title:** Nano-Engineering of Optical Fibre Fresnel Lenses

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Melbourne

**Summary:**

It is expected that the development of the Fresnel Lens Fibre will greatly enhance the simplicity with which fibres can be integrated into a variety of systems. An intrinsically focussing fibre will be cheap to produce and have significant size advantages over its competitors, thus giving it an excellent competitive advantage in the market place. Australia is home to a number of companies that would directly benefit from the commercialisation of a Fresnel Lens Fibre. In addition to a range of possible telecommunications applications, the focussing fibre also has applications in spectroscopy, minimally invasive surgical procedures, and especially in the field of photodynamic therapy.

**DP0558830** Dr N Iwashita; Dr L Ortega

**Title:** The measurement of primary traits in second language oral proficiency in second language acquisition research

**2005 :** \$70,000

**2006 :** \$65,000

**2007 :** \$65,000

**Category:** 4201 - LANGUAGE STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

The proposed research will help to inform high-quality learning outcomes for international ESL (English as a Second Language) students and students who study Japanese or Spanish as a second language in Australian universities. Improved effectiveness in current second language teaching pedagogy will result from a deeper understanding of the role that the key language traits (syntactic complexity, lexical range, accuracy and fluency) play in the attainment of advanced proficiency.

**DP0557176** A/Prof RH James; A/Prof G Baldwin; Prof C McInnis; Dr KD Krause

**Title:** The influence of disciplinary cultures on approaches to undergraduate teaching and learning: extending higher education theory and practice

**2005 :** \$65,000

**2006 :** \$65,000

**2007 :** \$65,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

Improving the quality of teaching in higher education is an important priority for Australian universities. There has been rapid growth in the number of training programs for university teachers. This study will directly support these efforts. It will investigate the effectiveness of the diverse approaches to teaching and learning traditionally adopted within different fields of study across the sciences, the arts, the humanities and the professions. The findings will be used to develop new training programs for university teachers that are tailored towards best practice in the particular areas of knowledge in which staff are teaching. Enhanced training of university teachers will lead to better teaching and better student outcomes.

**DP0557651** Dr KF Jones

**Title:** Agency, Rationality, and Emotion

**2005 :** \$20,000

**2006 :** \$30,360

**2007 :** \$30,360

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** The University of Melbourne

**Summary:**

This project addresses the puzzling and multiple connections between emotion and reason. Emotion, long viewed as an impediment to rationality, actually helps us reason well. Our image of good public deliberation as unemotional needs to be challenged and our understanding of the place of reason and emotion in human life needs to be revised. The project engages and contributes to new international research on emotion and rationality thereby contributing to Australia's international reputation for excellence in philosophy.

**DP0556024** Prof BE Kemp

**Title:** Coordinating energy metabolism to enhance exercise capacity

**2005 :** \$178,000

**2006 :** \$178,000

**2007 :** \$178,000

**2008 :** \$178,000

**2009 :** \$178,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Diet and exercise contribute to health and ageing productively whereas high caloric diets and sedentary life styles are deleterious. The enzyme AMPK regulates energy metabolism in response to diet and exercise and by studying it we expect to learn why diet and exercise are beneficial at the molecular level. This may allow the development of nutritional, exercise and drug strategies to enhance exercise capacity and well being during ageing as well as suppress age onset diseases that include obesity diabetes cardiovascular disease hypertension and neurodegeneration.

**DP0559783** Dr AT Kenyon

**Title:** The Future of Television: Australian Legal Protection of Digital Broadcast Content

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$90,000

**Category:** 3901 - LAW

**Administering Institution:** The University of Melbourne

**Summary:**

Free-to-air broadcasting performs central democratic, economic and cultural functions, with a key place in Australia's media. But technological changes pose fundamental and urgent challenges for broadcasters. By investigating mechanisms to protect digital content, the project will advance understanding of a crucial issue in the digital economy. The project will increase understanding of options for protecting broadcast content to promote innovation in content production and distribution, while not restraining reasonable content uses nor hindering innovative consumer electronics. Australian policies should foster an innovative and diverse broadcasting sector to serve Australian public interests. The project promotes this vital objective.

**DP0556552** A/Prof MJ Keough; Dr DJ Marshall

**Title:** Is recruitment of marine invertebrates affected by variation in larval quality?

**2005 :** \$140,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Melbourne

**Summary:**

Managing marine populations and habitats requires detailed understanding of how populations are replenished, and why some places receive more new recruits than others. Attempts to reach this understanding have been hindered by the difficulty in studying tiny larvae that live in the plankton, and for most species, recruitment is a highly variable, unexplained phenomenon. We have identified a new explanation for this variation, and will test this explanation using a marine invertebrate that is one of Australia's marine pests. A positive result offers promise of explaining recruitment variation in other species, and will provide insight into what makes this particular pest species successful.

**DP0556642** A/Prof BP Kohn; Prof AJ Gleadow; Prof RW Brown; Mr KG Osadetz

**Title:** From crystal to craton: unravelling the low-temperature thermal evolution and long-term stability of cratonic lithosphere

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$90,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

The project will expand Australia's knowledge base by increasing fundamental scientific knowledge about the evolution of cratons, the old nuclei of the continents. These areas are important for the resources they contain and their potential elsewhere as stable sites for long-term nuclear waste repositories. The project will also enhance our research capability by developing new methods and help to build and sustain world leading research capability in Australia. In addition, the project will forge strong international links with researchers overseas. Whilst not focussed directly on the National Research Priorities the project will nonetheless provide important background information to 'deep-earth resources' and 'geoinformatics'.

**DP0557575** Dr SD Kolev; Prof RW Catrall; Dr JM Perera

**Title:** **New Extraction Membranes and Beads for Use in Industrial Separation**

**2005 :** \$125,000

**2006 :** \$120,000

**2007 :** \$100,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of Melbourne

**Summary:**

This project involves the development and testing of new polymeric membranes and beads exhibiting high efficiency in the recovery of metal ions from hydrometallurgical solutions. These membranes and beads will also allow effective removal of toxic metal contaminants from wastewater streams before discharge into the environment and clean-up of contaminated natural waters. The research will ultimately lead to: (a) interactions with Australian companies involved in metal processing, metal finishing and hydrometallurgy with beneficial effects to Australian industry; (b) training of high quality scientists; and (c) more efficient environmental protection and remediation thus helping to maintain Australia environmentally sustainable.

**DP0557178** Dr B Krongold

**Title:** **Next-Generation OFDM Communication Systems: Analysis and Design for the Physical Layer**

**2005 :** \$106,708

**2006 :** \$96,000

**2007 :** \$105,358

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

APD Dr B Krongold

**Administering Institution:** The University of Melbourne

**Summary:**

Next-generation orthogonal frequency-division multiplexed (OFDM) systems represent the future of broadband wireless access technology. Such systems are vital to Australia's future infrastructure and growing economy by providing more bandwidth with greater flexibility for new broadband applications. The research outcomes from this project will help enable future OFDM systems, and thus directly benefit Australia. Development of cutting-edge information technology know-how will enhance Australia's international ICT reputation. Valuable research training of highly-skilled Australian students is another important benefit.

**DP0558972** Dr ED Lewis

**Title:** **Oral Tradition, Literacy and Education in Two Eastern Indonesian Societies**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 4201 - LANGUAGE STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

This project will improve our understanding of social and cultural change in eastern Indonesia, a region of strategic importance to Australia. The research will contribute significantly to knowledge of the educational system and literacy levels in eastern Indonesia. This knowledge will be of practical use in development projects in the region and to policy makers in Canberra who are concerned with Indonesian affairs. The involvement of a PhD student in the project will increase our national research capacity in eastern Indonesia. The contributions to anthropological theory and method this research will produce will enhance Australia's international reputation as a centre of anthropology, southeast Asian studies and the study of literacy.

**DP0556932** A/Prof TC Lindsey

**Title:** **Islamic Law in Contemporary Malaysia, Singapore and Brunei: The Anglo-Malay Madhhab**

**2005 :** \$55,000

**2006 :** \$45,000

**2007 :** \$70,000

**Category:** 3999 - OTHER LAW, JUSTICE AND LAW ENFORCEMENT

**Administering Institution:** The University of Melbourne

**Summary:**

Islam is a fundamentally legalistic religion: law and religion are largely inseparable. In the last decade radical Islamic interpretations of shari'ah (Islamic law) in SE Asia have led to increasingly militant responses to modernity and the secular state, that have come to threaten Australians. Through a detailed examination of legal theory, current intellectual debates, legal institutions and substantive law in Malaysia, Singapore and Brunei, the project offers a more complete understanding of Islam and law in the archipelago to Australia's North. It will update current knowledge but will also build bridges with Muslim scholars and lawyers in the region

**DP0556916** A/Prof TJ Lithgow; Dr S Buchanan

**Title:** Insertion and assembly of proteins and lipids into biological membranes.

**2005 :** \$145,000

**2006 :** \$145,000

**2007 :** \$145,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

We propose a multi-disciplinary approach to this fundamental biological problem and have established collaborations with experts in the USA, UK and Austria. Benefits from this research program fall into two discrete types. Firstly, detailed knowledge of the mechanism what is now a poorly understood biological process of cellular membrane assembly, with the prospects for using the knowledge for intervention into diseases such as cancer. Secondly, excellent outcomes are provided for the training of postgraduate students and research staff. This project entails cutting edge technology, and the development of skills not common in Australia.

**DP0557270** A/Prof TJ Lithgow; A/Prof PR Gooley; Dr TD Mulhern

**Title:** Evolution, structure and function of key components in a molecular machine

**2005 :** \$230,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

The project will provide the basis for training of students and personnel in the previously recognized priority "Genomes-Phenomes", still the central theme of modern biology. In particular, collaborations established with the Los Alamos National Laboratory in New Mexico will transfer to Australia expertise in the cutting edge discipline of small angle scattering for analysis of biologically important molecules. Such training is essential for developing a future pool of skilled Australian scientists to staff and utilise the major national infrastructure developments represented by the Replacement Research Reactor and Australian Synchrotron, as outlined in the National Research Priority "Frontier Technologies".

**DP0556660** Dr GC Lukey; Prof JS Van Deventer

**Title:** Design of Advanced Geopolymeric Materials Based on Nanostructural Characterisation and Modelling

**2005 :** \$80,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2911 - ENVIRONMENTAL ENGINEERING

**Administering Institution:** The University of Melbourne

**Summary:**

Geopolymers are a class of advanced aluminosilicate materials primarily utilised in the construction and building products industries, where their application as a replacement for ordinary Portland cement provides the potential for highly significant Greenhouse gas emission reductions. Australian research has led to the increasingly widespread commercial use of this technology in a range of areas. Development of a full understanding of the exact chemical structure of geopolymers is essential to finding and developing new applications for these materials as well as maximising their use in known applications.

**DP0557592** Dr H MacDonald

**Title:** Possessing the Dead: The Artful Science of Anatomy

**2005 :** \$83,000

**2006 :** \$91,000

**2007 :** \$78,000

**Category:** 4301 - HISTORICAL STUDIES

APD Dr H MacDonald

**Administering Institution:** The University of Melbourne

**Summary:**

This project has applied benefits which lie in its ability to stimulate and inform broad participation in an important contemporary national debate about the use and abuse of human remains. Medical authorities fear that, following the disclosure of abusive practices with the dead, public distrust will lead to fewer bodies being donated for post-mortem medical use. The project will engage in these debates, in both academic and non-academic forums, to facilitate a deeper understanding of what needs to be taken into account in national initiatives to deter unethical practices with human remains and provide donors with greater confidence.

**DP0556276** Prof DL Macmillan

**Title:** What is the biological significance of electrosensitivity in crayfish?

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

The finding that an Australian crayfish responds to low-level electrical signals in the surrounding water is the first report of electrosensitivity in an aquatic invertebrate. This project will investigate its unknown biological significance. The results will impact on behavioural studies in all aquatic invertebrates because they will now have to consider this factor. Some other decapod crustaceans will almost certainly be found to be electrosensitive. Not only are these important subjects for behavioural analysis, many form the basis of important commercial aquaculture industries. The outcomes will enhance Australia's scientific standing and provide opportunities for students to become leaders in a new field.

**DP0556240** Dr AM Martin

**Title:** Dynamics of Interacting Bose Gases/Fluids in Atomic and Condensed Matter Systems

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Melbourne

**Summary:**

This research would raise the profile of Australian theoretical physics in two key areas of fundamental research. The work on correlated electron fluids will be directly related to the breakdown of the quantum Hall effect, which is used to maintain the resistance standard, with one possible outcome being the improvement of the accuracy of this standard. The work on the dynamics of dilute gas Bose-Einstein condensates will promote understanding of such systems and propose new methods of exploring this novel state of matter. Drawing analogies between these two diverse subjects will promote a greater understanding of both research fields. The work would be in collaboration with internationally renowned research groups.

**DP0558536** Prof VL Martin

**Title:** Modelling the Transmission of International Monetary Policy Shocks: Implications for Australian Asset Markets

**2005 :** \$32,000

**2006 :** \$25,000

**2007 :** \$26,758

**Category:** 3404 - ECONOMETRICS

**Administering Institution:** The University of Melbourne

**Summary:**

Three main outcomes of the project are as follows. First, the relative strengths of the transmission mechanisms linking monetary policy and asset markets will be better identified. This will lead to a better understanding of monetary policy thereby enabling the Reserve Bank to achieve its policy goals of inflation operating at or near the target rate, and for currency markets to exhibit stability. Second, a number of empirical puzzles relating to monetary policy and asset markets in general, that exist in the empirical literature, will be solved. Third, the project will lead to a number of international papers which will add to the international reputation of Australia as a leading research nation.

**DP0557958** A/Prof AJ Mayne; Dr C Fahey; A/Prof R Frances; Dr LE Frost; A/Prof H Goodall; Dr J Gregory; Prof PA Grimshaw; Dr RQ Harrison; Dr RG Hosking; Prof RA Nile

**Title:** Land of the Black Stump: a history of Australia's Inland Corridor, 1815-2005

**2005 :** \$107,050

**2006 :** \$76,000

**2007 :** \$135,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

This project explains the origins of key areas of current interest and concern about rural and regional Australia. It provides historical lessons that address four National Research Priority areas (sustainable water and land management, sustainable communities, technological innovation, Australia in regional and global context). The project highlights the historical importance to Australia of inland regions, industries, and communities which today are undergoing fundamental economic, technological, and social readjustments. The project identifies the relationships that bind urban and rural Australia yet problematise racial reconciliation. It brings together a national network of researchers and provides vocational training for students.

**DP0558298** A/Prof JS McCalman; A/Prof IP Anderson; Mr GJ McCarthy; Dr Z Zhao; Dr RE Barwick

**Title:** A demographic and socio-medical history of the Aboriginal People of Victoria 1800-2000: reconstitutions and epidemiological analysis

**2005 :** \$118,000

**2006 :** \$43,000

**2007 :** \$60,000

**Category:** 3705 - DEMOGRAPHY

**Administering Institution:** The University of Melbourne

**Summary:**

We have produced a world-first historical demographic and epidemiological database that will be of continuing cultural and professional value to the Indigenous and research communities, and which can be copied to capture elusive mobile populations that are better identified genealogically than via conventional census methods. We will index and digitise the papers of the late Dr Diane Barwick. Through this innovative study of past life courses we seek to understand the unique experience of 'fourth world' people in the health transition, and the deep historical forces structuring the persistent health problems of Indigenous Australians.

**DP0558000** Prof PB McPhee

**Title:** **National identity, historical narrative and violence: A comparative study of contemporary Catalonia and the Basque Country in France and Spain.**

**2005 :** \$70,492

**2006 :** \$81,740

**2007 :** \$84,227

**2008 :** \$63,197

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

This project will make an important contribution to our understanding of the contemporary roots of self-determination, autonomy and identity. These themes have particular relevance in a world in which nationalist and ethnic claims have assumed a renewed importance. They are also particularly relevant in the light of Australia's current concerns about national security: understanding issues of nationalism and identity embedded in historical narratives is central to understanding the origins of political violence.

**DP0557495** Dr A Messina; Dr KM Abberton; Dr PJ Halley; A/Prof EW Thompson; Prof WA Morrison

**Title:** **Characterization and optimisation of Myomatrix: A novel extracellular matrix hydrogel from muscle**

**2005 :** \$160,000

**2006 :** \$130,000

**2007 :** \$135,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Melbourne

**Summary:**

This project would have several sources of benefit for the community. Foremost we will have produced a product that will have a strong commercial application in several fields including basic science and bioengineering. If its full potential were achieved, the development of this innovative new hydrogel would strengthen Australia's standing in the biotechnology field and also enrich specific applications. The knowledge gained from the characterization of this product could also be of benefit to several areas including chemical engineering, tissue engineering, tissue repair, polymer chemistry and food manufacture. The expertise generated and the possibility of collaboration, both academic and with industry would also benefit the community.

**DP0557772** Dr J Moss; Dr RB Young

**Title:** **Reassessing Egalitarianism**

**2005 :** \$67,000

**2006 :** \$50,000

**2007 :** \$70,000

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** The University of Melbourne

**Summary:**

Ever since the French revolution the issues of equality and egalitarianism have had enormous significance for modern democracies. These topics are also particularly important in Australian life. Indeed, Australia is often described as an 'egalitarian society'. Clarifying contemporary accounts of egalitarianism and developing our own original account will be of major national significance. In addition, this project will focus on the important areas of health and unemployment, with specific consideration given to the role of individual responsibility in determining eligibility for unemployment and health benefits. The project will also help maintain Australia's place as a leader in the areas of political and social philosophy.

**DP0558607** Dr RA Mulder; Dr MA Elgar

**Title:** **Mutual sexual selection and sperm competition in the black swan**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Melbourne

**Summary:**

The proposed research is curiosity-driven and therefore its main benefit is in enhancing our understanding of the evolutionary processes that shape our natural environment. The proliferation of 'natural history' television programmes, magazines and books demonstrates the very substantial national interest in these topics. The Black Swan is a well-known bird of particular public affection. Its status as a national iconic symbol has been reflected in the degree of local and general community interest and involvement in our research in Ballarat to date.

DP0558608 A/Prof PC Mulvaney; A/Prof JE Sader; Prof LM Liz-Marzan; Dr GV Hartland; Prof Dr M Giersig

**Title:** Nanotribology-The Chemical Rolling Resistance of Single Nanocrystals

2005 : \$225,000

2006 : \$195,000

2007 : \$200,000

2008 : \$200,000

2009 : \$200,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Melbourne

**Summary:**

Australian efforts in biosensors, environmental monitoring and mobile-health are predicated on the establishment of a nanotechnology based manufacturing sector. The key to this will be understanding how ultrasmall mechanical devices work. This application explores how we can make novel mechanical devices from molecules and small crystals.

DP0558065 Prof CW Nettelbeck

**Title:** The Double Revolution : Decline and Renewal in French Narrative Art from Celine to Godard

2005 : \$45,000

2006 : \$45,000

2007 : \$25,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

This study will offer new insight into contemporary France - and increased knowledge of the ongoing development of a major world culture is a significant benefit in itself. France's long-standing status as a great centre of civilisation makes it a vital focal point for understanding the implications of global change. Australia's cultural connections to Europe remain crucial to the continuing construction of our own identity, and in this context too, the French example is highly salient. The study will also constitute a valuable Australian contribution to world research, enhancing the nation's already solid international reputation in French studies.

DP0557470 Dr EJ Newbigin

**Title:** The molecular basis of self-incompatibility in solanaceous plants

2005 : \$100,000

2006 : \$80,000

2007 : \$80,000

**Category:** 2704 - BOTANY

**Administering Institution:** The University of Melbourne

**Summary:**

This study will examine plant reproduction, the processes that ultimately lead to seeds being formed. Seeds are a major source of food for human societies. Benefits likely to arise from this study include an improved knowledge of plant reproduction which could lead to the production of better crops and more sustainable agricultural systems. By examining reproduction in a native plant, this study will also improve our understanding of Australia's flora and could help improve management strategies for rare and endangered species. Through the training of students and researchers, this study will contribute highly skilled individuals to the Australian economy.

DP0557524 Dr NH Nguyen

**Title:** Vietnamese Women: Voices and Narratives of the Diaspora

2005 : \$125,000

2006 : \$135,000

2007 : \$117,000

2008 : \$107,000

2009 : \$94,252

**Category:** 4202 - LITERATURE STUDIES

ARF Dr NH Nguyen

**Administering Institution:** The University of Melbourne

**Summary:**

Migration and multiculturalism are hotly debated issues in Australia today. Engagement with Asia being one of the 3 pillars of Australian national security, it is all the more vital to conduct research on how Asian migrants have successfully integrated into Australian society. The Vietnamese overcame early difficulties to settle successfully here. Women played a major part in this. Their story is a tribute both to their determination to adapt to a new land and to Australia's willingness to accept new arrivals. This study will help address national and gender stereotypes, assist in fostering positive community relations, provide a deeper understanding of a significant refugee group, and contribute to strengthening Australia's social fabric.

DP0557576 A/Prof ME Nicholls; A/Prof JB Mattingley; Prof JL Bradshaw

**Title:** Attentional biases that underlie free-viewing perceptual asymmetries: Endogenous and exogenous effects in a behavioural/imaging study.

2005 : \$65,000

2006 : \$60,000

2007 : \$70,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

As we move our eyes and attention around us, we are capable of interacting with any part of our immediate environment. It is intriguing, therefore, to discover that the upper and leftward features of an object are more salient than those on the bottom or right. By investigating the nature of these attentional biases in normal individuals, this research will improve our understanding of the thought processes and brain structures that control spatial attention. This research has important implications for the development of remedial programs for patients with attentional disorders. The test we use to measure attentional asymmetries has the potential to become an important tool for the early detection of clinical abnormalities in attention.

**DP0558430** Dr RA O'Hair

**Title:** Gas Phase Studies to Catalyze a Better Understanding of Metal Reactivity

**2005 :** \$135,000

**2006 :** \$80,000

**2007 :** \$90,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The University of Melbourne

**Summary:**

The proposed research will increase knowledge of fundamental questions related to the mechanisms of catalysis and metal ion reactivity. The insights gained will be an important addition to the knowledge base of our culture, both nationally and in the wider international context. We note that research into the behaviour and design of catalysts is a burgeoning field which reflects the great importance of this area in the international scientific community. Our proposal will add to fundamental knowledge and may also result in practical applications. More importantly, we will train and equip talented young people with a spectrum of skills which will make them well placed to meet the demand for highly skilled professional scientists.

**DP0559131** A/Prof M Palaniswami; Prof M Zukerman; Dr W Wang; A/Prof S Low; Prof G Chen

**Title:** Congestion Control for the Future Internet

**2005 :** \$173,000

**2006 :** \$173,000

**2007 :** \$177,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

APD Dr W Wang

**Administering Institution:** The University of Melbourne

**Summary:**

Australia relies very much on its telecommunications infrastructure due to its geographic dispersion. Our novel and practical Internet congestion control scheme will overcome current weaknesses in the Internet, and will enable the Australian telecommunication service industry to provide a better quality of service to the customers (including Australia industries and rural communities) and at lower cost. This project will put Australia on the international stage as an leading contributor to Internet technology. We will provide training for PhD students and the management of postdoctoral fellows in the important area of Internet traffic engineering and control.

**DP0558799** Dr MC Patterson; Dr MA MacIntyre

**Title:** Managing Modernity : Capitalism, Globalisation and Governance in Melanesia

**2005 :** \$105,000

**2006 :** \$83,000

**2007 :** \$83,000

**Category:** 3703 - ANTHROPOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Australia's relations with its closest neighbours in the Pacific have been significantly reassessed as a consequence of the 'war on terror'. The goals of community development and national participation in global projects in Melanesian nation states have become linked to the issue of national security in the region. By revealing the significant impediments to and positive vectors for stability in Melanesian states, this research will provide better understandings of a region that is increasingly depicted as subject to corruption, violence and the failure of democracy.

**DP0556412** A/Prof PA Pearce

**Title:** Nonlocal Statistical Mechanics and Logarithmic Conformal Field Theory

**2005 :** \$67,000

**2006 :** \$67,000

**2007 :** \$67,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Melbourne

**Summary:**

Australia has an enviable track record as an innovator and developer of advanced materials. This project in strategic basic research consists of theoretical work within the disciplines of statistical mechanics and conformal field theory to determine the profound role of nonlocal interactions, such as connectivities, in determining the critical physical properties of materials. Connectivities play a significant role in diverse applications such as the gelation of polymers, random fuse networks, the spatial spread of epidemics and bushfires and the tertiary recovery of oil. This research will be practically useful in engineering the physical properties of advanced materials such as liquid crystals, gels, polymers and other materials.

**DP0558279** A/Prof GJ Pendock; Dr W Shieh

**Title:** Embedded Dispersion Measurement for Fibre Optic Transport Systems

**2005 :** \$76,000

**2006 :** \$63,000

**2007 :** \$66,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Melbourne

**Summary:**

This project addresses an important problem in long-haul optical transport systems and a solution would simplify the deployment, faultfinding and operation of these systems. A positive outcome may lead to an opportunity to license the technology to existing equipment manufacturers. Furthermore, the proposed solution involves optical and electronic technology that is within the capability of Australian industry. There will also be the more certain but indirect benefit the research in this project will provide additional stimulus to active and established research community in Australia working on optical devices, subsystems and systems.

**DP0556836** Dr MA Perugini

**Title:** The ApoE Interactome in Human Plasma

**2005 :** \$85,000

**2006 :** \$85,000

**2007 :** \$85,000

**2008 :** \$85,000

**Category:** 2505 - MACROMOLECULAR CHEMISTRY

APD Dr MA Perugini

**Administering Institution:** The University of Melbourne

**Summary:**

In this, the post-genome era, the emphasis has switched from the delineation of genome structure to the tremendous task of characterizing the gene products. One of the important aspects evolving in this new era is the design of strategies that enable identification of global protein-protein interactions, defined by the Human Proteome Organisation as the interactome. This, the apoE interactome in human plasma project, will identify novel interactions between plasma proteins and apoE, which is a lipid-binding protein genetically linked to age-related diseases affecting more than 500,000 Australians. This project will therefore provide scope for novel treatments and early detection of disease, namely cardiovascular and Alzheimer's disease.

**DP0559377** Dr P Pivonka

**Title:** Numerical investigation of signal mechanotransduction of bone cells - application to bone remodeling

**2005 :** \$75,000

**2006 :** \$73,000

**2007 :** \$75,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

APD Dr P Pivonka

**Administering Institution:** The University of Melbourne

**Summary:**

The understanding of signal mechanotransduction of bone cells is directly related to mechanical activation of bone remodeling processes, i.e., resorption and formation of bone tissue. Understanding of bone remodeling is essential for the development of new bone implants, the prognosis of osteoporosis, and studies related to changes in microgravity (e.g. space flight) to name a few key applications. This research proposal closely aligns with one of the major national research priorities, i.e., promoting and maintaining good health (ageing well, ageing productively). The research project is aimed to understand how mechanically induced loading may activate remodeling of bone.

**DP0556904** Dr J Rabeau

**Title:** Diamond Single Photon Source

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Melbourne

**Summary:**

This project will enhance Australia's international profile in the area of quantum technology and will link, for the first time, diamond single photon capability with fibre optics technology, building on the strengths of both fields. The innovative steps in photonics and materials science which we are initiating place us in a unique position to exploit the emerging niche market for single photon sources. A provisional patent application for this technology is being lodged by the applicant and University of Melbourne colleagues in conjunction with QUCOR Pty Ltd. Success in researching and developing this device will help consolidate Australia's reputation as a global contributor to leading edge science and technology.

**DP0558187** Dr RN Raimondo

**Title:** Economics of Incomplete Markets and Pricing in Equilibrium

**2005 :** \$30,000

**2006 :** \$30,000

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** The University of Melbourne

**Summary:**

This research has the potential to benefit society by improving the accuracy of pricing in securities markets. First, because the research leads to specific predictions about the interaction of prices for different type of assets, it should lead to more accurate pricing across markets, such as housing, stocks and bonds, which currently function largely independently. Second, it should lead to more accurate pricing of derivatives in the situations where the exercise price of the derivatives differs significantly from the current price of the underlying stock.

**DP0557199** A/Prof R Reeve; Prof BL Butterworth

**Title:** The Development of Young Children's Mathematical Abilities: A Longitudinal Analysis

**2005 :** \$90,000

**2006 :** \$60,000

**2007 :** \$75,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Many people have problems learning maths. Although maths is often seen as an esoteric subject of limited interest, poor maths skills are as great a handicap in education and employment as poor literacy, with similar costs for the individual and society. One cause of poor maths skills is developmental dyscalculia, a disability in which children's understanding of number is affected by underlying cognitive deficits. As yet there is no reliable way of identifying children with dyscalculia or other maths problems. Our research examines children's developing maths competencies as they enter and progress through primary school. Our aim is to develop diagnoses of different maths disabilities, so effective interventions can be implemented.

**DP0557834** Prof MB Renfree; A/Prof G Shaw; Prof RV Short; Dr AJ Pask; Dr DE Hickford

**Title:** Extrinsic Control of Mammalian Germ Cell Delineation

**2005 :** \$110,000

**2006 :** \$80,000

**2007 :** \$80,000

**2008 :** \$80,000

**Category:** 3210 - CLINICAL SCIENCES

APD Dr DE Hickford

**Administering Institution:** The University of Melbourne

**Summary:**

Australia is a leader in the recent exciting breakthroughs in reproduction and development, such as cloning and embryonic stem cell propagation, and understanding how germ cells are specified would help us understand the biology underlying specification and developmental potential of all cells. This research will continue to contribute to maintaining Australia's high reputation in advances in reproductive biology. In addition, a greater understanding of marsupial reproduction is a high priority for Australia in the 21st century, with its current unacceptably high rate of mammalian extinctions, for 'we cannot conserve until we comprehend' (Short, 1985). The results therefore are of great potential benefit to society.

**DP0556827** Dr G Restall; Prof GG Priest; Dr A Hazen

**Title:** Logic, Abstraction and Construction

**2005 :** \$27,200

**2006 :** \$40,280

**2007 :** \$43,190

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** The University of Melbourne

**Summary:**

This is unashamedly a pure research project in logic. It aims to enhance our understanding of core issues in the nature of the world and how we can appropriately reason about it. Nevertheless, the techniques developed in logic inevitably find a home in applications in computer science, linguistics, mathematics and related fields. This project, in particular, will develop tools for realistically reasoning about the kinds of abstract or constructed objects one finds in mathematics, and with the vague or contradictory concepts we use in everyday discourse. In addition, the project will provide research training for postgraduate students, and it will strengthen an already internationally recognised research centre in philosophical logic.

**DP0556064** A/Prof MA Rizzacasa; Dr HM Huegel

**Title:** Chemical Synthesis of Bioactive Metabolites and Analogues from Marine Sources and Myxobacteria

**2005 :** \$90,000

**2006 :** \$80,000

**2007 :** \$85,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The University of Melbourne

**Summary:**

This project could result in the production of a new type of anticancer compound. The proposal will study the synthesis of novel natural product analogues that could possess superior biological activities to the natural compounds. In addition, new chemistry may be developed which could be utilised to synthesise a number of related molecules.

**DP0557805** Prof R Robson; Dr BF Abrahams

**Title:** Contributions to the foundations upon which true crystal engineering of functional solids will be based.

**2005 :** \$200,000

**2006 :** \$200,000

**2007 :** \$200,000

**2008 :** \$200,000

**2009 :** \$200,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** The University of Melbourne

**Summary:**

The emerging area of crystal engineering promises to provide access to sophisticated materials tailored for specific applications. A major thrust of the proposed work is concerned with controlling the interactions and thus the arrangement of small molecular building blocks used to construct such materials. Through a variety of novel approaches that are proposed, we expect that our research work will provide a valuable scientific contribution to the development of crystal engineering, whilst affording an excellent training ground for the sorts of scientists upon whom Australia's future prosperity will depend.

**DP0557196** Prof DT Runia; Prof J Mansfeld

**Title:** Aetiana: laying foundations for the study of the history of ancient philosophy

**2005 :** \$35,000

**2006 :** \$31,000

**2007 :** \$31,000

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** The University of Melbourne

**Summary:**

Ancient philosophy is one of the pillars of the tradition of western thought. It has made a magnificent contribution to reflection on lasting problems in the areas of ethics, theory of knowledge, metaphysics and logic. The Socratic tradition of discussion on how we should live is the most striking example of how ancient philosophy remains directly relevant to issues in our society today. Research that strengthens our knowledge in this area will thus be of considerable benefit to the community.

**DP0556133** Prof MA Sandiford

**Title:** Neotectonics of the Indo-Australian plate

**2005 :** \$215,000

**2006 :** \$215,000

**2007 :** \$215,000

**2008 :** \$160,000

**2009 :** \$160,000

**Category:** 2601 - GEOLOGY

APF Prof MA Sandiford

**Administering Institution:** The University of Melbourne

**Summary:**

This project will contribute fundamental insights into the dynamics of our planet, towards earthquake risk assessment and to evolution of Australia's distinctive landscapes. The benefit of this project can therefore be evaluated in light of its contribution to the social and economic repercussions of improved understanding of earthquake risk and our landscapes and our place in them.

**DP0556831** Dr AW Schaap

**Title:** Fragility and Security: Human Rights, State Wrongs and Democratic Solidarity

**2005 :** \$50,621

**2006 :** \$55,000

**2007 :** \$50,621

**2008 :** \$50,621

**Category:** 3601 - POLITICAL SCIENCE

APD Dr AW Schaap

**Administering Institution:** The University of Melbourne

**Summary:**

This project will contribute to understanding our region and the world by providing a normative framework from which to judge the democratic value of security and human rights. In doing so, it will inform contemporary debates about border protection and clarify the role that Australian citizens should play in determining the nation's security interests and defending human rights. Moreover, an account of democratic solidarity will be developed, which would strengthen the bonds between citizens and non-citizens from different cultures thereby enhancing Australia's reputation as a tolerant, multicultural society. The implications of the findings for contemporary debates about the treatment of asylum seekers in Australia will be considered.

**DP0557505** A/Prof RE Scholten; A/Prof A Roberts; Prof KA van Leeuwen; Prof Dr HC Beijerinck; Dr EJ Vredenburg

**Title:** Quantum and classical imaging with light and atoms

**2005 :** \$155,000

**2006 :** \$80,000

**2007 :** \$120,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** The University of Melbourne

**Summary:**

Powerful new methods will be developed to extract greater information from optical and quantum imaging systems. These methods will be applied to important problems in biomedical and industrial optical and x-ray imaging and to experiments which test the foundations of quantum physics. Our work will help maintain Australia's strong international profile in optics and in optical imaging, while providing a professional and broad training environment for our best and brightest graduate students.

**DP0557542** Prof RJ Selleck

**Title:** **The work and workings of the Masson family**

**2005 :** \$30,000

**2006 :** \$40,000

**2007 :** \$20,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

The family is of crucial importance to the social and economic fabric of Australian society. To appreciate the family it is vital to realise how it has developed, that is, to understand its history. This project seeks, by studying a complex and intriguing family, to improve that understanding. It sheds light on how the family has been formed, how and why the relationships between its members have changed, how decisions as to who makes up the membership of the family are made, and how the family's development has been affected by economic, political and social pressures.

**DP0556419** Prof JG Sinclair

**Title:** **Globalisation and the media in Australia: an integrated analysis of trends and impacts, with special reference to the advertising industry.**

**2005 :** \$170,000

**2006 :** \$165,000

**2007 :** \$168,000

**2008 :** \$185,000

**2009 :** \$170,000

**Category:** 4001 - JOURNALISM, COMMUNICATION AND MEDIA

APF Prof JG Sinclair

**Administering Institution:** The University of Melbourne

**Summary:**

The overall national benefit will be to reveal how advertising is tied in to the manufacturing-marketing-media institutional complex in Australia, and how that in turn links us in to both economic and cultural processes of globalisation. A series of public outputs will provide an up-to-date and detailed account of how changes in advertising are affecting transformations in the media and related communication industries in Australia. They also will show the relevance of advertising to national identity in an era of cultural diversity, free trade and global communications, and contribute to public policy questions such as advertising regulation and community standards.

**DP0556183** Prof L Skene; Dr M Aitken; A/Prof M Delatycki

**Title:** **Communicating genetic information in families: practical, legal, social and ethical issues.**

**2005 :** \$40,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 3210 - CLINICAL SCIENCES

**Administering Institution:** The University of Melbourne

**Summary:**

The outcomes of this study, will give evidence as to whether or not people do pass on genetic risk information to relatives, how they do it, what the barriers are, what their preferences are. It will also provide data so that mechanisms for best practice communication and clear guidelines for legal and health professionals can be developed. Effective communication and exchange of genetic risk information will benefit individual health and the health of future generations.

**DP0558761** A/Prof PL Smith; Prof R Ratcliff

**Title:** **Stochastic, Neurally-Plausible Models for Selective Attention and Decision Making**

**2005 :** \$58,000

**2006 :** \$60,000

**2007 :** \$62,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

An understanding of the basic cognitive processes involved in attention and decision making is the goal of international research effort in a number of disciplines. The benefits expected from such understanding include improvements in the diagnosis and treatment of a variety of cognitive deficits and improved occupational safety and efficiency in settings involving interaction with complex systems, such as air traffic control, airline cockpits, motor vehicles, and process management. By developing mathematical models of these processes and the neural mechanisms that underlie them, this project will contribute to this understanding. It will also provide international postdoctoral opportunities for Australian-trained Ph.D. graduates.

DP0557487 Prof EA Sonenberg; Mr I Rahwan; A/Prof F Dignum

**Title:** Interest-based negotiation: theory and practice

2005 : \$61,000

2006 : \$57,000

2007 : \$60,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Melbourne

**Summary:**

The results of the project will provide theoretically sound technologies that can better support distributed resource and task allocation in complex problem solving settings. The combination of theoretical and practical outcomes from the research will enable these technologies to be applied in decision-making settings beyond those studied directly in the project. The project contributes to Australia's ability to compete in the emerging international market for knowledge-based software applications. The project's key connections and integration with European research will also strengthen research collaboration and training opportunities for Australian based students.

DP0557625 Dr J Stachurski

**Title:** A Principled Approach to Computer Simulation of Dynamic General Equilibrium Macroeconomic Models

2005 : \$55,367

2006 : \$52,367

2007 : \$52,367

2008 : \$52,367

**Category:** 3401 - ECONOMIC THEORY

APD Dr J Stachurski

**Administering Institution:** The University of Melbourne

**Summary:**

In the last two decades a new generation of computer-intensive modeling techniques has risen to prominence in macroeconomics. These methods have broad policy applications, from public finance and reserve bank operation to analysis of long-run productivity growth, taxation reform, unemployment, international trade policy and natural resource conservation. The size and complexity of these models means that even computer-based techniques will rely for the foreseeable future on efficient program design to solve them. The project will construct a comprehensive set of solution techniques and software for this class of macroeconomic models, including detailed mathematical analysis on accuracy of model output.

DP0557205 Dr WJ Stephenson

**Title:** Erosion Morphodynamics and Evolution of Shore Platforms

2005 : \$80,000

2006 : \$30,000

2007 : \$30,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Rocky coasts consist of a cliff and often a platform at the base which protects the cliff from wave energy. Such coasts undergo continuous erosion that may threaten property. Climate change may worsen this situation. Despite the importance of platforms in coastal management they remain poorly studied. This project seeks to improve scientific knowledge and understanding of the development and erosion of shore platforms, the relationships between shore platform and cliff retreat and the processes that drive erosion. As a result we will understand how rock coasts with platforms develop and change, especially as sea levels change and be better able to manage the coast in response to climate change.

DP0557870 Dr PA Swain

**Title:** Coherent, independent and user-friendly? Participant perceptions of social security administrative review processes in Australia and Britain

2005 : \$64,000

2006 : \$64,000

2007 : \$64,000

2008 : \$30,000

**Category:** 3903 - JUSTICE AND LEGAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

The capacity to exercise rights associated with citizenship, and to participate meaningfully in community life, is significantly affected by access to financial security and by community confidence in the independence and fairness of systems of entitlement review. This research will examine recent developments in Australian social security review mechanisms, in both policy and practice. It is of national significance as it will demonstrate the extent to which statutory objectives of fairness, comprehensibility and accessibility are achieved, particularly from the perspectives of participants in appeals. The research has critical implications for legislation, policy and practice in administrative law and tribunal practice.

DP0558161 Dr MR Symonds

**Title:** Pheromone evolution and ecology in insects on intra- and inter-specific scales

2005 : \$85,000

2006 : \$81,000

2007 : \$68,694

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Melbourne

**Summary:**

The study of pheromones is important because so many insect pests use them as part of their reproductive life cycle, increasing their potential to cause damage to crops and other natural products. My research will improve our understanding of the evolution of pheromones and communication by smell, a subject that has been largely neglected by evolutionary biologists. More specifically, by identifying the ecological factors that influence pheromone evolution, the research will help to assess the long-term consequences of the control measures currently used against such pests and, in particular, will have direct applications to the prevention of damage to Australian pine plantations by the invasive five-spined bark beetle, *Ips grandicollis*.

**DP0559869** Prof GN Taylor; Prof RA Lewis; Prof AB Rozenfeld

**Title:** **High Precision Silicon Pixel Detectors for High Energy Physics , Synchrotron and Medical Imaging Applications**

**2005 :** \$250,000

**2006 :** \$250,000

**2007 :** \$250,000

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Administering Institution:** The University of Melbourne

**Summary:**

Australia participates actively in the frontier field of high-energy particle physics to understand the fundamental building blocks of matter, their origins and interactions. This field excites the best minds in the scientific world and provides excellent training. To maintain our position in this field we must continue the development of the powerful instrumentation required for high-energy experiments. This project will satisfy that role. The application of particle detector expertise to state-of-the-art X-ray imaging detectors for the Australian Synchrotron and medical imaging is a perfect example of fundamental science tools applied to other fields. Australian Synchrotron experiments stand to gain much.

**DP0558238** Prof RV Teese; A/Prof SP Lamb

**Title:** **Academic Curriculum and School Setting : How school subjects live different lives in different schools**

**2005 :** \$110,000

**2006 :** \$100,000

**2007 :** \$140,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

What is it about some schools that enables success to occur even in the most unlikely settings: This project will investigate differences in how the senior school subjects of mathematics, English and chemistry are 'delivered' in particular settings, despite curricula that are centrally determined and examined. It will explore the impact of factors such as school organisation, teaching and assessment methods, teaching resources and student background characteristics on students' experience of, and success in, these subjects. This project will identify the changes in curricula, school organisation and teaching needed for more students to successfully complete their senior secondary education.

**DP0556817** Dr W Tham

**Title:** **Identification of the basic elements of Plasmodium transcription**

**2005 :** \$110,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 3204 - MEDICAL MICROBIOLOGY

APD Dr W Tham

**Administering Institution:** The University of Melbourne

**Summary:**

This Discovery Project falls under the NRP for safeguarding Australia. Australian troops stationed in malaria endemic areas face the threat of infection and require medical attention upon return. Any research on malaria will expand our knowledge on prevention and treatment. Australia near malaria endemic locations such as Indonesia and Papua New Guinea. These countries do not have the means to support effective basic research into the disease and wealthier countries such as Australia have the responsibility to fill this void. Furthermore, the aims of this Discovery Project are unique within the Australian malaria research community and the results fully complement other studies on transcription regulation of antigenic genes.

**DP0557617** Dr P Tombesi

**Title:** **From tourist siren to technological beacon: analysing the industrial function of the Sydney Opera House thirty years after its completion.**

**2005 :** \$75,000

**2006 :** \$25,000

**Category:** 3101 - ARCHITECTURE AND URBAN ENVIRONMENT

**Administering Institution:** The University of Melbourne

**Summary:**

The research will show that public buildings provide fertile ground to plant industrial seeds; but to have an impact on the local economy, they must respond to specific structural conditions or be supported by political will. These findings will improve Australia's institutional understanding of the relationship between cost and investment in construction, and clarify that the evaluation of building productivity requires a long-term perspective. Government agencies should use institutional projects to define their public face but also to plan and implement industrial strategies. The research will help Australia maximise its creative and technological capability by understanding the factors conducive to innovation and its acceptance.

**DP0558568** Dr P Tombesi; A/Prof B Dave; Mr BM Gardiner; Dr PC Scriver

**Title:** **Digital Outsourcing in Architecture: Opportunities for Australian Firms or Perils for Australian Workforce?**

**2005 :** \$91,000

**2006 :** \$64,000

**Category:** 3101 - ARCHITECTURE AND URBAN ENVIRONMENT

**Administering Institution:** The University of Melbourne

**Summary:**

This research will help assess competitiveness and viability of different digital outsourcing practices in connection to the needs, the operative conditions and the products of the Australian building design sector. The information will give industry analysts a tool to identify the markets within which these arrangements are likely to spread or occur in the future, and take consequent corrective or supportive action. The outcomes of this project will benefit Australia by forecasting changes in professional employment prospects, and by providing a framework to consider development scenarios for architectural educational and professional institutions, national research and development priorities, and international trade agreement agendas.

**DP0558808** Dr A Tordesillas

**Title:** **Seeing the discrete in a continuum: an integrated numerical-rheological-experimental approach towards high resolution micromechanical continuum models of granular media**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2907 - RESOURCES ENGINEERING

**Administering Institution:** The University of Melbourne

**Summary:**

Processes involving granular materials are complex and rarely reach more than 60% of the design capacity, due to inadequate understanding of granular rheology. The short term benefits of the proposed project are: improved insights on the rheology of granular media; experimentally validated micromechanical constitutive models with unmatched predictive capabilities; modelling techniques in the analysis of multiscale processes, germane to the Science of Complex Materials. The long term benefits are models of the required reliability for computer-aided design, production and management of particulate systems. These simulation tools will enhance Australia's competitive edge in the multi-billion dollar particulate and geotechnical industries.

**DP0558813** Prof JA Trinder

**Title:** **Respiratory and Cardiovascular Activation at Arousal from Sleep**

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$85,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

An arousal from sleep, no matter how brief, is associated with increased activity in the respiratory and cardiac systems. Under normal circumstances the response is considered adaptive. However, in disorders of sleep in which individuals arouse frequently and their sleep is fragmented, such as in Obstructive Sleep Apnea, the phenomenon has been linked to hypertension. While the clinical consequences of sleep fragmentation are now apparent, the mechanism that causes the increase in physiological activity at each arousal, is not known. The aim of this project will provide insight into the mechanism that produces the activation response and provide a basis for minimising the cardiac consequences of sleep disorders.

**DP0556334** A/Prof IR van Driel; A/Prof PA Gleeson

**Title:** **Cell biology of gastric acid secretion**

**2005 :** \$110,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

This research will result in a better understanding of the membrane structures in cells. In turn, this information could be exploited to manipulate ion transport, uptake, secretion of biological molecules, signal transduction events and the delivery and uptake of drugs in a number of disease situations thus leading to more effective therapies. Furthermore, this work will utilise and develop state-of-the-art technologies, contributing to national competitiveness in this area. A number of students and postdoctoral fellows will be trained as a consequence of working on this project

DP0558508 A/Prof TR Vidyasagar; Dr AB Metha

**Title:** Synaptic and network properties underlying neural coding in the mammalian visual cortex

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3207 - NEUROSCIENCES

**Administering Institution:** The University of Melbourne

**Summary:**

This study will:

(1) Increase our basic understanding of visual function that can help to explain many clinical perceptual disturbances. (2) Help in providing a detailed picture of intracortical neuronal networks that can form the basis for a prosthesis for the blind. (3) Discover the principles of neural organization underlying functions such as figure-ground segregation and perceptual learning which can inspire practical algorithms for robotic vision. (4) Train graduate students and postdoctoral fellows in state of the art techniques in a stimulating intellectual environment.

DP0558303 Dr T Visser

**Title:** The roles of attention and masking in perception of rapidly-sequential stimuli

**2005 :** \$50,000

**2006 :** \$40,000

**2007 :** \$45,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Many activities, such as driving and reading, require us to process rapidly-sequential visual inputs and to rapidly switch between different tasks. The present work uses a novel combination of behavioural testing and electrophysiological recording of brain activity to examine the mechanisms that underlie perception and performance under these conditions. This work will place Australian research at the forefront of international work on perception and cognitive neuroscience and contribute to student training. More importantly, it may lead to the design of safer driving environments or the creation of programs that will help Australian children learn to read more effectively.

DP0557660 Dr H Vu

**Title:** Performance Evaluation Methodologies for the Optical Internet

**2005 :** \$30,000

**2006 :** \$30,000

**2007 :** \$30,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Melbourne

**Summary:**

It will be important to Australia to be an early adopter of a next-generation Internet technology not only to ensure that the country retains its place in the world economic community of but also to ensure that its industries and citizens have access to new technologies. Techniques and methodologies emerging from this project will enable the design of Australia's future optical Internet. The project will enable strategic decisions on the viability of new technologies, and as a result Australian service providers will have better and cheaper networks, and Australian users will enjoy better services at a lower cost. The project will enhance the Australian knowledge base, skills base in the area of teletraffic and optical networking.

DP0557543 Dr JP Walker; Prof JD Kalma; Dr E Kim

**Title:** High resolution mapping of surface and root zone soil moisture

**2005 :** \$300,000

**2006 :** \$212,000

**2007 :** \$155,000

**Category:** 2605 - HYDROLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Knowledge of the spatial and temporal variation of surface and root zone soil moisture content at high spatial resolution is critical to achieving more efficient water utilisation practices in agriculture. Australia's main river basins are under mounting pressure to satisfy a wide range of competing economic, social and environmental needs for water, particularly in terms of environmental flows and efficient irrigation. A better understanding of the soil moisture distribution at sub-farm scales will allow farmers to better utilise both the moisture in their soil and their limited allocation for irrigation. This will help alleviate soil moisture related problems in some of the nation's key catchments, such as the Murray Darling Basin.

DP0558705 Dr MW Wallace; Prof MA Sandiford; Dr SJ Gallagher

**Title:** Murray Basin: A unique archive of late Neogene global change

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$85,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Salinization, soil erosion, groundwater depletion and surface water degradation are but a few of the inter-related environmental problems facing the Murray-Darling Basin. These problems require an understanding of the way in which shallow groundwater, salts and surface water interact with near-surface sediments. This project is aimed at a better understanding the nature of those near-surface sediments in the Murray Basin and how they were formed. If we can understand how the basin came to be the way it is (in the modern setting), we may better understand the way it might behave when subject to man-made changes like increased groundwater usage, etc.

**DP0556854** Prof AG Wedd

**Title:** **Molecular Characterisation of Metal Transport Proteins**

**2005 :** \$161,702

**2006 :** \$150,000

**2007 :** \$150,000

**2008 :** \$130,000

**2009 :** \$130,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Melbourne

**Summary:**

The trace metals are essential to life. The secrets of their catalytic and structural roles are under intensive scrutiny. The molecular mechanisms which regulate concentrations of nutrient metals in biological cells remain poorly understood. Errors in metal metabolism cause disease. For example, defects in copper metabolism cause Menkes and Wilson diseases in humans and there are connections of copper and zinc to neuro-degenerative diseases such as Alzheimer and Creutzfeldt-Jakob (mad cow). This project will study the chemistry of metabolic pathways responsible for import of nutrient copper and other metals into biological cells.

**DP0558058** Ms S Weller

**Title:** **Older Workers and Labour Market Adjustment: The Case of Ansett Airlines**

**2005 :** \$67,494

**2006 :** \$80,000

**2007 :** \$67,494

**Category:** 3402 - APPLIED ECONOMICS

APD Ms S Weller

**Administering Institution:** The University of Melbourne

**Summary:**

By tracing over 5 years the post-retrenchment careers of former Ansett Airlines employees, the study will advance knowledge of labour market adjustments for mature skilled workers from a global service industry. The work will improve understanding of labour market inequality, marginal employment and the relationship between age, household circumstances and workers' willingness to relocate in search of work. By addressing two National Research Priorities - the barriers to labour market participation of older workers and the motivations of skilled workers who emigrate from Australia - the project will contribute to the development of labour market policies attuned to the demands of an ageing workforce in a globalising economy.

**DP0557799** Dr AW Western; Dr FH Chiew; Prof G Bloschl; Dr AW Seed

**Title:** **Daily hydrological and erosion modelling utilising sub-daily rainfall intensity distributions**

**2005 :** \$90,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2605 - HYDROLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

Australian catchments face major environmental problems. Computer modelling for predicting outcomes of management decisions, in the priority setting process and for assisting with setting local targets is central to environmental management today. This research will develop a new approach for modelling runoff and erosion that is consistent with key process time and space scales. The research is based on improved process understanding and will utilize the large Australian database of hydroclimate and spatial data. This research will lead to improved estimation of runoff and erosion in gauged and ungauged catchments, allowing decisions on land and water resources and environmental management to be made with more reliable information.

**DP0558579** Dr E Weyer

**Title:** **Model quality evaluation from finite data sets**

**2005 :** \$96,000

**2006 :** \$81,000

**2007 :** \$85,000

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Institution:** The University of Melbourne

**Summary:**

Models of dynamical systems are used in many areas of science and engineering. There will always be uncertainties associated with a model, and in this project we will develop a tool for assessing this uncertainty. Having a good description of the uncertainty will depending on the application, lead to better designs, more efficient operations, better decision making etc. One particular application area of this research is to quantify the uncertainties in models of irrigation channels. This will allow us to design better systems for regulation of water levels and flows, leading to large water savings and significant environmental benefits.

**DP0558541** A/Prof SG Wheatcroft

**Title:** **Soviet Social and Political Crises in Perspective: From the Famine of 1931-3 to the Yezhovshchina of**

**2005 :** \$55,000

**2006 :** \$50,000

**2007 :** \$40,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

We will all gain from an improved understanding of some of the major historical developments of the modern period. But in addition to this, at a time when judicial proceedings are being suspended and extra-judicial detentions, and punishments are increasing, it is useful to consider the history of these activities in other societies. It is sobering to see what measures Stalin introduced to carry out what he considered to be a war on terrorism. We need to be aware of the causes of Stalinism in order to avoid similar consequences elsewhere.

**DP0557013** Dr RW White; A/Prof GL Clarke; Prof R Powell

**Title:** **Reading the orogenic record: mineral textures, metamorphic processes and crustal evolution**

**2005 :** \$90,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Melbourne

**Summary:**

This research will produce new information relevant to the geological evolution of the Australian plate by direct examination of appropriate areas and by providing constraints on the geological processes that formed Australia. The metamorphic belts we propose to study host several of Australia's major mineral deposits, economically-important resources generated as a consequence of orogenesis, intrinsically linked to their metamorphic evolution. The methodologies developed here and the resulting greater understanding of orogenesis will have direct application to many aspects of ore formation.

**DP0558835** A/Prof PM Whittington

**Title:** **How do interactions between axon guidance molecules bring about directed axon growth?**

**2005 :** \$110,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Melbourne

**Summary:**

This project deals with a fundamental, yet poorly understood biological problem at the cutting edge of international science - how axons navigate to their targets. A better understanding of this basic biological process will greatly assist the development of therapies to treat a wide range of clinical conditions in which axonal connections between neurons are disrupted by trauma or disease.

**DP0557227** Dr AM Whittaker

**Title:** **Infertility, IVF and reproductive tourism in Thailand and the region**

**2005 :** \$65,000

**2006 :** \$60,000

**2007 :** \$53,000

**Category:** 3703 - ANTHROPOLOGY

TR Dr AM Whittaker

**Administering Institution:** The University of Melbourne

**Summary:**

This project will deepen our knowledge of the cross-cultural issues involved in infertility and the transfer of assisted reproductive technologies in the Asian region. Australian IVF expertise and technology is exported overseas and the project will reflect upon the processes and dilemmas involved in this. Innovative work on reproductive tourism will develop new theoretical insights as well as describe a growing social phenomenon in our region.

**DP0557316** Dr U Wille

**Title:** **Atmospheric Free-Radicals: Exploring the Role of Nitrate Radicals in the Oxidative Damage of Bio-**

**2005 :** \$90,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The University of Melbourne

**Summary:**

This project falls within the National Research Priority 2 (Promoting and Maintaining Good Health) as identified by the ARC, specifically Priority Goal 2 (Ageing well, ageing productively) and Priority Goal 3 (Preventive healthcare). The study will lead to a better understanding of environmental factors influencing health and welfare of Australians every age and will provide unique opportunities for students to be trained in cutting-edge basic research. Knowledge and fundamental understanding of the damage of bio-surfaces caused by atmospheric free-radical oxidants and their potential role in ageing processes will help to develop novel medical strategies, which substantially contribute to the quality of Australian sciences.

**DP0557888** Dr G Willett

**Title:** **The Origins of Homosexual Politics in the British World: A Transnational Study**

**2005 :** \$42,200

**2006 :** \$55,000

**2007 :** \$30,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

This project's findings will be of national and community benefit in three ways. Addressing the origins and early development of one of the most important social movements of modern times, it will contribute to the understanding of the ways in which social inequality has been so successfully tackled in Australia over the past fifty years. By attending to the international context of this history it will expand knowledge of the nature, extent and longevity of Australia's connections to global political cultures. Finally, it will strengthen Australian scholarship's already well-established claim to world-class research in gay and lesbian and queer studies.

**DP0557062** Prof IP Williamson; Ms J Wallace

**Title:** **DESIGNING LAND ADMINISTRATION SYSTEMS TO SUPPORT MODERN LAND MARKETS**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2910 - GEOMATIC ENGINEERING

**Administering Institution:** The University of Melbourne

**Summary:**

Economies require successful land markets to generate wealth. Our land administration systems are expensive but essential infrastructure for land markets. However, since they were designed 150 years ago, the market has invented complex commodities: time shares, unit and property trusts, financial instruments, mortgage backed certificates, insurance products, options, corporate development instruments, vertical villages, and more. The project will explain how modern land markets evolved and how land administration systems can be adapted to provide more efficient land trading and better support for trading in new complex commodities.

**DP0556134** Mr BB Wong

**Title:** **Sexual signalling and parental care: A life-history perspective**

**2005 :** \$95,000

**2006 :** \$80,000

**2007 :** \$76,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

APD Mr BB Wong

**Administering Institution:** The University of Melbourne

**Summary:**

I will use a fish, the Australian desert goby, to gain pivotal insights into male reproductive investment. Under-appreciated as potential study subjects, desert gobies are ideal because males must make important reproductive decisions regarding how much effort to spend on mate attraction and parental care but, importantly, they must do so within the constraints imposed by desert-living. The likely impact of my work in the field of behavioural ecology will improve Australia's research capacity and profile. By using an Australian study species, my research will also raise awareness and understanding of extraordinary fishes living in habitats vulnerable to human impact.

**DP0557498** Dr S Wyithe; Dr DG Barnes; Prof A Loeb

**Title:** **The End of the Dark Ages of the Universe**

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$75,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The University of Melbourne

**Summary:**

There is one large gap in our understanding of the early evolution of the universe, namely, when did the first sources of light appear? Resolution of this puzzle requires new theoretical and observational strategies. Several international initiatives are now beginning to tackle the problem. This collaboration will provide a significant Australian contribution at the forefront of modern cosmology.

DP0557902 Prof JG Wyn; A/Prof L Andres

**Title:** Pathways then and now: new student transitions to adulthood in a comparative context.

**2005 :** \$145,000

**2006 :** \$80,000

**2007 :** \$92,000

**2008 :** \$100,000

**2009 :** \$105,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Melbourne

**Summary:**

This project will generate new knowledge about young people's development and use of 'creative capital', which is crucial to their participation in the new labour markets in a post-industrial society. The research is designed to contribute directly to new policy frameworks in post-compulsory education and training that acknowledge the need for young people to make creative choices, develop positive pathways and to live within supportive family and community contexts. In this way, the project will support the Government's agenda of strengthening Australia's social and economic fabric in the face of weaker traditional support structures.

DP0556978 A/Prof CG Young; Asst Prof P Basu; Prof GN George; A/Prof ML Kirk

**Title:** Bioinorganic Chemistry of Molybdenum

**2005 :** \$170,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Melbourne

**Summary:**

Enzymes containing the trace element molybdenum play crucial roles in plant, animal and human health, drug metabolism, environmental processes and climate. This international, multidisciplinary project will advance our understanding of the structure and function of these enzymes at the atomic level and inform strategies to reduce the impact of crop, livestock and human diseases and adverse environmental (e.g. algal blooms, leaching of toxic arsenic) and climatic events. Effective strategies would be of enormous social and economic benefit to Australia. The training of skilled scientists and access to major overseas facilities are additional benefits of the project.

DP0558677 Dr S Zhou; Dr VH Mak

**Title:** Channel Assignment in Cellular Communication Systems and Optical Networks

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Melbourne

**Summary:**

Due to the rapid growth in mobile communications, efficient management of the scarce radio spectrum has emerged as an important issue. To avoid interference various conditions need to be satisfied by channels assigned to the transmitters in a cellular communication network. This project targets optimal assignments under such constraints, and similar problems for optical networks. Its implementation will have potential applications in computer and telecommunication industries, and advance significantly our knowledge on relevant subjects of mathematics and operations research.

## Victoria University of Technology

DP0557572 A/Prof Y Zhang; Dr C Liu; A/Prof J Yang; Prof MP Papazoglou

**Title:** A Framework for Supporting Consistent and Reliable Collaborative Business Transactions

**2005 :** \$81,000

**2006 :** \$67,000

**2007 :** \$70,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** Victoria University of Technology

**Summary:**

Business integration and enterprise computing is at the heart of ICT objectives and initiatives global wide. The project aims to be of unique value to Australian industry and provide a means to achieve excellence in the field of research that promises to shape the future of e-business technology. The research conducted within this project will position Australia as one of the leaders in the business transaction area. The project outcomes in the form of specifications and formal models will provide generic solutions that are applicable to many Australian and international companies involved in distributed computing and e-business technologies.

## Walter & Eliza Hall Institute of Medical Research

DP0559372 Dr J Baum

**Title:** The Evolution and Diversification of Apicomplexan Cell Invasion Mechanisms

2005 : \$67,494

2006 : \$67,494

2007 : \$67,494

**Category:** 2702 - GENETICS

APD Dr J Baum

**Administering Institution:** Walter & Eliza Hall Institute of Medical Research

### Summary:

Insights gained through this project, about the mechanisms of cell invasion in Apicomplexan parasites, will have far reaching implications for a number of parasites of great significance to humans and animals. Since host cell invasion is a key step in the parasite lifecycle, proteins identified here will be prime targets for novel drugs that prevent invasion or antigens that can be used as vaccines. This will be important for developing new control strategies for diseases of global significance such as malaria or toxoplasmosis, as well as those of national importance to the food industry of Australia, including diseases like babesiosis and coccidiosis that cause significant economic loss to the livestock and poultry industries each year.

DP0559454 Dr Z Feng

**Title:** Intrinsically Unstructured Proteins (IUPs): NMR characterization, prediction, and application to malarial proteome

2005 : \$67,494

2006 : \$67,494

2007 : \$67,494

**Category:** 3203 - MEDICAL BIOCHEMISTRY AND CLINICAL CHEMISTRY

APD Dr Z Feng

**Administering Institution:** Walter & Eliza Hall Institute of Medical Research

### Summary:

Determination of protein structures with longer DR by NMR will enrich the DR dataset and provide a deeper understanding of protein structure-function relationships and protein folding pathways. The proposal will also provide valuable information in the key applied area of target selection in structural biology. Not all current web services are freely accessible and available services can be improved further by using more reliable training dataset or more effective algorithms, development of a national DR predictor will help Australian structural biologists increase the success rate of structure determination and provide greater insight into a range of proteomes.

DP0556154 Dr BT Kile

**Title:** GENOMIC/PHENOMIC IDENTIFICATION AND CHARACTERISATION OF NOVEL HEMATOPOIETIC REGULATORS

2005 : \$100,126

2006 : \$100,126

2007 : \$100,126

2008 : \$100,126

2009 : \$100,126

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

QEII Dr BT Kile

**Administering Institution:** Walter & Eliza Hall Institute of Medical Research

### Summary:

Blood cells are fundamental to health. They play a vital role in maintaining the condition of tissues and organs, fight infections and are essential players in the body's response to injury. Understanding how blood cells are produced and how they function is critical to improving the treatment of disease. With the sequencing of the genome, we now have the tools we need to find the genes controlling these processes. This project will harness the power of modern genetic technologies to dissect the role of novel genes involved in blood cell formation and function, and will open up new therapeutic opportunities for treating the many diseases associated with dysregulation of this important cell system.

## Queensland

### Bond University

DP0560034 Dr JJ Kline; Prof M Kaneko

**Title:** Memory, Induction, and Strategic Behaviour in Economic and Social Situations

2005 : \$38,000

2006 : \$20,000

2007 : \$20,000

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** Bond University

### Summary:

This project will provide economists, game theorists and other social scientists with a theoretical framework to model players with limited memories, and to model the process by which they develop their subjective views. By giving a formal treatment of the problem of induction, it will help us to understand how people might come to have different views on the world. By capturing new aspects of bounded memory, it will extend our understanding of agents with bounded rationality. The emergence of sophisticated strategic concepts and behavioural implications of these subjective views in society can also be described and discussed in this framework.

## Central Queensland University

DP0557089 Dr DR Halpin

**Title:** Is Australian agricultural policy making still 'exceptional'? Investigating the population of issue niches in the Australian agricultural policy domain.

2005 : \$35,000  
2006 : \$35,000  
2007 : \$30,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** Central Queensland University

### Summary:

Agriculture is an important part of Australian economic, social and cultural life. So too is the notion that public policy in all areas, agriculture included, should be formulated on the basis of consultation and input from the fullest possible range of interests and groups. This research will reveal the degree of competition and cooperation between interests over agricultural policy issues in Australia. In so doing, it provides an important window on the public policy process which in turn should simulate public debate about agricultural policy making specifically and Australian political processes generally.

## Griffith University

DP0556469 Dr RM Connolly; Dr JS Hindell; Dr GP Jenkins

**Title:** The importance of edge effects in determining the value of seagrass landscapes as fish nurseries

2005 : \$75,000  
2006 : \$70,000  
2007 : \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Griffith University

### Summary:

Seagrasses are a conspicuous element of Australian marine environments, and are crucial in the conservation and maintenance of biodiversity. Degradation of seagrass ecosystems from climatic extremes, increased sediment and nutrients in the water, and other pollutants results in loss and fragmentation of meadows. These changes to seagrass are linked with increased coastal erosion, severe loss of biodiversity, and collapse of fisheries. Increased understanding of how biological processes such as predation and food availability influence animal associations with seagrasses, and how these effects change with landscape structure, will have important applications in the sustainable management of Australia's threatened coastal habitats.

DP0557794 Dr RA Cropp

**Title:** A modelling analysis of the implications of biogenic feedbacks on environment for the adaptation of ecosystems.

2005 : \$40,000  
2006 : \$37,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Griffith University

### Summary:

The sustainable management of Australia's living resources depends critically on a deep understanding of the fundamental properties of ecosystems. These properties will determine the response of an ecosystem to perturbation. Anthropogenic perturbation of ecosystems, whether instantiated by living resource harvesting, habitat destruction, species invasions, pollution or climate change, is the greatest current threat to Australia's biodiversity and hence the continued functioning of the systems that we rely on for maintaining our environment in a habitable state and for providing economic benefit. This research will attempt to discover some of these properties, and assess their implications for the sustainable management of our environment.

DP0558908 Dr PE Dale; Dr MB Dale; Dr NG Sipe

**Title:** Predicting Malaria and Other Vector-borne Disease Risk Using Eco-epidemiological Models

2005 : \$50,000  
2006 : \$50,000  
2007 : \$50,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** Griffith University

### Summary:

The project will benefit the nation by safeguarding public health through modelling and assessing the risk of malaria and other mosquito-borne diseases such as Ross River virus and Dengue. Direct benefits will include reduced or managed risk of these mosquito-borne diseases along with a more efficient allocation of public health resources. Direct and indirect benefits will also flow to Indonesia by reducing death and illness associated with malaria and other mosquito-borne diseases. This project will further the international collaboration already begun with Indonesia and has the potential to extend into other South-East Asian countries.

**DP0557303** Prof FK Dehne

**Title:** Coarse Grained Parallel Algorithms

**2005 :** \$76,000

**2006 :** \$63,000

**2007 :** \$66,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** Griffith University

**Summary:**

Various fields of research face barriers created by problems that are computationally hard and/or require processing of large amounts of data. For example, some computational biochemistry methods on protein or gene sequences can not be scaled up to data sets required for human health research because of performance problems. Parallel computing enables new research by increasing the size of solvable problems. In addition to fundamental parallel computing research, this project studies parallel algorithms for structure-based drug design and protein-protein interaction prediction that will enable new biochemistry research, as well as parallel algorithms for data cubes that will help enable the next generation of very large data warehouses.

**DP0558922** Prof D DeLeo

**Title:** An Investigation into Suicidal Behaviours by Males during the Process of Marital and De Facto

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$115,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** Griffith University

**Summary:**

The project has a likelihood of reducing rates of fatal and non-fatal suicidal behaviour by high-risk groups such as males aged 25 - 44, and growing Australian populations such as the separated/divorced. The anticipated saving of lives, injuries, and mental distress is expected to achieve substantial and sustainable cutback in individual, corporate and public expenditure on mental health, injury control and suicide prevention by government, community and corporate agencies. Time and personnel resources utilised by the police, ambulance, coroner, hospital, and insurance departments can be diverted from highly preventable suicides to other areas.

**DP0559301** Prof S Dimitrijevic; Prof HB Harrison

**Title:** Nonvolatile Dynamic Memories

**2005 :** \$131,000

**2006 :** \$114,000

**2007 :** \$116,000

**Category:** 2899 - OTHER INFORMATION, COMPUTING AND COMMUNICATION SCIENCES

**Administering Institution:** Griffith University

**Summary:**

This project will expand the knowledge base that will support the development of a frontier technology (superior memory chips) to be undertaken by an Australian based start-up company (QsRAM). The project will provide an excellent environment for training researchers who will be able to lead development of frontier technologies. It will also generate additional intellectual property with high potential to spawn new commercial activities. Direct financial benefit from any commercialization of the intellectual property can be assured through standard practices in the semiconductor industry (license fees, royalties, product design, etc.)

**DP0556131** Dr SP Fullagar

**Title:** Rethinking women's depression through narratives of recovery and wellbeing

**2005 :** \$32,000

**2006 :** \$40,000

**2007 :** \$30,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** Griffith University

**Summary:**

This research project explores the growing problem of depression for women in Australia from a new angle. It investigates how rural and urban women at different life stages talk about their own experiences of recovery from depression and what helped to improve their emotional wellbeing. By considering the social and gendered context of women's depression this project will contribute to a broader evidence base for prevention policies and treatment practices. It will also enable different ways of approaching women's depression amongst health professionals, families and communities.

**DP0556905** Prof RS Guest; Prof J Creedy

**Title:** An Improved Framework for Analysing the Fiscal Implications of Population Ageing

**2005 :** \$50,000

**2006 :** \$30,000

**2007 :** \$25,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** Griffith University

**Summary:**

The Commonwealth Government's 'National Strategy for an Ageing Australia' explicitly acknowledged the potential for intergenerational conflict in Australia as relatively fewer young people must provide for the consumption of a growing proportion of retired people. The Intergenerational Report (IGR) in 2002 was an important step in national planning to avoid such a conflict. The proposed project seeks to address major shortcomings in the IGR and provide an improved framework for future IGRs. The project addresses two Priority Goals within the Designated National Research Priority 2. These are: 'Ageing well, ageing productively' and 'Strengthening Australia's social and economic fabric'.

**DP0556312** Prof WK Halford; Dr KL Wilson; Dr AJ Lizzio

**Title:** Relationship self-regulation as a predictor of marital satisfaction and stability in the early years of

**2005 :** \$60,000

**2006 :** \$52,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Griffith University

**Summary:**

Marital distress and separation are major social problems in Australia. Marital problems are associated with domestic violence, poor health and adjustment of adults and children, and substantial financial costs to individual families and society. The current project tests whether the effort partners expend to sustain the relationship helps maintain relationship satisfaction. If true, relationship education programs can be structured to teach people how to enhance their relationships. Effective relationship education could significantly improve the health and quality of life of partners and their children, and reduce national and community costs associated with marital problems.

**DP0557732** A/Prof PJ Jordan; Dr AC Troth

**Title:** The impact of emotional intelligence and styles of conflict resolution on performance in high and low stress situations

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Griffith University

**Summary:**

Research from 1980 reveals that organizations in Australia do not deal well with conflict (Hollis & Cunnington, 1980). Recent research has revealed similar shortcomings within Australian organisations (Lewis et al., 1997). Improving the effectiveness of individuals in resolving conflict is vital for organisational effectiveness in both the private and public sectors. In particular, functional conflict can contribute to organisational innovation, creativity and productivity. The understanding gained about the links between emotions and conflict resolution in this research will assist in identifying and improving the skills that contribute to better conflict resolution and consequentially better performance within organisations.

**DP0558420** A/Prof J Kane; Dr H Patapan

**Title:** Democratic Leadership: How democracy shapes, constrains and empowers its leaders

**2005 :** \$30,000

**2006 :** \$50,000

**2007 :** \$40,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** Griffith University

**Summary:**

A more profound understanding of the authority conferred, and limits imposed, by democracies on their leaders allows us to recognize what is, and is not, possible in democratic politics. It encourages a more subtle appreciation of the onerous demands of leadership, negotiating the extremes of idealism and cynical pragmatism that so often undermine confidence in politics and politicians. It gives greater insight into how democratic institutions and practices can be sustained and improved upon, both domestically, and internationally. Australia's commitment to democratisation in the region makes even more pressing the question of the type of leadership necessary in transitional states.

**DP0558857** A/Prof J Kane; Dr H Patapan; Dr PJ Bishop

**Title:** E-Democracy in Theory and Practice

**2005 :** \$30,000

**2006 :** \$50,000

**2007 :** \$30,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** Griffith University

**Summary:**

Democratic experiments using the internet are increasingly prevalent in Australia and internationally, promising to make far-reaching changes to the way we understand and implement democracy. It is important that such experiments be undertaken with full appreciation of the nature of the transformations they seek to effect in our democratic institutions and practices. The twofold nature of this project, combining the theoretical and the practical, allow a more thoughtful and comparative assessment of the nature of e-democracy, and will provide practical guidance regarding the efficacy of its various applications.

**DP0559930** Dr K Khanna; Dr M Fabbro

**Title:** **Functional characterisation of CMAP, a novel centrosome- and midbody-associated protein**

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** Griffith University

**Summary:**

Cell division is a highly regulated process involving many components to produce two daughter cells which contain an equal amount of DNA. Thus incorrect localisation and modification of specific proteins that regulate this process cause cell division errors resulting in genomic instability. We have recently identified a novel protein called CMAP that is involved in the final stages of cell division, which involves the cleavage of the cell membrane to produce two daughter cells. Here, we aim to characterise the mechanism(s) of CMAP function and to identify and characterise CMAP binding proteins to further understand the mechanisms involved in the final stages of cell division to maintain genomic stability.

**DP0559577** Prof GH McTainsh; Dr HA McGowan; Dr N Tindale; Dr JF Leys; Dr AY Chan

**Title:** **The Australian Dust Transport System: characterisation and downwind impacts**

**2005 :** \$100,000

**2006 :** \$95,000

**2007 :** \$70,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** Griffith University

**Summary:**

Most Australians are aware that dust storms occur in dry inland areas and recently many experienced first hand, the dust storms that engulfed our cities. Few, however, are aware of the diverse impacts of desert dust downwind from source. Recent technological advances in remote sensing have made dust storms much easier to study, and Australian researchers will use these, and other innovative techniques, to reconstruct the major dust storms back to 1960. They will reconstruct the sources, dust loads and trajectories of these storms, and examine how dust affects urban air pollution. Their data will also be provided to an allied research team in New Zealand, who are examining how iron-rich Australia dust affects phytoplankton in the oceans.

**DP0559782** Dr S Myhra; Dr GS Watson

**Title:** **Nano-machining of diamond-like carbon (DLC): Scientific basis and technical potential**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** Griffith University

**Summary:**

Nanotechnology will be the basis for the next post-industrial revolution, and will be the main driver of future national economies. It is crucially important that at the very least Australia is a significant niche player in those developments. The project represents an effort to promote those goals.

**DP0559697** Prof SE Selvanathan; A/Prof S Selvanathan

**Title:** **Advertising and Drinking: Does it Matter?**

**2005 :** \$55,000

**2006 :** \$50,000

**2007 :** \$40,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** Griffith University

**Summary:**

The Health profession and various community groups have been demanding the government introduce new alcohol advertising policies that aim to reduce the social cost and misery associated with the misuse of alcohol (estimated to cost Australians about \$8 billion, cause about 3,300 deaths and 72,000 hospitalisations annually) and to maintain the health and future well-being of Australians. This project will assess the impact of current advertising policies and the impact of a possible ban on alcohol advertising on the level of alcohol consumption in Australia. The results will be useful to the Australian government, the Australian community and the alcohol industry in developing new advertising policies that aim to reduce alcohol consumption.

**DP0559870** Dr G Tiralongo

**Title:** **Regulation of cell surface sialylation by targeting the CMP-sialic acid transporter and sialyltransferase: Towards the development of anti-metastatic agents**

**2005 :** \$67,494

**2006 :** \$67,494

**2007 :** \$67,494

**Category:** 3203 - MEDICAL BIOCHEMISTRY AND CLINICAL CHEMISTRY

APD Dr G Tiralongo

**Administering Institution:** Griffith University

**Summary:**

The mortality rates for many of the cancers afflicting the world's population are mirrored in Australia, particularly colon cancer. It's generally accepted that colon cancer, and cancers as a whole, are a significant healthcare issue in this country, representing a major challenge to biomedical researchers and healthcare professional. The economic and social impact is immense, placing a huge strain on the healthcare system, as well as on the families affected. Any alternative treatment reducing cancer metastasis would be of enormous national and international benefit. It's believed that the significant studies outlined in this proposal, which are based on exciting preliminary data, will make a sizeable contribution to achieving this goal.

**DP0557028** Dr SE Trevaskes

**Title:** **Striking Hard at crime: criminal justice practice in China today**

**2005 :** \$72,546  
**2006 :** \$72,346  
**2007 :** \$67,494

**Category:** 3903 - JUSTICE AND LEGAL STUDIES  
APD Dr SE Trevaskes

**Administering Institution:** Griffith University

**Summary:**

Australia has established a bilateral human rights dialogue with China. Chinese society is increasingly violent and its crime problems are increasingly transnational in nature. Some of the crimes targeted in China's current anti-crime policy have direct impact on our political refugee policy in Australia, in particular, Falungong adherents applying for refugee status. It is therefore vital that we strengthen our knowledge of this area of Asian law. This project aims to strengthen Australia's understanding of China's key politico-legal issues in order to better understand and engage with this emerging world superpower.

**DP0556165** Prof PM Weller; Dr Y Xu

**Title:** **International Civil Servants and the World Bank: their Role and Impact**

**2005 :** \$55,000  
**2006 :** \$60,000  
**2007 :** \$60,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** Griffith University

**Summary:**

The World Bank is the principal international organisation responsible for alleviating poverty and advocating good governance. Understanding the World Bank and its impact in the South Asian and East Asia regions should enable an improved capability for Australia to appreciate the attempts to alleviate the poverty in the region that is so much a source of instability there. We further need to understand the potential of international civil servants to contribute to international cooperation and the process of globalization.

**DP0559935** Dr DT Welsh; Dr T Meziane; Dr L Seuront; Dr PR Teasdale

**Title:** **Heterogeneity and ecosystem function: The role of microphytobenthos and macrofauna in inducing spatial variability in biogeochemical processes and fluxes.**

**2005 :** \$80,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Griffith University

**Summary:**

Human disturbances such as eutrophication (nutrient enrichment) increasingly threaten the sustainable use of Australia's coastal seas. Management of threats such as eutrophication are usually based on observations at large spatial scales, but ecological processes underpinning nutrient dynamics occur at much smaller scales. This multi-disciplinary study will examine the relationship between processes mediated by small organisms (microscopic algae and burrowing animals), and large-scale nutrient dynamics pattern on sheltered coasts. Modern technologies will be used for monitoring the micro-scale processes, allowing models to be constructed to benefit both scientists and policy-makers alike.

## **James Cook University**

**DP0557170** A/Prof RA Alford; Dr L Schwarzkopf; Prof TW Schoener

**Title:** **BEYOND ABUNDANCE: HOW TOP PREDATORS AFFECT MESOPREDATOR BEHAVIOUR AND LIFE HISTORY**

**2005 :** \$75,000  
**2006 :** \$70,000  
**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** James Cook University

**Summary:**

Top predators strongly influence biodiversity. Areas with high biodiversity attract tourism income and provide valuable ecosystem services. In Australia, high biodiversity, and the opportunity to view top predators, increase the experience quality of tourists, and increase the probability that they will visit an area, but Australia has many highly fragmented ecosystems, which lose top predators. Disappearance of top predators can lead to expanding populations of mid-level predators, and concomitant losses of biodiversity. In Australia, where lizards are major top- and mid-level predators in terrestrial systems, our study will directly address the consequences of predator disappearance, and provide management strategies to deal with it.

**DP0558073** A/Prof R De Nys; Mr WC Dunlap; Dr K Burns

**Title:** Coenzyme Q as a measure of environmental stress in aquatic ecosystems

**2005 :** \$35,992

**2006 :** \$31,220

**2007 :** \$24,285

**Category:** 2504 - ANALYTICAL CHEMISTRY

**Administering Institution:** James Cook University

**Summary:**

Australia's marine and freshwater water resources including high profile regions such as the Great Barrier Reef and the Murray-Darling River system are under increasing threat. This project is significant as it aims to provide a rapid tool to quantify low-level impacts in aquatic systems and provide a novel and accurate early-warning-system of stress within aquatic environments. Through the innovative development of an assay system from proven biomedical technologies it will be possible to deliver a significant community benefit by providing an early warning mechanism for the combined effects of urban and industrial impacts on our invaluable marine and freshwater resources.

**DP0555986** Dr B Fu; Prof BW Yardley; Dr P Philippot

**Title:** CO<sub>2</sub>-brine behaviour in high temperature geological processes: Microanalysis and significance

**2005 :** \$90,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2601 - GEOLOGY

APD Dr B Fu

**Administering Institution:** James Cook University

**Summary:**

This project clearly lies within the national research priority of developing deep earth resources. It may strengthen our economic fabric through mineral deposit discoveries in Australia as well as other circum-Pacific countries. The proposed research will also indirectly enhance our understanding of the relationships between geosphere, biosphere, fluids and global greenhouse warming. By strong national and international collaborations and our use of innovative frontier technologies of fluid microgeochemistry, we will expand recognition of Australia's world-class research capacities.

**DP0556653** A/Prof Y He; Dr NM Davies; Prof IH Frazer

**Title:** Jet breakup of emulsions for the production of designer microparticulate drug delivery systems

**2005 :** \$90,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** James Cook University

**Summary:**

Drug delivery systems are an important and growing part of the pharmaceutical and biotechnology market. The growth is estimated to be at 23% p.a. and is tied to the requirements for more precise and complex delivery profiles by highly potent drugs or vaccines (bioactives). To achieve the required level of control and precision, improved encapsulation technologies are needed to produce particles of a precise size and narrow size distribution. This project aims to develop an innovative technology for the production of superior uniformly sized particulate drug delivery systems for the delivery of the 'next generation' bioactives.

**DP0557190** Dr DJ Kemp

**Title:** Nanotechnology in nature: the evolutionary significance of iridescent ultraviolet colouration in butterflies

**2005 :** \$101,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

APD Dr DJ Kemp

**Administering Institution:** James Cook University

**Summary:**

Nanostructural colour is a novel and interesting biological phenomenon that has potential application in textile and paint industries. This research has the potential to uncover knowledge relevant to future genetic manipulation and/or artificial synthesis of this trait for industry. Fundamental benefits will include a contribution to our understanding of evolution and biological diversity, enhancement of Australia's research profile, and the cultivation of new scientific expertise. This proposal also promises to benefit the Australian scientific community through the establishment of collaborative links with universities in the USA and UK, and to increase mainstream awareness of Australia's stunning natural resources.

DP0558497 Dr Q Li

**Title:** Designs of Periodic Microstructure Materials with Prescribed Multiphysical Properties

**2005 :** \$100,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** James Cook University

**Summary:**

The evolutionary structural optimization (ESO) is an Australian initiative, which has made a significant impact on modern structural optimization. In advanced materials areas, Australia has well-established infrastructure and world-class expertise. Exploitation of ESO to advanced materials design will be of "exclusive significance" to Australia. More importantly, the new material design technology will present to Australia an opportunity to lead in this rapidly-growing area, which will definitely underpin Australia's standing as a major contributor and developer in a global materials market. It is expected that fresh classes of futuristic materials can be developed in a cost-effective fashion and add great economic benefits to Australia.

DP0558346 Dr JF Nott

**Title:** Tropical sand beach ridges - a new approach to palaeotempestology

**2005 :** \$40,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** James Cook University

**Summary:**

Investigations of sand beach ridges in northern Australia will considerably reduce the impact of future tropical cyclones on communities. These ridges record a detailed history of cyclones over the past 5,000 years. Due to the great length of record we will now be able to identify cycles of cyclone activity, which will allow us to better predict the consequences of these hazards under an enhanced greenhouse climate and reduce the threat to human life and economic loss.

DP0558516 Dr PV Ridd; Prof ML Heron

**Title:** Measuring the flushing time of waters in the Great Barrier Reef

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2604 - OCEANOGRAPHY

**Administering Institution:** James Cook University

**Summary:**

There are concerns both in the scientific community and in the general public about the possible implications of agricultural runoff to the Great Barrier Reef (GBR). Due to this, the Great Barrier Reef Marine Park Authority has developed a "Reef Water Quality Protection Plan" (RWQPP) which may have significant economic implications to the grazing, sugar, and other primary industries. In order to protect the GBR, whilst also minimizing the impacts on agricultural industries, it is important to understand the processes that affect the buildup and broad-scale dispersion of contaminants in the GBR. This project will facilitate that understanding.

DP0556411 Dr GA Shields; Prof Dr KB Follmi; Prof Dr H Strauss

**Title:** Sedimentary phosphorites as geochemical sponges: trace element scavenging, the chemical evolution of seawater and an innovative method for dating sediments

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$40,000

**Category:** 2603 - GEOCHEMISTRY

**Administering Institution:** James Cook University

**Summary:**

Ancient sedimentary phosphorite is the major source of commercial phosphate in Australia and East Asia. This project will lead to economic and environmental benefits to Australia by providing the minerals industry with the tools to target purer phosphate, thus improving resource estimations and minimising the environmental impact of trace metal burdened fertiliser. The study will enhance our understanding of the nature and timing of key moments in Earth history and could serve as a launchpad for future studies on the use of phosphate for environmental remediation. We hope to provide exciting opportunities for Australian postgraduates through cutting edge research in partnership with both homespun and international academic collaborators.

## Queensland University of Technology

**DP0559807** A/Prof VV Anh; Prof KS Lau; Prof N Leonenko; Prof J Angulo; Prof M Ruiz-Medina

**Title:** Stochastic modelling of spatiotemporal nonlinear diffusion processes with multifractal characteristics

**2005 :** \$72,000

**2006 :** \$70,000

**2007 :** \$71,000

**2008 :** \$70,000

**2009 :** \$70,000

**Category:** 2302 - STATISTICS

**Administering Institution:** Queensland University of Technology

### Summary:

This research is relevant to solute transport and plume evolution in heterogeneous media. Detailed modelling of these processes is computer-intensive, while the diffusion models of this project offer a more economical alternative. Our study will also benefit the research on the salinity problem. Excessive demand for irrigation water to support agricultural production has stretched freshwater aquifers beyond their long-term yield. Large areas of land have been lost to saltwater intrusion. This proposal will provide suitable tools to predict the level and movement of saltwater in the aquifers. Application to the development of management strategies would bring direct benefit to coastal areas where salinity is a sustainability issue.

**DP0558209** A/Prof DA Atchison; Dr AD Carkeet

**Title:** Optical defects of the eye and their relationship to visual performance

**2005 :** \$85,000

**2006 :** \$65,000

**2007 :** \$64,000

**Category:** 3209 - OPTOMETRY

**Administering Institution:** Queensland University of Technology

### Summary:

All of us will need ophthalmic correction (spectacles, contact lenses and/or refractive surgery) at some stage in our lives. This research is important to the whole Australian community as it will lead to improved equipment for measuring optics of the eye and their effects on spatial vision, better techniques for measuring vision, and obtaining a better understanding of the contribution of the optics to human vision. It will provide information about how correcting optical defects through customized refractive surgery and how inducing optical defects (eg with progressive addition lenses) affect vision, and will thus guide developments in refractive surgery and spectacle lenses.

**DP0556543** A/Prof RR Ballantyne; Ms JM Packer; Dr JH Falk

**Title:** Investigating the educational impact of wildlife-based leisure experiences in supporting visitors' adoption of environmentally sustainable practices

**2005 :** \$64,000

**2006 :** \$52,000

**2007 :** \$37,000

**Category:** 4003 - CURATORIAL STUDIES

**Administering Institution:** Queensland University of Technology

### Summary:

National environmental policy makers acknowledge the central role education plays in addressing the many serious environmental problems facing the country and encouraging Australians to adopt environmentally sustainable practices. This project will inform the design of free-choice, wildlife-based learning experiences that are relevant, meaningful and accessible to the majority of society. Wildlife-based learning experiences offer a way to secure sustainable economic benefits while supporting both wildlife conservation and local communities. By developing new tools to assess and enhance the educational impact of such experiences this project will contribute to building the capacity of visitors to adopt environmentally sustainable practices.

**DP0559287** Dr SE Bottle; Prof GA George; Dr E Rizzardo; Dr SH Thang

**Title:** New Fluorescent Probes to Elucidate Complex Oxidation Mechanisms

**2005 :** \$130,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2505 - MACROMOLECULAR CHEMISTRY

**Administering Institution:** Queensland University of Technology

### Summary:

From medicine to manufacturing, polymers ("plastics") are a major component in the materials we use in our modern society, yet the manner by which they degrade and break down is often not well understood. Controlling the lifetime of polymers by either accelerating degradation on the one hand or preventing, or limiting, it on the other, will have significant benefits to society but this can only be achieved by reaching a thorough understanding of the degradation process. This project makes use of a unique, Australian-designed additive which stabilises polymeric materials, provides a marker for degradation levels and also provides information about the nature of the degradation processes occurring within polymers.

**DP0559426** Dr SE Bottle; Prof MF Lavin

**Title:** **New Antioxidants Impacting on ROS and Free Radical Mediated Cellular Damage and Disease**

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** Queensland University of Technology

**Summary:**

Oxidative stress describes the condition where free radicals damage cells and biological systems and this stress underlies many diseases including neurological conditions and aging disorders such as Alzheimer's Disease. This project sets out to create new forms of powerful antioxidant drugs able to probe the mechanisms of such diseases with the view to developing new treatments and therapies.

**DP0559687** Prof JL Dale; A/Prof RM Harding; Dr DK Becker; Dr MB Dickman

**Title:** **Manipulation of apoptosis-related genes to generate novel disease resistances in banana**

**2005 :** \$90,000

**2006 :** \$80,000

**2007 :** \$80,000

**2008 :** \$80,000

**Category:** 3003 - HORTICULTURE

**Administering Institution:** Queensland University of Technology

**Summary:**

Bananas are one of Australia's most important fruit crops. However, the industry is continually threatened by numerous diseases including yellow and black Sigatoka, Fusarium wilt and bunchy top. Control of these diseases currently requires either extensive pesticide treatments or complex agronomic procedures, of which most are ineffective, expensive or environmentally damaging. The aim of this project is to utilise a novel strategy to generate transgenic bananas with resistance to these diseases. The benefit will be both economic and environmental as implementation should significantly reduce or eliminate pesticide use. Importantly, this strategy can potentially be extrapolated to many other crops.

**DP0557300** A/Prof GJ Ianziti

**Title:** **Renegotiating the Origins of History: A Study of Early Modern Historical Writing as Practiced by Leonardo Bruni and His Contemporaries**

**2005 :** \$30,000

**2006 :** \$20,000

**2007 :** \$20,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** Queensland University of Technology

**Summary:**

This project will pioneer a new account of the origins of modern historical writing, one which will focus on the political affiliations of foundational figures. Such a study is of vital importance to the community in a time when an intense public debate is being waged over conflicting interpretations of our national past. Participants in this debate have sometimes appealed to pure disciplinary origins, accusing their opponents of politicizing history. This study will show that political engagement was a central feature of Western historiography from its inception, and will explore the way politics underpinned the early development of the discipline.

**DP0559461** Prof GF Ledwich; Dr ZY Dong; Dr TK Saha

**Title:** **EMERGENCY CONTROL FOR POWER SYSTEM SEPARATION**

**2005 :** \$95,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Institution:** Queensland University of Technology

**Summary:**

In 2003 we saw major blackouts of power systems for US/Canada, Italy and London leading to billions of dollars of lost production and major impacts on many peoples lives. One aspect contributing to some of these is the control of system dynamic response and the targeted use of emergency controls such as load and generator shedding. This project is contributing to the development of an integrated control response such that appropriate levels of emergency controls are determined and the probability of cascading blackouts reduced through automated systems.

**DP0556455** Dr Y Li; Dr RY Lau; Dr Y Xu

**Title:** **Automatic Ontology Learning and Data Reasoning in Web Mining**

**2005 :** \$47,772

**2006 :** \$47,772

**2007 :** \$47,772

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** Queensland University of Technology

**Summary:**

This research has an impact on both research and practical applications. In research, it provides opportunities for research students to carry out research using both data mining and data reasoning to solving Web based application problems. In practical, it can help IT industry to design the new generation of Web mining systems in order to provide invaluable service to users. This research also develops new techniques for data automatic processing within areas of smart information use in Australia. In particular it further develops data mining techniques by introducing data reasoning models for using discovered knowledge. It must be useful to improve the efficiency of the existing data mining systems.

**DP0559383** Prof M Mahendran

**Title:** **An Investigation into the Behaviour of Light Gauge Steel Structures under Fire Conditions**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** Queensland University of Technology

**Summary:**

This research will clearly result in a major national benefit with potential reduction in loss of life, loss of property and reduced insurance rates with improved fire resistant construction. Australian manufacturers will have a leading edge internationally with the use of high strength steels. There is an opportunity for Australia to become a world leader in an area of fire research. The project will assist in developing fire resistant prefabricated building systems. It also provides valuable research training to young Australians. Most importantly it will contribute to Australia's major initiatives in protecting its critical infrastructure.

**DP0556473** Dr BM McKimmie; Prof DJ Terry; A/Prof R Schuller

**Title:** **Impaired jury decision-making: The impact of stereotypes in the Australian court room**

**2005 :** \$52,000

**2006 :** \$65,000

**2007 :** \$68,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Queensland University of Technology

**Summary:**

There have been calls for reforms and overhauls of the jury system in Australia because of concerns about the ability of jurors to reach objective verdicts and concerns about the costs associated with the jury system; however the consequences of these proposed changes for jury functioning are not well understood. This research will provide a better understanding those factors that contribute to impaired jury decision-making, helping to avoid the very real risk of any changes to the jury system resulting in profound and unpredictable changes to the functioning of the legal system. By doing so, the concerns of people calling for drastic reforms can be addressed without socially and economically expensive overhauls of the jury system.

**DP0558340** Dr AS Micallef; Dr DP Arnold; Dr PG Parsons

**Title:** **Redox-Tuneable Sensitisers for Photodynamic Therapy of Malignant and Non-Malignant Proliferative Diseases**

**2005 :** \$90,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2503 - ORGANIC CHEMISTRY

APD Dr AS Micallef

**Administering Institution:** Queensland University of Technology

**Summary:**

Cancer is currently Australia's leading cause of death with 85 231 new cases reported during 2000, costing the health system >\$2 billion annually. Photodynamic Therapy is a promising anti-cancer therapy which combines the action of a photosensitising drug and light to destroy tumours. This project will lead to the development of new photosensitisers which will enable the specific targeting of tumours while protecting healthy tissue from damage. Post-treatment skin photosensitivity will be minimised by antioxidant features integrated into the photosensitisers. The development of improved photosensitisers during this project will ultimately lead to improved treatment and new alternatives for Australian cancer sufferers.

**DP0558409** Prof L Morawska; Dr M Jamriska; A/Prof D Birtwhistle

**Title:** **Development and validation of a model predicting charged aerosol characteristics in the proximity to high voltage powerlines**

**2005 :** \$100,000

**2006 :** \$75,000

**2007 :** \$80,000

**Category:** 2499 - OTHER PHYSICAL SCIENCES

**Administering Institution:** Queensland University of Technology

**Summary:**

With over 780,000 km length of High Voltage Power Lines running through different parts of the country, the scientific and socio-economic benefits to Australia and worldwide include: (i) The developed novel semi-empirical model would become an important tool for research on human exposure and health effects in the vicinity of powerlines and vehicle transport routes, and for developing future directions for management and control strategies for transport and land development plans; (ii) The ultimate benefit of this research will be reduction of risks and thus increase in health and well-being of Australians and reduction in health care costs.

**DP0558410** Prof L Morawska; Dr MH Hargreaves; Dr ZD Ristovski; Dr SJ Corbett; Dr GA Smith

**Title:** Mechanisms of virus transport in indoor environments

**2005 :** \$100,994

**2006 :** \$86,000

**2007 :** \$87,324

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** Queensland University of Technology

**Summary:**

The socio-economic benefits to Australia from the project will include the developed and validated model for quantification of virus spread and survival through aerosolization processes, which will become an important tool for: (i) prediction of the pathways of virus spread in indoor environment, and (ii) developing future directions for management and control for prevention or minimization the likelihood of human infections. The ultimate economic benefit of this research will be reduction in health care costs and lost productivity. The research will also place Australia in the forefront of international progress and race towards toward better methods for virus spread prevention.

**DP0557429** Dr PJ O'Shea; Dr Z Hussain; Dr AJ Postula; Dr DR Iskander

**Title:** Efficient signal processing using short word-length techniques

**2005 :** \$73,000

**2006 :** \$61,000

**2007 :** \$63,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** Queensland University of Technology

**Summary:**

It is expected that the research will lead to significant reductions in cost and computational overheads for signal processing systems in general. These cost/speed enhancements have implications for radar, communications, audio, speech, video, aerospace, defence and biomedical engineering. In the last few decades, developments in enhancing the speed of processing signals has been clearly seen to impinge greatly on the lives of all citizens and so positive outcomes from the research can be expected to translate into increased quality of life for the whole country.

**DP0558199** Prof AN Pettitt; Adj/Prof MJ Faddy

**Title:** Bayesian Statistical Inference for Implicitly defined Probability Models

**2005 :** \$123,000

**2006 :** \$113,000

**2007 :** \$112,000

**Category:** 2302 - STATISTICS

**Administering Institution:** Queensland University of Technology

**Summary:**

Bayesian statistics has recently been used to provide solutions for a large number of hitherto intractable problems in science and technology. The success of Bayesian statistics has mainly been due to the application of so-called Markov chain Monte Carlo computational techniques. We aim to improve these algorithms, by providing fast, simple and efficient computational implementations. We will use the results to give insight by carefully quantifying and modelling uncertainty for such topics as the transmission rate of infectious diseases, the spatial distribution of plant and animal species, investigating biological theory for the genome of a virus, and changes in human fertility.

**DP0557387** Prof S Sridharan

**Title:** Enhanced Multilingual Speaker Recognition through the Incorporation of High-Level Features, Late Fusion and Discriminative Classification Methods

**2005 :** \$56,000

**2006 :** \$51,000

**2007 :** \$55,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** Queensland University of Technology

**Summary:**

The development of robust multilingual speaker recognition systems will benefit the community through the elimination of fraud incurred by financial institutions and customers by enabling several person authentication applications such as: voice based signatures and document issuance; credit card verification by voice and secure over-the-phone financial transactions. The technology will also assist in the protection of the community and safeguard Australia by enabling the implementation of the following: suspect identification using voice print; national security measures for combating terrorism by using voice to locate and track terrorists; preemptive criminal activity counter-measures; surveillance and secure building access by voice.

**DP0559791** Dr RN Thwaites; Dr PR Grace

**Title:** Reducing uncertainties in greenhouse gas emissions from sub-tropical land use systems

**2005 :** \$120,000

**2006 :** \$105,000

**2007 :** \$110,000

**Category:** 2799 - OTHER BIOLOGICAL SCIENCES

**Administering Institution:** Queensland University of Technology

**Summary:**

The principle outcome of the research is the identification of sustainable land use management strategies that will ensure the continued productivity and profitability of food and fibre in the Australian sub-tropics and tropics in response to climate change whilst reducing greenhouse gas emissions. Regional communities will benefit through a greater awareness of emission sources and sinks and exposure to viable and practical strategies that promote productivity through regional diversity in land use. Improved data on greenhouse gas accounts will also ensure the Australia community is provided with full and accurate representation in international climate change fora and policy development.

**DP0559750** Prof P Timms; Dr SA Mathews; Dr JM Hogan; Dr F Maire; Dr T Read

**Title:** Kernel methods for the analysis of whole bacterial genomes

**2005 :** \$91,000

**2006 :** \$71,000

**2007 :** \$71,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** Queensland University of Technology

**Summary:**

This project addresses the fundamental scientific problem of the identification of regulatory regions and specific promoters within bacterial genomes, with a focus upon two organisms of great social, economic and bioterrorism significance. From the machine learning perspective, the project will be the first to produce a kernel-based approach directly tailored to the problem of the detection of regulatory regions. The methods developed will be made available through a straightforward web-based interface, allowing biologists throughout the world to utilize the approach as a tool to be applied to a progressively widening class of bacterial genomes, and even to eukaryotes.

**DP0559655** Dr S Tong; Prof DW Connell

**Title:** Toward the effective surveillance of environmental health hazards for a sustainable society

**2005 :** \$110,000

**2006 :** \$98,000

**2007 :** \$100,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** Queensland University of Technology

**Summary:**

It is important to maintain and enhance environmental health and community well-being from a sustainable development perspective. There has been an increasing realisation that an effective surveillance system needs to be developed to identify and manage environmental health hazards. The expected research outcomes of this project provide significant social benefits by contributing to the development of an effective surveillance system of emerging environmental health hazards for a sustainable society. The results of this project will also assist governments to formulate policies, guide actions and assess progress in the direction toward sustainable development.

## The University of Queensland

**DP0556754** Dr T Aoyama

**Title:** From musume (daughters) to shojo (girls): representations of young women in modern Japanese

**2005 :** \$55,000

**2006 :** \$45,000

**2007 :** \$40,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

This will be the first comprehensive study of the transition of young women from musume (daughters) to shōjo (girls) in modern Japanese literature. Intended as a pioneering study of 'girl power literature', it will identify neglected texts and authors, clarify the significant changes in literary representations of young women, and recognise the positive and creative aspects in these representations. With its scope covering historical and contemporary, and popular and serious, the project will enhance Australia's understanding of Japanese literature, culture, and society. It will also be beneficial to studies of women, children, and adolescence in other communities including Australia.

**DP0556342** Prof SK Bhatia; Dr DJ Bernhardt

**Title:** Improved Nanoscale and Molecular Models for Nanostructured Carbons, and their Applications in Simulation of Confined Fluids

**2005 :** \$100,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

This project has a multitude of benefits for Australia, a key one of which is the promotion of cross-disciplinary interaction and collaboration to conduct leading edge research in a technologically important area. In addition the project will utilize two PhD students who will be trained in research, and gain a broad range of skills in this multifaceted project involving theory, simulation and experiment. The research, grounded in molecular fundamentals, will also lead to the development of advanced tools for adsorption process modelling, useful in process design and scale-up, and contribute to Goal 1 of National Priority Area 3: Frontier Technologies for Building and Transforming Australian Industries.

**DP0555879** Dr I Blakey; A/Prof PM Fredericks; Dr CJ Hawker

**Title:** **Synthesis and Characterisation of Encoded Hybrid Polymer/Gold Nanoparticles for Application in**

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2505 - MACROMOLECULAR CHEMISTRY

**Administering Institution:** The University of Queensland

**Summary:**

Bioassays are the cornerstone of in vitro diagnostic and biomedical research. This proposal will significantly contribute to these areas, by targeting an emerging technology that is crucial for their future development. The hybrid nanoparticles described in this project have the potential to replace conventional detection strategies that are currently used for bioassays. In doing so, they should provide significant advantages over conventional detection strategies. These advantages include increased sample throughput and conservation of biological samples, which makes possible the acceleration of patient diagnosis and drug discovery.

**DP0559779** A/Prof MW Blows; Dr KL McGuigan

**Title:** **MULTIVARIATE QUANTITATIVE GENETICS AND THE LEK PARADOX**

**2005 :** \$150,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2702 - GENETICS

APD Dr KL McGuigan

**Administering Institution:** The University of Queensland

**Summary:**

This research program has the potential to change the way evolutionary biologists view how selection changes the available patterns of genetic variance and covariance. In particular, it will highlight the possibility that a lack of genetic variance in multi-trait systems may be an important mechanism that limits the response to selection. It therefore addresses a fundamental problem in quantitative genetics that underlies selection limits in evolution and agriculture.

**DP0557151** Dr FJ Bonner

**Title:** **Television Presenters as Cultural Intermediaries**

**2005 :** \$43,992

**2006 :** \$57,539

**2007 :** \$37,422

**Category:** 4001 - JOURNALISM, COMMUNICATION AND MEDIA

**Administering Institution:** The University of Queensland

**Summary:**

With significant changes in television programming, especially its preoccupation with everyday life through formats such as lifestyle shows and reality TV, it is important that research maintains its understanding of television's social and cultural function. This project will examine what kinds of ethical and social advice are being presented to the public, how this advice is being given and what the context of such advice is. The hypotheses investigated will enable hard data to be inserted into debates about the media's role in society, benefiting the industry itself as well.

**DP0558018** Dr LJ Bryan-Lluka

**Title:** **Determinants of Expression, Assembly and Function of the Noradrenaline Transporter**

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3205 - PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

The noradrenaline transporter protein that is the focus of this project is important for mental health because it belongs to the family of proteins where psychostimulants, such as cocaine, and drugs used in the treatment of depression act. The project will lead to exciting advances in our understanding of how the structure of this protein controls its functions, and potentially to the design of better antidepressant drugs and to the design of drugs to prevent the effects of cocaine.

**DP0558328** Prof RG Carson; A/Prof SP Riek

**Title:** Cortical Mechanisms Mediating Bilateral Interactions Between the Upper Limbs

**2005 :** \$124,000

**2006 :** \$110,000

**2007 :** \$130,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

Each year 40,000 Australians suffer from stroke with many survivors left with problems that limit limb function. With reduced duration of hospital care, the opportunities for retraining in the period immediate following stroke are rapidly diminishing. Effective and efficient strategies of rehabilitation that will maximise the level of recovery following stroke will result in benefits expressed in terms of enhanced quality of life and functional life-span, as well as significantly reduced costs of health care. In understanding the fundamental principles underlying the stability and adaptability of movement coordination, this research is likely to make a significant contribution to the design of programs for rehabilitation of the upper limb.

**DP0557272** Dr M Casey

**Title:** Confronting Representations: Performing Indigenous Protests

**2005 :** \$74,000

**2006 :** \$74,000

**2007 :** \$70,000

**Category:** 4203 - CULTURAL STUDIES

APD Dr M Casey

**Administering Institution:** The University of Queensland

**Summary:**

By using performance studies approaches to analyse public political events this work will provide the practical benefit of increasing our understanding of how different cultures interpret and misinterpret each other in public encounters. Examining the dynamics that have and continue to operate between people and social discourses increases our understanding of ourselves as Australians and our ability to interpret ourselves. A further benefit is that the project develops an innovative methodology for interdisciplinary research drawing from the fields of performance studies, media studies and cultural studies.

**DP0559416** Dr M Cemazar

**Title:** Folding and dynamics of bioengineered cyclic cystine knot proteins

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$70,000

**Category:** 2505 - MACROMOLECULAR CHEMISTRY

APD Dr M Cemazar

**Administering Institution:** The University of Queensland

**Summary:**

This project will increase knowledge of the structure and function of an important family of proteins, namely the conotoxins. Conotoxins are of particular interest in Australia as nearly 300 species of cone snails occur in Australian waters and they represent a rich source of novel peptides for drug discovery. This project will enhance their stability by altering their structures and will have a direct impact on peptide-drug based therapies, resulting in economic and social benefits for Australian society. Additionally, some peptides under study have agricultural significance for crop protection and this too, has the potential to provide significant economic benefits.

**DP0558844** A/Prof SP Collin; Dr AE Trezise; Prof DM Hunt; Prof M Kalloniatis; Prof IC Potter; Dr WL Davies

**Title:** The evolution of dim light vision in vertebrates

**2005 :** \$130,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

High sensitivity (rod-based) vision has been extremely important for the survival and adaptive radiation of many vertebrates, including humans over evolutionary time. This multidisciplinary project will reveal the evolutionary and physiological constraints on early photoreception and the difficulties in operating over an enormous range of lighting conditions. Not only will the findings be crucial for our understanding of basic mechanisms of dim light vision, but also provide potential insights into the physiological bases of various rod dystrophies affecting humans and the improved design of more sensitive cameras and safe light environments for rearing animals in captivity e.g. for aquaculture.

**DP0557990** A/Prof JJ Cooper-White; Dr DI Leavesley; Dr AJ O'Connor; A/Prof KA Landman

**Title:** Mastering the Microenvironment - Integrated, functional, biosynthetic scaffolds for tissue engineering

**2005 :** \$165,000

**2006 :** \$145,000

**2007 :** \$150,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

Organ transplantation is available to only the lucky few, with, for example, less than 3000 of Australia's annual 30,000 patients suffering end-stage renal failure receiving transplants. Tissue engineering of soft, functional tissues using in vitro and/or in vivo methods offers the potential to replace missing or non-functioning tissues, such as liver, pancreas, lung, heart, fat and muscle, with newly created tissue. This project will deliver integrated, functional polymeric scaffolds for organ replacement. Over 12 higher degree candidates and one research associate will be trained in the field of tissue engineering, representing a significant benefit to the Australian scientific community.

**DP0558016** A/Prof JJ Cooper-White; A/Prof MR Davidson; Prof GH McKinley

**Title:** **Micro Process Plants - Non-Newtonian flow and particle synthesis in confined geometries**

**2005 :** \$210,000

**2006 :** \$185,000

**2007 :** \$190,000

**2008 :** \$190,000

**2009 :** \$190,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

Understanding the flow behaviour of well characterised non-Newtonian fluids within microfluidic and nanofluidic devices is of vital importance to development of novel high-value added services, products and devices within Australia's burgeoning biotechnology, environmental technology, communications and information technology industries. The outcomes of this project will provide new 'systematic' design standards for microdevice manufacture for these industries, ultimately leading to the creation of new, exciting avenues for tailoring novel biotechnology and 'point-of-care' products for Australia.

**DP0559217** Dr TH Cribb; Dr I Beveridge; Dr DT Littlewood

**Title:** **Co-divergence or opportunism: the evolution of trematode parasitism in the sea**

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

This proposal is for fundamental research into how a major group of parasites (trematodes) has evolved in interaction with its hosts. The work is mainly the kind of 'basic science' that underpins other science without having intended immediate community benefit. However, the work depends strongly on the important task of developing better knowledge of trematodes in Australian native animals. Some of these parasites are pathogens of bivalves (scallops, giant clams and oysters) but almost nothing is known about them here. Another benefit of the study is in the training of several postgraduate students who will be able to contribute to the further study and management of parasites in Australia.

**DP0558322** Dr MA Crotty

**Title:** **Eternal Vigilance: A History of the Returned Serices League of Australia**

**2005 :** \$45,000

**2006 :** \$25,000

**2007 :** \$30,360

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

The history will provide a better understanding of what has been, throughout most of the twentieth century, an extremely influential and powerful institution with close connections to government, an active and vociferous membership, and the ability to command considerable press attention. Its history, oddly, has been poorly understood. The work will also inform contemporary concerns with 'exclusionary nationalism' and the treatment of minorities in wartime. In light of recent international conflict and the potential for internal social and ethnic conflict, analysis of the discourse and politics of 'loyalism' and their potentially marginalising effects on dissident groups seems especially socially important and relevant.

**DP0557846** Prof PM Cryle

**Title:** **Frigidity in France: the history of a sexual pathology and of its place in feminist critique**

**2005 :** \$88,000

**2006 :** \$75,000

**2007 :** \$74,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

The history of sexuality is an area of research which puts into historical perspective the disorders and abnormalcies which make up so much modern talk about sexuality. It helps to show that many of the supposed sexual problems which are central to modern thinking took shape only recently, and did so in particular circumstances. This is in fact a very active field of international humanities research, and this project will make an Australian-based scholarly contribution to it. A detailed, circumstantial history of frigidity will make it possible to question the 'science' which founds twentieth-century norms for female sexual behaviour. It will also enable the project to make a critical contribution to modern feminist thinking.

**DP0558901** A/Prof BM Degnan; Dr F Simpson; Prof Dr G Worheide; Dr VF Hinman

**Title:** **The making of a sea shell: function and evolution of genes encoding calcareous architectures of phenomenal strength, purity and beauty**

**2005 :** \$130,000  
**2006 :** \$120,000  
**2007 :** \$120,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Queensland

**Summary:**

The mollusc shell is composed of microscopic layers of tabular calcium carbonate crystals and thin sheets of proteins with precise nanoscale architectures. This configuration produces a high-performance composite material that exceeds the present capabilities of human engineering. This integrated study will elucidate the molecular mechanisms controlling the fabrication of these architectures. This knowledge will contribute significantly to the development of materials for advanced electronics and energy transducers, human bone therapeutics and marine-based products such as pearls and cements, through the identification of genes underlying biofabrication networks and the development of in vitro bioproduction systems.

**DP0558585** Dr SM Degnan

**Title:** **Variation in larval gene expression in a marine invertebrate: implications for population divergence via differential settlement response**

**2005 :** \$102,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Queensland

**Summary:**

Evolutionary and ecological functional genomics is an emerging field that integrates gene profiling technologies with experimental and field approaches of ecology and evolution. I take this approach to address a key problem in marine invertebrate biology: how do larvae respond to their environment and how does variation in this response influence the distribution and evolution of a species? I will use a marine gastropod (abalone) model, for which there exists substantial development and population genetic data, and established aquaculture methodologies. Outcomes of this study will enhance knowledge of the stock structure of this and other commercial fisheries, as well as aquaculture efficiency.

**DP0557722** A/Prof AC Doherty; Dr SD Bartlett

**Title:** **Entanglement as resource for quantum technology**

**2005 :** \$100,000  
**2006 :** \$100,000  
**2007 :** \$100,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** The University of Queensland

**Summary:**

This project focuses on groundbreaking research in quantum information theory, an exciting new area of fundamental physics that underpins the development of quantum technologies. Australia has already invested heavily in one particular quantum technology: computation. Our project, if successful, will enable an Australian research effort into other quantum technologies for communication, metrology, data storage and security. This project will assist in elevating Australia to a major international research centre in quantum information theory, complementing its existing strength in experiment, and will provide extensive training of early career researchers.

**DP0557676** Dr MJ Drinkwater; Dr S Phillipps; Dr MD Gregg; Prof PA Thomas

**Title:** **Uncovering the Fossil Record of Galaxy Formation**

**2005 :** \$90,000  
**2006 :** \$75,000  
**2007 :** \$80,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

Our Australian-led team recently used the Anglo-Australian Telescope to discover large numbers of a new type of very small galaxy in the centres of two galaxy clusters. This project will allow us to maintain Australian leadership in this new area of astrophysics research, whilst using leading international facilities.

**DP0558507** Dr PR Ebert; Prof Dr MJ Waters

**Title:** **Genetics of longevity and the delay of post-reproductive senescence**

**2005 :** \$80,000  
**2006 :** \$75,000  
**2007 :** \$75,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Queensland

**Summary:**

Ageing of the population in the coming decades will cause an increasing health care burden. Diseases of ageing such as Alzheimer's, heart disease, Parkinson's and a range of cancers, as well as impairments of ageing such as reduced mobility and cognitive ability are all caused or exacerbated by oxidative stress. With some exceptions, current medical practices focus on surgical repair or drug therapy to alleviate symptoms of ageing rather than addressing the physiological causes of ageing itself. Our project will provide understanding of natural systems that prevent age-related senescence due to oxidative stress. The goal is to identify novel and natural ways to maximise the fitness, well-being and self-sufficiency of people as they age.

**DP0559821** Prof DP Fairlie; Dr PC Sharpe

**Title:** **Chemical Insights to Peptide Helix-Sheet-Nanofibre Equilibria**

**2005 :** \$100,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The University of Queensland

**Summary:**

We live in an ageing community that is experiencing exponential growth in neurological diseases that require full time carers and place significant burdens on our health system. Many such diseases are caused by (apparently) abnormal folding of proteins that aggregate into insoluble materials. The chemistry behind these processes is not sufficiently well understood to know precisely why the diseases are caused and how they might be treated. This project will use new strategies to control peptide folding, provide important new information relevant to understanding such processes/diseases, and teach us how to engineer important new biomaterials that can advance nanotechnology.

**DP0558044** A/Prof C Ferrier; Dr M Dever

**Title:** **Letters between Vance and Nettie Palmer, 1909-1959: The Complete Correspondence.**

**2005 :** \$85,000

**2006 :** \$65,000

**2007 :** \$70,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

Nettie and Vance Palmer were two highly influential national figures, of considerable significance in literary and cultural circles especially in the inter-war period. This project, the preparation of Collected Letters, will considerably extend knowledge of their public contribution to cultural production in Australia and also of their private lives. It will provide a vital reference tool for historians, literary critics, biographers and scholars as well as be entertaining and compelling for the general reader. As a highly innovative example of the genre of the edited letter, in retrieving these writings of two gifted individuals, Australia's cultural heritage will be enriched.

**DP0557024** Dr M Fine; Dr S Ward; Dr SG Dove; Prof M Kuehl

**Title:** **MICROENDOLITHS, CORAL BLEACHING AND ENVIRONMENTAL CHANGE**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Queensland

**Summary:**

Planning for sustainable use of ecosystems like the Great Barrier Reef (GBR) can only be done with an accurate understanding of how ecosystems are likely to change, and at what rate, under persistent climate change. This project, aligned with National Research Priority 'An Environmentally Sustainable Australia', will be performed over 3 oceans and focusing on the GBR, will contribute to the national benefit by rapidly improving our understanding on one such major factor-the endolithic community in coral skeletons. It will allow better predictions of short and long-term consequences to reefs, and will also continue to show Australia's leadership in understanding the rate and direction of changes within coral reef ecosystems.

**DP0555961** A/Prof RA Fotheringham

**Title:** **Australian Stage Comedians 1915-1930: Configuring a Comic National Identity**

**2005 :** \$25,000

**2006 :** \$42,000

**2007 :** \$31,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

This project aims to make a major contribution to Australian cultural history by examining the origins of what has often been described as the distinctive Australian sense of humour.

While elements of this national characteristic emerged in colonial times, including an emphasis on stoicism, self-deprecation and the contradictions of existence (e.g. in Steele Rudd's and Henry Lawson's stories), this project will increase community awareness of how stage comedians during and after the First World War focused these tendencies into a distinctive emphasis on the comedy of everyday experience, and on maintaining a tough-minded optimism in adversity.

**DP0558868** A/Prof CE Franklin; Dr F Seebacher

**Title:** **Physiological Thermoregulation and Cardiovascular Function in Reptiles**

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2706 - PHYSIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

This project will be important in advancing the concept of physiological thermoregulation in reptiles from a descriptive to a mechanistic basis, thereby providing a better conceptual framework within which the evolutionary processes and selection pressures acting on modern animals and their ancestors can be evaluated. Benefits of conducting this research will include: maintaining the high international profile of Australian comparative physiology; the training of post-graduate students, both Honours and Ph.D.s; stimulating collaboration between two of Australia's research intensive universities (Sydney and Queensland); and show-casing Australia's impressive reptilian fauna.

**DP0557466** Prof MJ Gidley; Dr T Howes; Dr BR Bhandari

**Title:** **Self-assembly of gelling biopolymer particles**

**2005 :** \$80,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2901 - INDUSTRIAL BIOTECHNOLOGY AND FOOD SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

Biopolymers provide a renewable source of structuring agents for a variety of potential uses in food, pharmaceutical and other applications that require bio-compatibility. Swollen biopolymer particles of sub-millimetre size are particularly useful as they combine macroscopic structure formation with an ability to flow and a desirable soft solid texture. Two limitations to the current utilisation of biopolymer particles are that they either cannot be predictably produced direct from a dried form, or if they are (e.g. cooked starch granules), there is a lack of scientific understanding that limits use of natural sources without subsequent chemical modification. This project will provide the science & technology to overcome these limitations.

**DP0558067** Prof MJ Gidley; Dr GA Dykes

**Title:** **Cellulose-based composites as models for primary plant cell walls of cereals and grasses**

**2005 :** \$85,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2704 - BOTANY

**Administering Institution:** The University of Queensland

**Summary:**

Cereals and grasses are the lynchpins of the Australian Agri-Food industry. Cell walls provide shape, form and barrier properties to the plant and are the basis for both post-harvest mechanical properties and direct nutritional benefits. There is as yet no validated model for the molecular assembly, architecture and mechanical behaviour of cereal/grass cell walls. This project aims to derive such a model, so that predictions can be made concerning the effects of tailoring either plant composition (e.g. at the gene level) or post-harvest treatment in order to achieve desired plant or food properties. The findings will also be relevant to understanding how individual features of cell walls affect digestibility and nutritional properties.

**DP0556119** A/Prof RM Gillies; Dr AF Ashman

**Title:** **Effects of training teachers in communication skills during cooperative learning on classroom discourse, social inclusion, and learning among middle-year students.**

**2005 :** \$76,000

**2006 :** \$70,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

Helping children work together, communicate effectively, and think constructively are critically important if children are to engage in learning, develop self-efficacy as learners, and respect for the unique contributions of others to their learning experiences. Teachers play a key role in creating learning environments that are conducive to learning, responsive to children's needs, and supportive of their endeavours. This project will help teachers enhance children's strategic and metacognitive thinking and learning through the promotion of interactions and relationships that are inclusive of all children regardless of their diverse learning needs and social and ethnic identities.

**DP0558854** Dr G Governatori; A/Prof RM Colomb; Dr S Sadiq

**Title:** **A Formal Approach to Resource Allocation in Service Oriented Marketplaces**

**2005 :** \$96,000

**2006 :** \$81,000

**2007 :** \$85,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** The University of Queensland

**Summary:**

There was a strong opinion at the 2004 World Economic Forum that interorganisational computing was a major factor in productivity improvements underpinning continuing economic growth in the developed world, and will continue to be so for the foreseeable future. The results of the proposed research are directed to advanced systems of this type, and will add momentum to Australia's Information Technology research community. Increased international recognition will positively impact on future interactions with the service composition research groups in Europe and the USA.

**DP0559034** Prof SF Gray; Dr M Zhong

**Title:** **Australian Costs of Equity**

**2005 :** \$75,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** The University of Queensland

**Summary:**

The goal of this project is to identify the most appropriate framework and estimation methodology for estimating the cost of equity capital for Australian firms. The outcome of the project will be the identification of precise costs of equity of all industries and exchange-listed companies in Australia. Our final product will not only attain high academic value by providing comprehensive examination of all popular asset pricing models, but will also serve as a comprehensive benchmarking tool for all investment decisions (both corporate and government) in Australia. This will bring about economic efficiency and benefits to the business community via more accurate valuation of assets and more appropriate evaluation of potential new projects.

**DP0558376** Dr AB Griffiths

**Title:** **Institutional Governance Systems and Sustainability: The Transformation of Resource Industries in the United States and Australia 1974-2004**

**2005 :** \$55,000

**2006 :** \$55,000

**2007 :** \$25,000

**Category:** 3502 - BUSINESS AND MANAGEMENT

**Administering Institution:** The University of Queensland

**Summary:**

Variations in industry performance within and across nations has resulted in renewed interest in the institutional governance systems that generate national competitive advantage and innovation. There has also been an increased focus on the impact of sustainability and environmental costs on corporations. The significance of this project to the nation and the community is that it develops an understanding of the role played by industry institutions in transforming corporate and industry approaches to sustainability. This study will show how industries and corporations respond to sustainability over time and the impact of these changes on major stakeholders (communities; shareholders; employees).

**DP0557475** Dr L Grondahl; Dr GA Lawrie; Dr DJ Martin

**Title:** **Graded Biomaterial for Articular Cartilage Replacement**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

Osteoarthritis is a major health and economical burden on the Australian community which can be addressed in part by providing a viable option for effective clinical treatment. 34% of people over the age of 50 suffer from osteoarthritis, predominantly the knee. The development of a biomaterial to enable repair of articular cartilage through minor surgical procedures will release resources at point of care. Current biomaterial options are still in infancy and an Australian based product would benefit the Australian economy as well as Australia's international standing within the biomaterials community.

**DP0557058** Dr AS Grutter; A/Prof SC Barker; Prof AD Russell; Em/Prof RJ Lester; Dr NJ Smit

**Title:** Do cleaner-fish control infections of parasitic protozoa transmitted by gnathiid isopods and leeches?

**2005 :** \$150,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Queensland

**Summary:**

We will study a popular example of mutualism, cleaning behaviour, from a different point of view: that cleaner-fish control the parasitic protozoa of the blood of client-fish by eating their vectors. This will provide information on the biological control of vector-borne parasites and develop mathematical models that will help us understand the epidemiology of vector-borne parasites in the sea. Our study will provide baseline data of a parasitic disease in a wild population, information useful for managing and monitoring the health of coral reefs. With the increased aquaculture of tropical fish species in Australia, this study will benefit the fish-farming industry by providing information on the biological control of fish parasites.

**DP0556169** Dr Q Guo

**Title:** Nanoporous Epoxy Thermosets via Microphase Separation of Block Copolymers

**2005 :** \$85,000

**2006 :** \$78,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

This project has many expected outcomes and benefits to Australia: (1) Development of the first technology to produce nanoporous epoxy thermosets (i.e. epoxy nanofoams) that may have many applications in microelectronics, optical waveguides and biological separations; (2) Providing impetus for an advanced materials synthesis and manufacturing industry for Australia and contributing to the Frontier Technologies National Research Priority-Advanced Materials Priority Goals; (3) The development of new niche markets with these new materials and the new technologies, which is an excellent vehicle for Australia to move to a high-value added industrial portfolio that maximises return and promotes job growth.

**DP0556547** Dr BD Hankamer; Dr TP Garrett; Dr RP McGeary

**Title:** Structural analysis of membrane proteins using template-mediated crystallization

**2005 :** \$150,000

**2006 :** \$130,000

**2007 :** \$100,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

A new frontier technology will be developed in the form of a systematic crystallization pipeline for membrane proteins. This high throughput monolayer template technology is particularly suited for the structure determination of proteins that are otherwise difficult to crystallize and has clear commercial potential. Membrane protein structures are themselves of value to the biotechnology and pharmaceutical industry for targeted drug design, which could realise benefits in the form of novel medical treatments and reduced side effects. The monolayer template technology will also extend the capabilities of the National Cryo-EM facility, the infrastructure of which, is open for all Australian researchers.

**DP0558681** Dr NS Hart; A/Prof JN Marshall

**Title:** Aquatic eye design: sharks and rays as models of underwater colour and luminance vision.

**2005 :** \$110,000

**2006 :** \$110,000

**2007 :** \$110,000

**2008 :** \$110,000

**2009 :** \$110,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

QEII Dr NS Hart

**Administering Institution:** The University of Queensland

**Summary:**

Sharks are usually assumed to be colour blind. We have discovered that they may in fact see colour very well and that the eyes of different species are adapted to their particular lifestyles. Our research will help to raise the profile of sharks and portray them as animals with advanced sensory systems and complex visual behaviours rather than just dangerous killing machines. Studying the vision of sharks may also help to reduce the number (currently >50,000) that are killed each year as bycatch by Australian long-line fisheries and make a valuable contribution to one of Australia's National Research Priorities (an Environmentally Sustainable Australia) for managing and conserving our biodiversity.

**DP0558408** Prof IJ Hayes; Dr GP Smith

**Title:** Analysing and Generating Fault-Tolerant Real-Time Systems

**2005 :** \$142,000

**2006 :** \$80,000

**2007 :** \$81,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** The University of Queensland

**Summary:**

Safety-critical real-time systems are being deployed increasingly in diverse areas such as controlling critical infrastructure like transportation (e.g., railway signalling) as well as in defence applications (e.g., fly-by-wire). Such systems must be dependable and hence must be built using fault-tolerant strategies.

This project is researching frontier ICT technologies for analysing, designing and generating fault-tolerant systems, concentrating on their software control components.

**DP0559784** Prof PC Hayes

**Title:** **Step Change Technologies in Ironmaking - Slag Compositions for Use in the New Low Energy Blast Furnace Practice.**

**2005 :** \$85,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2913 - METALLURGY

**Administering Institution:** The University of Queensland

**Summary:**

The world's current iron and steelmaking production capacity is over 200 million tonnes annually; this is set to rapidly rise with the increasing production in China and in India. Australia is a major exporter and supplier of iron ores and coal and coke to the South East Asian region. It is in Australia's National interest to encourage improvements in these technologies not only to increase export income but also to contribute to improved environmental performance. The proposed project will assist in the development of a modified iron blast furnace, and in so doing substantially reduce the energy consumption and CO2 emissions from the process.

**DP0557471** Dr NK Hayward; Dr GF Kay

**Title:** **The function of menin in mammalian development**

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Queensland

**Summary:**

This project aims to determine the role of a ubiquitous transcriptional co-regulator, menin, in mammalian development. Mice that lack menin through targeted deletion of the gene die during embryogenesis, but the cause is unknown, although is likely to be due to the abnormal expression of genes usually regulated by this factor. We will determine which genes are inappropriately expressed and responsible for the accompanying developmental defects. This knowledge will help us understand the process of development in mammals, including birth defects in humans.

**DP0556707** Dr B Heras; Dr HJ Schirra; A/Prof JC Bardwell; Prof Dr LC Thony-Meyer

**Title:** **Disulfide Bonds and Protein Folding**

**2005 :** \$80,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2799 - OTHER BIOLOGICAL SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

This work will advance our understanding of protein folding, which has important implications in biotechnology, impacting on commercial production of recombinant proteins (for pharmaceutical and biomedical applications) and on 1000s of research laboratories worldwide that use recombinant technologies. This research could also contribute to medicine (new treatments for diseases of protein misfolding like Alzheimer's), and to membrane protein structural biology. This work could yield economic benefits in the long-term through patentable outcomes and will benefit the community by producing high impact research papers, providing training to Australians and forging links with renowned international scientists.

**DP0559002** A/Prof J Indulska; Dr MF Brereton; Prof SM Kaplan

**Title:** **Human interaction with context-aware computing systems**

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** The University of Queensland

**Summary:**

Context-aware systems can provide seamless support of IT applications in a variety of technologies and therefore can improve: (i) work performance and adoption of IT in many industries; and (ii) the quality of life through better support for health services, education, and everyday tasks. Currently proposed solutions for context-aware systems fail to deliver systems which are usable for non-IT professionals. The proposed project will show how to design context-aware systems that are usable and whose autonomic decisions can be trusted. Additional benefits include increased scientific competitiveness of Australia, strengthened collaboration with international research institutions, and high quality graduates (PhDs, Masters, Honours).

DP0559894 Dr E Jak

**Title:** The Physicochemical Properties of Complex Silicate Melts - Application of a New Quasichemical Model to Surface Tension Prediction

2005 : \$60,000  
2006 : \$58,000  
2007 : \$60,000

**Category:** 2913 - METALLURGY

**Administering Institution:** The University of Queensland

**Summary:**

Most chemical reactions occur at surfaces or interfaces. The contact area and ease in which fluids spread or cover surfaces depends critically on the surface tension or surface energy of the fluid. In the processing of metals and advanced ceramic materials the behaviour of molten oxides can greatly influence the rates of reactions, the quality of the interfaces between phases and therefore mechanical and other key properties of advanced materials produced. This project provides a means of predicting the surface tensions of molten oxides, making it possible to design, control and improve metal and material manufacturing processes.

DP0556748 Dr BS Kamber; Em/Prof SR Taylor; Dr AW Bevan

**Title:** From dust to planets: New initiatives to refine models of the inner Solar System's earliest history

2005 : \$60,000  
2006 : \$20,000  
2007 : \$40,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

This project will help continue the proud tradition of Australia as an international leader in mass spectrometric analyses and cosmochemistry. The questions surrounding the origin and significance of terrestrial planets are closely related to our very presence: "Are we alone"? Research into meteorites is one of the few areas of science that truly captures the imagination of the general public. This project, through its integration with the WA Museum, gives the public a possibility to share in this experience.

DP0559710 A/Prof B Kobe; Dr BJ Carroll; Dr TG Lonhienne

**Title:** Functional and structural characterisation of Defective embryo and meristems (Dem) proteins involved in plant development.

2005 : \$100,000  
2006 : \$80,000  
2007 : \$80,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

The proposed research will lead to advances in understanding the regulation of plant development, a process impacting on agriculture, environmental management and human health, areas designated as national research priorities. This understanding is required for modifying plant growth and architecture to fit particular environments, for example generating plants with more extensive and deeper roots to mine the soil moisture and nutrients to enhance crop productivity in Australia, and maintaining the competitive advantage of Australian agriculture in view of the range of environmental conditions encountered in this country. The project will also contribute to the health of the Australian population through consumable plants in the diet.

DP0556631 Dr DP Kroese; Dr JM Keith

**Title:** Cross-Entropy Methods in Complex Biological Systems

2005 : \$82,000  
2006 : \$81,141  
2007 : \$81,000

**Category:** 2302 - STATISTICS

**Administering Institution:** The University of Queensland

**Summary:**

The Cross-Entropy method provides a powerful new way to find superior solutions to complicated optimisation problems in biology, ranging from better design and implementation of medical treatments to an increased understanding of complex ecosystems.

DP0558957 Dr DP Kroese

**Title:** Rare Event Simulation with Heavy Tails

2005 : \$50,000  
2006 : \$50,000  
2007 : \$50,000

**Category:** 2302 - STATISTICS

**Administering Institution:** The University of Queensland

**Summary:**

The project provides a rigorous way to enhance our understanding of the mechanisms that bring about catastrophic rare events such as urban flooding, electricity shortages and financial bankruptcy. Australia is at the forefront of exciting recent developments in rare event simulation. The advancement of the knowledge in this area will generate a competitive advantage for various sections of the Australian industry, including the areas of industrial reliability, finance and insurance, where accurate simulation techniques are becoming increasingly important.

**DP0556447** Prof C Lee; Dr NA Pachana

**Title:** **Resilience and coping: Predicting positive well-being following life transitions and major life events among young Australian women**

**2005 :** \$115,000

**2006 :** \$100,000

**2007 :** \$105,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

The project addresses a major issue for the well-being of Australians. It examines positive well-being and resilience, which provides an important complement to other work on diagnosed mental illness. Mental health problems are a major problem in Australia, contributing to unemployment, family problems, and risky life choices. By identifying people who maintain good psychological health despite life stress, it can help in prevention and early intervention. It focuses on the important years of early adulthood, when people are dealing with new relationships, employment, and family formation. Its focus on women reflects the fact that women and men experience different life courses, often diverging markedly when the first child arrives.

**DP0559719** Ms CJ Lentfer

**Title:** **Palaeoenvironmental change, resource exploitation and land use relating to a 72,000 year cultural sequence at Liang Bua, Flores, Indonesia.**

**2005 :** \$192,494

**2006 :** \$137,494

**2007 :** \$121,494

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY  
APD Ms CJ Lentfer

**Administering Institution:** The University of Queensland

**Summary:**

This project, involving international collaborative links between Australian universities and Indonesian universities and institutions, is at the cutting edge of palaeoenvironmental research and will provide valuable training as well as information which will be of great benefit to other researchers in the region. Being focused on prehistoric patterns of resource exploitation, land use and management issues, it is relevant to current important issues about the environment, human impact and sustainability, and will help promote awareness of these issues in the Australian and Indonesian communities.

**DP0557949** Dr JR Links

**Title:** **Integrable quantum systems: mathematical foundations for developing quantum science**

**2005 :** \$91,000

**2006 :** \$91,000

**2007 :** \$91,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Queensland

**Summary:**

Quantum science is an exciting and challenging area, one which will underpin the development of the next generation of computers and novel devices such as atom lasers. New mathematical techniques are being pursued, to formulate the frameworks that will provide deep insights into the complex nature of the physical principles governing this field, in order to fully realise the potential applications. This project will enhance the scale of an established and internationally competitive program in mathematics research, producing new approaches to meet these demands. It will also provide opportunities for research training, important in ensuring that Australia is well equipped to play a leading role in future quantum science developments.

**DP0559868** A/Prof OV Lipp

**Title:** **Stimulus fear-relevance: Exploring the boundaries of preferential attentional processing**

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

The present project will contribute to our knowledge about the manner in which emotionally salient events are processed. It will test predictions from a current, influential theory of anxiety and in doing so, inform our understanding of information processing in psychopathology. Investigation of these basic questions can have implications for the design of therapeutic interventions. Moreover, the present project will provide the opportunity for research training for undergraduate and post graduate students. In doing so, it will enhance the quality of our culture and contribute to the discipline of psychology.

**DP0559563** Prof JD Litster; Prof ET White; Prof AM Lenhoff; Prof NJ Wagner

**Title:** **Controlled Crystallisation of Bioactives**

**2005 :** \$150,000

**2006 :** \$98,000

**2007 :** \$100,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

The new technologies developed in this project for bioactive recovery and particle design will allow the development of new value added products for Australia's growing biotechnology industry, especially in pharmaceuticals, nutraceuticals and functional foods. Two PhD students will receive excellent research training to then move into research and development in these industries.

**DP0559594** Prof GM Lu; A/Prof HM Cooper; Dr Z Xu

**Title:** **TAILORING OF LAYERED DOUBLE HYDROXIDE NANOPARTICLES FOR EFFECTIVE DELIVERY OF BIOLOGICALLY ACTIVE PEPTIDES AND cDNAs**

**2005 :** \$200,000

**2006 :** \$145,000

**2007 :** \$150,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

APD Dr Z Xu

**Administering Institution:** The University of Queensland

**Summary:**

This project will lead to a new class of nanoparticle for effective peptide and DNA transfer, promising efficient drug delivery system with controllable loading and releasing and thus help maintain good health, particularly targeting neurological diseases. This project has also involved fundamental research into the nanomaterial science, surface chemistry, cell biochemistry and neuron sciences. Successful completion of the project will contribute to the development of advanced materials helping Australia advance and build the industrial competitiveness. Through this project highly skilled researchers will be well trained.

**DP0558668** A/Prof JN Marshall; Prof DI Vaney; Dr M Vorobyev

**Title:** **Colour vision and photoreceptors in reef fish: a model system to discover the function of double cones**

**2005 :** \$250,000

**2006 :** \$220,000

**2007 :** \$220,000

**2008 :** \$220,000

**2009 :** \$220,000

**Category:** 2705 - ZOOLOGY

APF A/Prof JN Marshall

**Administering Institution:** The University of Queensland

**Summary:**

Humans are visual animals and as lucky Australians we love to look at The Great Barrier Reef. This project, while rooted in the complexities of visual neurobiology, uses a recently discovered set of 4 different reef fish from the GBR to teach us more about fundamental principles in vision. These fish, diverse as damselfish and snappers, will help solve a mystery centuries old. Double cones are the commonest daytime photoreceptor in the eyes of almost all vertebrates (humans without them are exceptions) and yet nobody knows what they do. Reef fish have them, so let's ask them what they see!

**DP0559227** A/Prof R Martin; Dr CJ Jackson; Dr NL Jimmieson

**Title:** **Leaders as motivators: A test of an integrated theory of leadership and motivation to predict employees' psychological health and productivity.**

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

The effectiveness of organisations depends upon the quality of its leaders. While research shows that certain leader behaviours can enhance psychological health (increase job satisfaction, reduce stress) and productivity, it is not clear why this occurs. This proposal addresses this shortcoming by developing a model of leadership that places motivation as a core process between the leader's behaviour and outcomes. The model is tested across new innovative research designs, including a study that tests an intervention to improve leadership effectiveness. The research will increase the understanding of workplace leadership and provide practical ways to improve employees' psychological health and productivity.

**DP0557773** Dr M Maynard

**Title:** **Through the Lens: A Cultural Study of Women's Fashion Photography in Australia, 1890 to 2000**

**2005 :** \$48,000

**2006 :** \$45,000

**2007 :** \$30,360

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

This study supports growing academic interests in Australian fashion and provides the nascent fashion industry, and the media, with a cultural and historical context for their current practices. It sets up debate and expands available information about local fashion photography, challenging the assumption that it is solely dependent on overseas ideas and practices. It has the further potential to export understandings of Australian fashion and its photographic representation, including its creative and aesthetic aspects, and by implication will assist the fashion industry, and the public, develop understanding of its workings.

**DP0557532** Prof RH McKenzie; Dr BJ Powell; Dr MR Pederson; Dr JB Marston; Dr R Coldea; Dr D McMorrow; Dr F Pratt

**Title:** Quantum states of matter: from spin liquids to superconductors

**2005 :** \$150,000

**2006 :** \$120,000

**2007 :** \$135,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

APD Dr BJ Powell

**Administering Institution:** The University of Queensland

**Summary:**

Condensed matter physics has produced the technologies and materials that fuelled the digital and communications revolution. The scientific importance of condensed matter physics is indicated by the fact that ten Nobel prizes have been awarded for work in this field since 1990. This proposal brings together world leading chemists, experimental physicists and theoretical physicists from Australia, USA and UK to work on highly interdisciplinary projects designed to discover how quantum mechanics leads to the novel properties of chemically complex materials. Such materials will be of central importance to the technologies of the future such as computer memories and the superconducting magnets in hospital MRI machines.

**DP0559215** Dr P Meredith; Dr BJ Powell; Dr AP Micolich; Dr RE Giedd

**Title:** Ion Implanted Polymers as New Plastic Electronic and Superconducting Materials

**2005 :** \$125,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Queensland

**Summary:**

A current focus of the electronics industry is developing electronic circuitry and devices on plastic. Such 'soft electronics' offer significant benefits over conventional 'hard' electronics including low cost large-scale production, mechanical flexibility and chemical versatility. We recently discovered that plastic electronic and superconducting materials could be created using a process called ion implantation. This project aims to develop these new materials for potential applications including plastic superconducting electronics, low-cost lightweight plastic circuitry for use with other organic/inorganic electronic materials and electrodes for interfacing with biological systems to create biosensors and biomolecular electronics.

**DP0556890** A/Prof CR Moore

**Title:** The Underdevelopment of Malaita Province and its Relevance to the Current Crisis in the Solomon

**2005 :** \$76,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The University of Queensland

**Summary:**

Australia's rationale for the 2003 intervention in Solomon Islands was to stop this 'failed state' becoming a haven for crime, terrorism, and drug and gun running. Australia has committed an estimated \$A40 to \$A45 million per year for the rehabilitation of the Solomon Islands over the next decade. Malaitans, one of the two sides in a civil war, are the largest, most influential island group in the nation, but have not received development infrastructure commensurate with their level of importance. Developing a more nuanced and culturally and historically grounded understanding of Malaita will aid the national reconstruction process, and serve as a template for handling similar problems in the Pacific Islands in the future.

**DP0556205** Dr JF Mueller; Dr PV Ridd

**Title:** Development of a biosensor/bioassay for measuring nutrient pollution

**2005 :** \$80,000

**2006 :** \$38,000

**2007 :** \$30,000

**Category:** 2999 - OTHER ENGINEERING AND TECHNOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

Input of nutrients to water bodies is associated with a deterioration of ecological health. Uncertainty remains about the effect of nutrients on the Great Barrier Reef as monitoring in remote locations remains difficult, expensive and rather sporadic. Here we aim to develop a sensitive and continuous monitoring technique. The availability of such a technique will allow more appropriate monitoring of nutrient inputs. This will facilitate appropriate application of nutrients, in the form of agricultural fertilizer and sustainable land management practices in order to minimize the risk of nutrients to the environment and humans.

DP0557638 Dr JF Mueller; Dr C Gaus

**Title:** The role of bush fires in the formation and fate of dioxin like chemicals in Australia

2005 : \$70,000

2006 : \$68,000

2007 : \$40,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

A global (POPs) treaty signed by more than 100 nations targets the reduction and elimination of dioxins, which are persistent, bioaccumulative and highly toxic to humans. Bushfires have been suggested as the major source of dioxins in Australia. Experimental data indicate bushfires may not represent the actual sources of dioxin. Our aim is to experimentally establish the levels of dioxins formed and re-emitted from bushfires in Australia. The results will assist to make informed decisions that lead to effective action for reducing dioxin contamination in Australia, fulfilling the treaty requirements and protecting the population and environment.

DP0559414 Dr TA Nieminen; A/Prof NR Heckenberg

**Title:** Optically-driven micromachines and microtools

2005 : \$195,000

2006 : \$135,000

2007 : \$115,000

2008 : \$115,000

2009 : \$115,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

QEII Dr TA Nieminen

**Administering Institution:** The University of Queensland

**Summary:**

The use of optical forces to trap and manipulate microscopic particles has developed from a novelty into a widely used versatile research tool - optical tweezers. New advances, such as the application and optical measurement of optical torque, have been brought to the brink of practical application. We will apply these methods to the development and production of micromachines of unprecedentedly small size, and the development of new medical diagnostic techniques, and industrial and research tools.

DP0557987 Prof SL O'Neill; Dr E McGraw; Dr I Iturbe-Ormaetxe; Dr JC Brownlie; Dr M Riegler; A/Prof MS Hunter

**Title:** A comparative genomics approach to understanding host-endosymbiont interactions

2005 : \$120,000

2006 : \$110,000

2007 : \$110,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Queensland

**Summary:**

Australia's unique ecosystems are vulnerable to invasion by exotic pests that threaten agriculture and human health. The bacterial symbiont Wolbachia is found in many major pests of agricultural and medical importance. Our results will give insights into how Wolbachia spreads into host populations and improve its use as a tool to impair insect transmission of disease, e.g. as an agent to carry genes into an insect population that limit disease transmission. Our results will also make fundamental contributions to understanding host-parasite evolution, host-parasite communication, and insect developmental processes, and will be of interest to a large international community of researchers in this field.

DP0558879 Prof ME Orlowska; Dr X Li

**Title:** Mining Distributed, High-Speed, Time-Variant Data Streams

2005 : \$158,000

2006 : \$153,000

2007 : \$152,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** The University of Queensland

**Summary:**

With the high-speed and large volume of data generation, the data mining research community is facing an unprecedented challenge to provide instant data mining outcomes for prompt usage. Getting access to derived information from multiple, dynamically changing data is vital for many business, science and security services. Extended networks of sensors and other devices assist many environments with data collection that should be correlated and processed towards discovery of dependencies, regularities and patterns. Data mining tools, especially of this new generation, are capable of dealing with data streams, and they offer great benefits for users from many industry sectors; defence, health management, security, commerce and science.

DP0559056 Dr P Pecenko

**Title:** Recently discovered rare manuscripts of mediaeval Pali subcommentaries: a missing link in Buddhist textual transmission

2005 : \$33,000

2006 : \$20,000

2007 : \$20,000

**Category:** 4402 - RELIGION AND RELIGIOUS TRADITIONS

**Administering Institution:** The University of Queensland

**Summary:**

The project will "enhance Australia's capacity to interpret and engage with its regional environment through a greater understanding of languages, societies and cultures" (Research priority 4: Understanding our region and the world); it will deepen our understanding of religious and cultural traditions of many Buddhist countries, which constitute a substantial part of Australia's regional environment, and advance our knowledge of Buddhism, the fastest growing religion in Australia. Since this is the first project of its kind in the field of Pali studies, it will increase the international prestige of Australian research capability and open new possibilities for international cooperation in the field.

**DP0557390** Dr P Poronnik; Prof S Kumar

**Title:** Functional ubiquitination of neuronal voltage-gated sodium channels

**2005 :** \$140,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

Alterations in the electrical properties of excitable cells occur during tissue injury and regeneration as well as many disease states. Preventing or controlling these changes is a key strategic therapeutic aim. It is, however, only through a comprehensive understanding of the molecular mechanisms that regulate cellular excitability that we can identify these therapeutic targets. The major outcome of this project will be a thorough characterisation of a novel pathway that is potentially crucial in the development, homeostasis and regeneration of the nervous system. Disruption of normal function of this system may underlie the hyperexcitability observed in many neurodegenerative conditions.

**DP0557606** Prof DP Rao; Dr AN Rambaldi; Dr HE Doran

**Title:** Consistent Space-Time Comparisons of Real Income

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$75,000

**Category:** 3404 - ECONOMETRICS

**Administering Institution:** The University of Queensland

**Summary:**

The project will result in internationally comparable macroeconomic data, spanning all years since 1950 and covering in excess of 120 countries. The Australian government, private sector and academic researchers will find from this project a wealth of economic information on Australia, its geographical neighbours and trading partners which can be used in assessing Australia's economic performance and role in a global context. Results from this project will provide international organisations, multinationals and researchers with a much improved data set, to those currently available, thus enhancing the reputation of the research team, the University of Queensland and Australia.

**DP0559699** Prof MR Sanders

**Title:** Examining the work-family interface: The impact of a worksite parenting intervention on family and occupational outcomes and objective performance measures.

**2005 :** \$65,000

**2006 :** \$52,000

**2007 :** \$45,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

This study will contribute to strengthening the evidence-base for work-family balance policies and practices. There have been few controlled studies examining the effects of workplace interventions targeting working parents. The study will increase our knowledge of the relationship between work-family conflict and occupational functioning. It will enable conclusions to be drawn about the efficacy of a specific strategy to enhance working parents ability to manage their respective work and family roles in a cost effective manner. Such evidence will usefully inform both the scientific literature on the effects of work-family balance issues and policy development in the area.

**DP0559504** Prof PM Sanderson; Dr MO Watson; Prof WJ Russell

**Title:** Designing for visual and auditory attention in complex high-tempo worlds

**2005 :** \$183,000

**2006 :** \$173,000

**2007 :** \$172,000

**Category:** 2801 - INFORMATION SYSTEMS

APD Dr MO Watson

**Administering Institution:** The University of Queensland

**Summary:**

This research addresses the national priority of developing frontier technologies through smart information use. Advanced display technologies are positioned for rapid uptake in many sectors of the economy but are not fully tested. Results of our research will generalise to manufacturing, defence, aviation, and medicine. Given the focus on anaesthesia in this proposal, our research may help to make anaesthesia safer for patients and easier for anaesthetists to administer. With this research, an Australian group will enhance its international lead in the area of innovative interfaces for safety critical applications. The proposed research should lead to further inventions that have the potential to benefit Australian industry.

**DP0559004** Prof G Schaffer; Dr TB Sercombe

**Title:** **Rapid Manufacturing of Aluminium**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

The project has both national and international significance and addresses the National Research Priority: Frontier Technologies - Advanced Materials (light alloys). Rapid manufacturing produces functional parts directly from a computer solid model using a layer wise rapid prototyping device. Rapid manufacturing is particularly important in the Australian context where small production runs means that tooling and inventory costs are a much larger proportion of the total cost than in North American, European or Asian countries. With a large installed machine base, a substantial automotive and automotive component industry and a major aluminium industry, this project can assist in the further development of these industries.

**DP0557615** Dr MA Schembri

**Title:** **Autotransporter proteins of Escherichia coli**

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

Autotransporters are a novel class of proteins associated with bacterial virulence properties such as adhesion, invasion and biofilm formation. Despite this, limited information is available on their functional role. The aim of this project is to characterize several of the autotransporter proteins from pathogenic E. coli. The likely contribution of these proteins to infection suggests that they are potential targets for strain attenuation and vaccine strain construction. Many of these proteins also mediate bacterial aggregation and are therefore targets for novel drugs that inhibit this process. The project will be carried out with a high profile partner from Denmark and will provide opportunity for travel and technology development.

**DP0558652** Dr G Schenk; Dr NE Dixon; Dr MJ Riley; A/Prof LR Gahan; Prof GR Hanson; Dr LW Guddat

**Title:** **An Integrated Approach Towards Development of Highly Specific Chemotherapeutics**

**2005 :** \$160,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The University of Queensland

**Summary:**

Many diseases are caused or can be treated by modifying the activities of particular enzymes. Molecules that affect enzymatic activities have potential as therapeutic agents. A successful approach to the discovery of new drug molecules is to design them based on very detailed knowledge of how the target enzyme works. In this project, a highly motivated team of scientists will use state of the art instruments and their combined creativity to understand the intimate details of how one large group of enzymes work. The enzymes selected are the bimetallic hydrolases, many of which are associated with disorders including osteoporosis, mental illnesses, cystic fibrosis and various types of cancer.

**DP0557010** Dr S Schmidt; Prof D Rentsch; Asst Prof M Tegeger

**Title:** **Feasting on protein? Strategies of organic nitrogen acquisition by plant roots**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2704 - BOTANY

**Administering Institution:** The University of Queensland

**Summary:**

Crops require large amounts of nitrogen for growth. Application of nitrogen fertiliser enhances yield, but causes off-site nitrogen pollution, a main threat to ecosystem integrity. Most nitrogen in soil occurs as organic complexes that are broken down by soil organism into small compounds, which are taken up roots or lost from the soil. This project will generate fundamental knowledge of how an Australian species and a crop species with unusual root specialisations access soil organic nitrogen, thus increasing the efficiency of nitrogen use and reducing nitrogen loss. The research employs cutting-edge techniques for sustainable resource use, improved efficiency of crops and farming systems, and preservation of Australia's biodiversity.

**DP0557169** A/Prof NV Shuley; Prof ID Longstaff

**Title:** **Target Identification with Ultra-Wideband Polarimetric Radar**

**2005 :** \$106,000

**2006 :** \$91,000

**2007 :** \$96,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Queensland

**Summary:**

Radar reflecting objects resonate when electromagnetically and appropriately excited. These resonances can be extracted from the returned radar signal and used to identify the object. A simile is identifying a tuning fork from its sound rather than its image. The techniques developed in this proposal are primarily to be used in security and defence applications for better screening of threat targets. The benefit is a safe and more secure environment.

**DP0557285** Dr UE Siebeck

**Title:** HIDE AND SPEAK - COLOUR COMMUNICATION IN REEF FISH

**2005 :** \$97,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 3207 - NEUROSCIENCES

APD Dr UE Siebeck

**Administering Institution:** The University of Queensland

**Summary:**

Fish play an important role in many Australian's lives, they are a source of recreation for scuba divers, snorkelers and fishermen, they are a draw card for tourists as well as a healthy source of food. This project will investigate the visual world of fish, unravelling their use of colour communication, thereby identifying environmental factors affecting successful communication. Such a study will provide insight into the impact on reef fish of changes in water quality (e.g. river runoff) and temperature (e.g. bleaching events), as well as factors that affect the successful rearing of fish in aquaculture.

**DP0557667** Dr Z Skrbis; A/Prof MC Western; Dr BK Tranter; Prof DJ Hogan

**Title:** Social Futures, Orientations and Identities of Young People in Queensland

**2005 :** \$30,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

Much has been written about the unprecedented change in society and how it impacts on the identities of young people. It has been argued that life pathways of young people are much more diverse, flexible and unpredictable than they were in the past and that they are developing new strategies of coping with these new conditions. This research will follow a large cohort of young Australians through adolescence to empirically investigate how young people think of their future and how they master their life trajectories in a world of rapid change and uncertainty.

**DP0558722** Prof RJ Stimson

**Title:** The Geography of Australia's People in Places: Processes of Change and Policy Responses

**2005 :** \$55,000

**2006 :** \$55,000

**2007 :** \$55,000

**Category:** 3704 - HUMAN GEOGRAPHY

**Administering Institution:** The University of Queensland

**Summary:**

A major book will be written on the changing geography of people and places across Australia's settlement system between 1976 to 2006. Globalisation, economic restructuring, the changing nature of work, population growth and decline, migration, changes in households and families, and policy reorientations combine to impact in many different ways on people-in-places, affecting their fortunes and well-being. How to cope with change represents exciting opportunities for some people in some places, while other people and places are vulnerable. The challenges for public policy are enormous, requiring rethinking of approaches by governments at all levels.

**DP0557972** Dr PA Strooper; Dr DA Carrington; Mr KR Duddy; Dr RW Duke; Dr S Kim; Mr LP Wildman

**Title:** Enhancing model-driven architecture with support for verification and validation

**2005 :** \$162,000

**2006 :** \$97,000

**2007 :** \$102,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** The University of Queensland

**Summary:**

The proposed project will augment emerging methodologies for applying model-driven architecture to include verification and validation tools and techniques. This will decrease the time and effort required to develop software systems, and lead to better quality systems. It will evaluate and integrate existing verification and validation tools and techniques into the standards currently being developed to facilitate model-driven architecture. This will strengthen Australia's software-based industries and its prominent role in defining international standards in this area.

**DP0557424** Dr T Suddendorf

**Title:** **Evolution of Mind: The representational capacities of gibbons (*H. syndactylus*) and the common ancestor of humans and apes.**

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3899 - OTHER BEHAVIOURAL AND COGNITIVE SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

This research is the first systematic investigation into the mental capacity of gibbons. These apes are one of our closest genetic relatives. Results of the research will inform human-animal comparisons and investigations into the evolution of the human mind. More appropriate enrichment measures for captive apes could be developed as a result. It is hoped that this work will also lead to new collaborations with Indonesia, home of many gibbon species. The proposed research continues Australia's outstanding tradition of excellence in basic research.

**DP0559293** Dr SD Taylor

**Title:** **Gender and genetic risk: Exploring how men and women conceptualise and experience genetic risk in the Australian context**

**2005 :** \$43,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 3799 - OTHER STUDIES IN HUMAN SOCIETY

**Administering Institution:** The University of Queensland

**Summary:**

The proposed comprehensive empirical investigation will contribute new foundational knowledge relevant to preventative healthcare in Australia, an area of national research priority. Genetic technology promises significant preventative health economy benefits to Australia. Knowledge from this study will potentially benefit male and female users of healthcare services involving genetics, by elucidating their perspectives and needs. It will potentially benefit policy-makers and service providers in clinical genetic and other services involving genetics and inform future service models. It will contribute to future strategic research directions and the training, at PhD level, of a future researcher in a priority health area.

**DP0558334** Prof I Toth

**Title:** **CHARGED LIPOSACCHARIDE BASED DRUG DELIVERY SYSTEM**

**2005 :** \$100,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 3205 - PHARMACOLOGY AND PHARMACEUTICAL SCIENCES

**Administering Institution:** The University of Queensland

**Summary:**

Complexation of a drug with lipid and/or sugar units represents one of the most important of the strategies being investigated in this burgeoning field. Increasing the lipid solubility of a hydrophilic compound has been established as an important factor in improving its absorption as it is necessary for passive transport across intestinal mucosal membranes. The role of sugar unit is very important: (i) it modifies the physico-chemical properties (solubility), (ii) utilizes active transport systems (e.g. Glucose transport) and (iii) target the compound - "MAGIC BULLET" (Lewis X analogues - damaged cells). There is no limit to the areas of medicine and public health that would benefit from revolutionary new technology in these areas.

**DP0555914** Prof M Trau; Dr GA Lawrie; Prof PA Silver

**Title:** **Multiplexed Molecular Reading of Protein Associations via Nanoscaled Devices**

**2005 :** \$130,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Queensland

**Summary:**

Current developments in Nanoscience and Nanotechnology hold many promises in terms of revolutionising our industrial base, transforming biology, medical science and practice. This project strives to achieve some of these goals by, for the first time, building and testing nano-scaled devices with the capability to rapidly 'read' information about complex protein associations. With the recent completion of the Human Genome project, major opportunities exist to provide spectacular advances in human health care (eg, via novel diagnostics) provided that appropriate high-throughput biological reading devices can be developed. In developing such devices, this project also aims to catalyse the Australian Nanotechnology/Biotechnology industry.

**DP0559378** Dr BW Van Horen; Prof DK Forbes; Prof GW Jones; Prof B Sanyal; Prof AA Laquian; Prof M Racelis; Prof Dr D Hau; Prof T Firman

**Title:** **Strengthening urban slum upgrading and urban governance in cities in Southeast Asia**

**2005 :** \$70,000

**2006 :** \$80,000

**2007 :** \$72,000

**Category:** 3799 - OTHER STUDIES IN HUMAN SOCIETY

**Administering Institution:** The University of Queensland

**Summary:**

1. Improve the approach to evaluating the impact of slum upgrading in building institutional capacity, and thereby, on the longer-term continuity of poverty reduction for poor communities. These lessons can be applied in impoverished settlements in developed and developing countries;
2. Enhance best practice in planning upgrading projects and design of governance frameworks. These lessons can be applied throughout Asia - a region to which Australia is closely linked;
3. Make a substantial contribution to scholarly literature on urban upgrading and governance;
4. Strengthen international linkages between Australian researchers and key scholars in the USA, Canada, Philippines, Vietnam and Indonesia.

**DP0559300** Dr D Wang

**Title:** **Correction of the Effects of Gradient Field Nonlinearity in Magnetic Resonance Imaging - A Complete 3-Dimensional Approach**

**2005 :** \$125,000

**2006 :** \$98,000

**2007 :** \$100,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

The outcomes of this research will have direct benefits to various areas of diagnostic and interventional medicine especially in neurological diseases such as Alzheimer's disease, stroke, multiple sclerosis or brain tumors. The techniques developed in this project will in general enable MRI to provide a higher quality service to the community.

**DP0558337** Dr J Weerawardena; Prof PW Liesch; Dr GM Sullivan Mort; Asst Prof G Knight

**Title:** **A Study of Dynamic Capabilities in Australian and US Born Global Firms**

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$40,000

**Category:** 3502 - BUSINESS AND MANAGEMENT

**Administering Institution:** The University of Queensland

**Summary:**

Government policy recommendations for internationalising resources-constrained small and medium firms will be made. Practitioners will be informed of feasible paths for early and rapid internationalisation. Yet-to-internationalise small and medium enterprises will be advised on how to acquire, reconfigure and use capabilities to achieve positional advantages in international markets. The Australian and international academic community will be better informed of born global internationalisation, enriching teaching and learning practices in entrepreneurship, international business, international marketing, strategic management and small business management.

**DP0557523** Dr AG White; Dr SD Bartlett; A/Prof AC Doherty; Dr A Gilchrist; Dr JL O'Brien; Dr GJ Pryde

**Title:** **Controlling quantum technologies**

**2005 :** \$260,000

**2006 :** \$150,000

**2007 :** \$250,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** The University of Queensland

**Summary:**

Australia is a leader in quantum technology - from molecular machines to quantum computers, amazing advances are being made possible as we harness the laws of quantum physics. Our project will enhance the nation's profile in this discipline by developing some of the ground rules for measuring and controlling the operation of quantum devices. This foundational work will put Australian theoretical and experimental researchers at the forefront of this new field, and there is significant opportunity for development of intellectual property such as patents. Young researchers and postgraduate students will play a substantial role in the project, maximising the training impact for new professionals in cutting-edge science and high technology.

**DP0558134** Dr SJ Wilson; Prof S Crozier; Dr F Liu; Dr RA Denman; Dr RE Slaughter; Dr L Xia

**Title:** **Cardiac electrographic modelling and analysis**

**2005 :** \$200,000

**2006 :** \$98,000

**2007 :** \$100,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Queensland

**Summary:**

The outcomes of this project will improve the accuracy with which abnormal conduction pathways in the heart are found and will also use chaotic modelling tools to better predict the need and outcomes of patients with life threatening arrhythmias.

**DP0559380** Dr GF Wyeth; A/Prof J Wiles

**Title:** **Enhancing Intelligent Robot Navigation with the Evolution of a Robot-Friendly Language**

**2005 :** \$76,000

**2006 :** \$63,000

**2007 :** \$68,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Queensland

**Summary:**

Personal robots are set to become as popular as personal computers. The key ingredient that has been missing is intelligence - not the kind of intelligence that plays chess, but the kind that allows robots to understand the world in the way that we humans do. This project represents a major advance in that kind of intelligence, giving robots the ability to understand the world and the ability to communicate about their experiences. Armed with this new technology, Australia will have a competitive edge in the new and fast growing personal robot industry.

**DP0557213** Dr M Zhang; Prof K Lu; A/Prof Y Shi

**Title:** **Surface Nanocrystallization and Surface Alloying of Nonferrous Alloys**

**2005 :** \$130,000

**2006 :** \$125,000

**2007 :** \$130,000

**2008 :** \$110,000

**2009 :** \$110,000

**Category:** 2914 - MATERIALS ENGINEERING

ARF Dr M Zhang

**Administering Institution:** The University of Queensland

**Summary:**

The research will offer materials scientists a totally new way to undertake surface modification for nonferrous alloys. The low temperature surface alloying technique to be developed will considerably improve the surface durability, therefore increase the service life of components. Combination of the surface alloying treatment with the ageing process can save energy and lower the cost of product. This will enhance Australia's competitive ability in international markets. The study of atomic diffusion in nanomaterials will significantly contribute to material science and increase Australian research reputation in the world. In addition, the project initiates the research on surface nanocrystallization in Australia.

## University of Southern Queensland

**DP0559090** Dr J Li

**Title:** **Investigation and development of robust rule discovery and classification system**

**2005 :** \$46,196

**2006 :** \$26,136

**2007 :** \$40,182

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** University of Southern Queensland

**Summary:**

This research focuses on a national research priority, namely smart information use. The expected outcomes of the project will greatly advance intelligent system design, such as automatic decision making, fault detection and problem diagnosis, for finance, medical, telecom and many other areas. It has great potential for commercialisation and earning incomes for the future research. The publications will benefit the future development of intelligent systems for dealing with missing data. This project directly supports a PhD student and two research assistants who will most likely continue their higher degree study. These contribute to regional tertiary education.

**DP0556035** Dr RS Merfield; Dr AV Lyamin

**Title:** **Rigorous Three Dimensional Plasticity Solutions for Soil and Rock Slopes**

**2005 :** \$89,002

**2006 :** \$55,000

**2007 :** \$50,522

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** University of Southern Queensland

**Summary:**

Slope failures and landslides are a persistent cause of economic loss in Australia. Damages resulting from landslides include both property damage and loss of life. One such recent catastrophic slope failure is the landslide that occurred at Thredbo Village in New South Wales in 1997. This monumental landslide resulted in the deaths of 18 people and was considered by the coroner as the worst natural disaster in Australian history. The primary aim of this research project is to apply recently developed computational tools to better understand 3D slope behaviour and to develop rigorous stability solutions that can be used by design engineers. A better understanding of 3D slope failure will lead to more economic and safer slope designs.

**DP0560040** Prof AJ Roberts; Dr D Strunin

**Title:** **Systematically model the large-scale complexity of turbulent floods and thin film flows**

**2005 :** \$40,000

**2006 :** \$38,000

**2007 :** \$40,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** University of Southern Queensland

**Summary:**

This project continues development of new models, and computer simulation, of turbulent flood, river and estuarine flow. The models will be based systematically upon established turbulence models to resolve accurately the complex physical processes. The development of new and robust computer models for thin layers of coating fluid will aid many industrial processes. We also aim to provide correct initial conditions and boundary conditions for simpler cases of the above flows. The approach leads to a greater understanding of the range of applicability of the models through better estimating the errors in the modelling process. The project develops a fundamental enabling methodology for engineering and the sciences.

### University of the Sunshine Coast

**DP0559761** Dr JM Matthews; Dr RJ Hattam; A/Prof PH Christie; A/Prof P Singh; A/Prof SC Taylor; Dr RK Sidhu

**Title:** Schooling, Globalisation and Refugees in Queensland, Australia

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** University of the Sunshine Coast

**Summary:**

Project outcomes will enhance Australia's capacity to engage with its changing regional, national and global environment and address issues of national security. The project develops an analytical approach and conceptual tools to conduct multileveled policy analysis under new regional and global conditions thereby providing valuable resources to policy-makers at all levels. The project will generate case studies and a website, which will improve the capacity of schools, teachers and policy-makers to meet the educational needs of refugee students, to advance the development of inclusive education and the achievement of equal opportunity for all Australian students.

### South Australia

#### The Flinders University of South Australia

**DP0556876** Prof N Brewer; Prof GL Wells; Mr N Weber

**Title:** Eyewitness identification: Metacognitive influences on choosing behaviour

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$96,000

**2008 :** \$50,000

**2009 :** \$45,000

**Category:** 3801 - PSYCHOLOGY

APD Mr N Weber

**Administering Institution:** The Flinders University of South Australia

**Summary:**

There is major national and community interest in the successful conduct of criminal investigations. This research addresses the two most significant problems associated with the conduct of eyewitness identification tests: mistaken identifications of innocent suspects and failure to identify guilty suspects when they are present in the lineup. Progress on the latter problem - which results in offenders avoiding detection - would be a major contribution with national impact. As well as the obvious implications for the conduct of lineups, the international collaboration on the project will increase the visibility of Australian social science research and provide crucial development opportunities for young Australian scientists.

**DP0557451** A/Prof RT Cahill

**Title:** Development and study of a new theory of gravity

**2005 :** \$30,000

**2006 :** \$30,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The Flinders University of South Australia

**Summary:**

Gravity is thought to be an understood physical phenomena. But recently dramatic discoveries have revealed that major aspects of this phenomenon have been completely missed. This research project will develop and explore implications of these discoveries. At one level this project is about major breakthroughs in fundamental science, but discoveries are revealing space to be a complex dynamic system, and new technologies to detect and exploit this are foreseen. There is some evidence that space is a self-organising information system of a totally new kind, and this will also have applications. At a scientific level these developments will attract considerable international attention and will enthuse younger researchers

**DP0556471** Dr M Halsey

**Title:** Understanding recidivism and repeat incarceration among young male offenders: a biographical and longitudinal approach

**2005 :** \$47,000

**2006 :** \$47,000

**2007 :** \$47,000

**2008 :** \$20,000

**Category:** 3904 - LAW ENFORCEMENT

**Administering Institution:** The Flinders University of South Australia

**Summary:**

The research focuses on the group of offenders who, as a cohort, annually commit the most crime within Australia. The production of longitudinal qualitative data about individual experiences of secure care, release, and imprisonment, will provide a foundation for empirically driven policies and debates in the area of youth crime and incarceration for each state and territory. Accordingly, the community will benefit through the generation of new possibilities for intervening in cycles of persistent offending and repeat custodial sentences. This has major social, cultural and economic implications.

**DP0558402** Prof R Hassan

**Title:** **Suicide Terrorism: The Use of Life as a Weapon**

**2005 :** \$188,000

**2006 :** \$170,000

**2007 :** \$157,000

**2008 :** \$157,000

**2009 :** \$157,000

**Category:** 3701 - SOCIOLOGY

APF Prof R Hassan

**Administering Institution:** The Flinders University of South Australia

**Summary:**

Bali attacks were a powerful reminder that Australians are not immune from terrorism. Suicide terrorism is the most lethal form of terrorism. It constitutes 3 % of all terrorist attacks but accounts for 48 % of all deaths. Australia's involvement in Afghanistan, Iraq and East Timor has made Australia a more likely terrorist target. An informed understanding of suicide terrorism in our region would assist in developing appropriate policies for protecting Australia from terrorism. The research will also contribute to evaluation of costs and benefits of Australian government policies of democratisation in the region and War on Terror.

**DP0557818** Dr MR Johnston; Dr JG Shapter; Dr ER Waclawik

**Title:** **Development of an Adjustable Porphyrin-based Molecular Platform for Nanotechnology Applications**

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The Flinders University of South Australia

**Summary:**

Nanotechnology, the art of molecular control, is often heralded as the next industrial revolution. For this to be realised, the construction of useful devices will require precise control at the molecular level. Our control is realised through a process called self-assembly which means that the once the components of the device are correctly designed, the device will simply be able to put itself together. This research will use nature's light harvesting elements, namely porphyrins, and our ability to precisely control their position with respect to each other to build new, more efficient solar cells.

**DP0558960** A/Prof L Lack; Dr SA Ferguson

**Title:** **Brief naps as a countermeasure to fatigue**

**2005 :** \$45,394

**2006 :** \$47,000

**2007 :** \$47,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The Flinders University of South Australia

**Summary:**

The proposed research will be necessary in order to identify the best length of nap to reduce fatigue both in the afternoon and in the early morning hours. It may also discover that naps of certain lengths may impair performance and safety under some conditions. Thus the proposed research is crucial in order to develop a non-drug countermeasure for fatigue in conditions of impaired performance and safety. Therefore, it will play an important occupational health and safety role on the job in the afternoon day shift and the early morning during night shift work.. Furthermore, it will improve general quality and productivity of life in a culture of increasing fatigue.

**DP0560144** Prof R Maltby; Dr M Walsh; Dr K Bowles; Ms DK Verhoeven

**Title:** **Regional Markets and Local Audiences: Case Studies in Australian Cinema Consumption, 1928-1980**

**2005 :** \$189,271

**2006 :** \$128,427

**2007 :** \$115,839

**Category:** 4103 - CINEMA, ELECTRONIC ARTS AND MULTIMEDIA

**Administering Institution:** The Flinders University of South Australia

**Summary:**

The argument that Australian cinema maintains Australian identity is mirrored by the perception that imported cinema threatens national cultural integrity. We examine the historical basis for this discourse in order to propose alternative conceptual frameworks which view cultural exchange in less alarmist terms. In analysing the role of cinema in the creation of community identity, our research positions the social experience of Australian cinema-going as central to emerging international research, and provides a basis from which policy researchers can sustain a more complex account of national cultural maintenance, given the demographic circumstances which unavoidably position Australia as a net importer of cinema product.

DP0557070 Dr R Nixon

**Title:** An investigation of the cognitive processes underlying intrusive traumatic cognition

2005 : \$40,000

2006 : \$40,000

2007 : \$40,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The Flinders University of South Australia

**Summary:**

Intrusive unpleasant thoughts and memories occur in sufferers of anxiety and depression, and are common in normal individuals. Understanding the processes underlying intrusive cognition is critical, especially in the present world climate in which the Australian public is increasingly confronted with threats of terrorism and other negative world events. This research will have the direct benefit of leading to improved health of sufferers of anxiety and depression in the Australian community, and has the potential to increase normal individuals' ability to contribute to society by reducing intrusions that can interfere with work productivity, promote absenteeism, and have a negative impact on general wellbeing.

DP0557472 Prof ES Richards

**Title:** Australian Immigrant Mentalities

2005 : \$44,000

2006 : \$40,000

2007 : \$30,000

2008 : \$30,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The Flinders University of South Australia

**Summary:**

Immigrants arrive in Australia in hundreds of thousands and are generally anonymous and invisible in the historical and contemporary record. But many emigrants, from the days of the convicts to present times, have written home. These records contain their direct experience of immigration. This project explores the inner worlds of the immigrant, their response to Australia and how they coped with the process of migration. As one of the great immigrant nations of modern times Australia would benefit from hearing the voices of the immigrant. This intimate documentation relates to all the controversies that have accompanied the course of Australian immigration, past and present.

DP0556252 Dr N Skinner

**Title:** Burnt out and worn out or engaged and energised? Exploring the antecedents and consequences of burnout and engagement in drug-treatment specialists.

2005 : \$30,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The Flinders University of South Australia

**Summary:**

This project will have significant social benefits in regard to the health and well being of workers in the health and human services sector. The results and outcomes of this project will contribute to the National Research Priority of 'Promoting and Maintaining Good Health' by (1) contributing to the design of workplace interventions to facilitate health and wellbeing in the workplace, (2) contributing to the policies designed to address problems with worker retention in the AOD workforce, and (3) contributing to the development of strategies and interventions which are likely to benefit a key disadvantage group - individuals with alcohol or other drug problems.

DP0560102 Dr KL Soole

**Title:** Use of mitochondrial electron transport chain mutants to evaluate how non-phosphorylating respiration influences plant metabolite profiles and stress tolerance.

2005 : \$75,000

2006 : \$70,000

2007 : \$70,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The Flinders University of South Australia

**Summary:**

This project uses transgenic plant technology to elucidate how mitochondrial function impacts on the profile of metabolites in plant cell and tissues and whether altering these profiles influences a plant's ability to grow in harsh conditions. It will contribute to our fundamental knowledge of plant metabolism using a metabolomic analysis of plant stress response. This will be achieved using new high-throughput technologies, allowing reliable qualitative and quantitative analysis of large numbers of samples. This approach will complement existing genomic and proteomic analyses of plants exposed to abiotic stress.

## The University of Adelaide

DP0556113 A/Prof D Abbott

**Title:** Option pricing via path integrals: a new perspective

2005 : \$56,000

2006 : \$46,000

2007 : \$45,000

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** The University of Adelaide

**Summary:**

The risk management of derivative securities is a very exciting challenge for financial market researchers. The knowledge base resulting from this proposal will benefit both large financial institutions and Australia's financial system by creating a more competitive and efficient economic environment, which will inevitably lead to more gross domestic product (GDP) gains. Furthermore a large amount of software and numerical analysis work to be developed during the project can be turned into IP for Australia. This will contribute to catalysing development of internationally competitive financial risk management software industry.

**DP0556850** Dr SF Al-Sarawi

**Title:** **Wireless microvalve for biomedical applications**

**2005 :** \$70,000

**2006 :** \$63,000

**2007 :** \$65,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of Adelaide

**Summary:**

This program will investigate and perform an in-laboratory proof-of-concept demonstration of a polymer microvalve that can operate by a remote control radio signal. This will be a wireless microvalve that does not require a battery power source. This advance in the technology and scientific knowledge will have important applications for humankind ranging from drug delivery devices to through to valves in chips that can perform microfluidic chemical analysis. A far reaching long-range vision is its use in electronically reversible male fertility control. The community benefit in terms of novel biomedical devices and the resulting large international commercial market is significant.

**DP0557066** Prof NG Bean; Dr M Roughan

**Title:** **Ensuring the Robustness of IP Routing**

**2005 :** \$146,000

**2006 :** \$121,000

**2007 :** \$121,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The University of Adelaide

**Summary:**

The Internet is by its nature international, and so any such effort to model and understand it must be somewhat international. However, Australia has longer network paths to the rest of the world and the routing protocols' operation depends on this latency. This emphasizes why Australia must participate in such research: to ensure that Australian issues are considered when Internet protocols are designed. This project will directly deliver a more robust Internet for Australia, international exposure in an area of general interest, the potential for patents, and the development of commercially valuable expertise and measurement infrastructure.

**DP0556042** Prof JH Bowie

**Title:** **Negative ion mass spectrometry: fundamentals and applied applications.**

**2005 :** \$110,000

**2006 :** \$95,000

**2007 :** \$95,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Adelaide

**Summary:**

1. We seek to establish negative ion mass spectrometry as a major technological tool for the sequencing of peptides and proteins. In this context, we will investigate the structures and modes of action of peptide complexes which may be of importance for the treatment and control of heart disease and stroke.
2. Negative ions of known structure will be converted (in the mass spectrometer) into transient (and reactive) molecules which are present in interstellar ice and dust clouds. The structures and chemistry of such molecules are of importance in understanding the origins of life on this planet.

**DP0556549** Prof MJ Brooks

**Title:** **Multi-objective parameter estimation techniques for computer vision**

**2005 :** \$101,000

**2006 :** \$79,000

**2007 :** \$81,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Adelaide

**Summary:**

This project will benefit Australia's scientific knowledge and technology base in the area of computer vision. By contributing improved methods for parameter estimation applicable to a wide variety of technical problems, the project will aid the generation of improved software products in a wide variety of domains. Examples include: augmented reality systems, with which virtual reality artifacts may be immersed within real video; 3D from 2D systems, with which 3D object structure may be computed from image streams; and visual robotic systems, with which the pose of viewed objects may be determined.

DP0557815 Prof MI Bruce

**Title:** All-carbon molecules in metal complexes - novel materials and intermediates

2005 : \$150,000

2006 : \$140,000

2007 : \$140,000

2008 : \$130,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** The University of Adelaide

**Summary:**

An important requirement for the future is new materials with unusual properties that can be controlled. The need for ever smaller electronic devices requires knowledge about appropriate properties (particularly electronic) of molecules designed to model devices such as wires, switches, etc. This work seeks to design, measure and evaluate such molecules, which are based on chains of carbon atoms linking metal centres which can gain or lose electrons readily. As the electronic structure changes, so do the physical (photo, solid-state) and chemical properties (reactivity). Improved understanding of these features will benefit development of advanced technology and new materials.

DP0558262 Dr F Bulleri

**Title:** The interplay between natural and human perturbations in structuring marine habitats

2005 : \$126,000

2006 : \$105,000

2007 : \$105,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

APD Dr F Bulleri

**Administering Institution:** The University of Adelaide

**Summary:**

Empirical predictions of which could be the changes to natural habitats caused by human perturbations will increase the ability to prevent irreversible losses of biodiversity. This project will enable the planning of sound strategies for the conservation of valuable ecosystems, such as kelp forests, in view of the massive changes that will likely take place as a consequence of increasing exploitation of marine resources and of global climatic changes. The scientific knowledge generated by this project is necessary for a sustainable development of coastal areas, which would guarantee the provision of goods and services to Australian future generations.

DP0560088 Dr A Burke

**Title:** Global Security, Strategic Paradox and Limited War: The Politics and Ethics of Force

2005 : \$70,000

2006 : \$40,000

2007 : \$40,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** The University of Adelaide

**Summary:**

This project will provide detailed empirical research results plus conceptual innovations in the areas of peace and conflict studies. These will contribute to better understanding of contemporary threats and the effects of using force, and will enable the development of more effective policy options. The project will contribute strongly to the ARC's research priority 4, 'Safeguarding Australia', by providing important studies, analytical tools and policy recommendations that will strengthen Australia's national security, contribute to reducing conflict, and help us shape the regional and global security environment in our interests.

DP0559011 Dr A Chapman-Smith; A/Prof ML Whitelaw

**Title:** The bHLH.PAS transcription factors: Determinants of dimerization specificity and high affinity DNA

2005 : \$110,000

2006 : \$70,000

2007 : \$70,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

This program of fundamental research will advance our knowledge of the way essential proteins act to correctly regulate critical biological processes. A detailed understanding of these processes at the molecular level has the potential to contribute to the design of pharmaceutical compounds to assist in the treatment of diseases such as ischaemia, myocardial infarction and tumour progression. The work will contribute to the training of one or more graduate students in a technologically advancing and internationally competitive field.

DP0560001 Dr CL Ciobanu

**Title:** Order-disorder behaviour in Bi-tellurides: a tool to monitor gold scavenging by Bi-Te melts

2005 : \$100,000

2006 : \$100,000

2007 : \$90,000

**Category:** 2601 - GEOLOGY

APD Dr CL Ciobanu

**Administering Institution:** The University of Adelaide

**Summary:**

This project addresses a group of minerals (bismuth tellurides) that are often part of the exotic assemblages present in gold deposits, yet their potential to model the gold-forming processes is only recently apparent. These minerals also have the capacity to record their genetic history due to crystal modularity. Materials scientists target the analogous synthetic compounds because of the same structural modularity for applications in nanotechnology. The dataset on the mineral compounds, using the geological environment as a natural laboratory, will serve materials science research, as much as delivering key information relevant to understanding the reasons for gold enrichment in economically important types of ores.

**DP0557454** Dr SM Cox

**Title:** Robust fluid mixing through topological chaos

**2005 :** \$60,000  
**2006 :** \$58,000  
**2007 :** \$60,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

**Administering Institution:** The University of Adelaide

**Summary:**

The Australian chemicals and plastics industry has an annual turnover of over \$20 billion and employs over 77,000 people; fluid mixing is fundamental to this industry, yet the industry is recognised as underinvesting in research and development in this essential area. Furthermore, frontier technologies such as biotechnology and the next generation of smart materials also crucially rely on fluid mixing. This project aims to evaluate a new paradigm (topological chaos) for the design of mixers, to provide better and more robust mixers that work from microscopic to industrial scales.

**DP0557656** Dr P Crogan

**Title:** War, Computer Games and Contemporary Technoculture

**2005 :** \$36,037  
**2006 :** \$36,999  
**2007 :** \$20,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** The University of Adelaide

**Summary:**

This project examines computer games with a view to understanding the profound interrelationship of war and cultural developments that influences much of the innovation in computer gaming and simulation today. In the wake of the recent escalation of terrorism and state-supported counter-terrorism, war has become even more visible in media and audio-visual entertainment, making the question of the relation between war and mainstream culture one which poses itself with increasing urgency. This project's exploration of computer games is aimed at illuminating crucial features of this wider question of war's place in Australian contemporary culture, connected as it is to the global media context.

**DP0559091** Dr GM Cullity

**Title:** The Morality of Cooperation and Concern

**2005 :** \$33,897  
**2006 :** \$36,758  
**2007 :** \$43,860

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** The University of Adelaide

**Summary:**

The ethical issues of the greatest ongoing importance to the Australian community concern the conflicts between the interests of individuals and those of society. This project tackles those issues at a fundamental level. Its practical applications are of pressing importance to policy and public debate. It offers guidance to the many Australians whose work involves reflection on ethical principles - such as ethics committee members. It will contribute to the international profile of Australian moral philosophy, while broadening the knowledge base of the discipline in this country. And it will add to Australia's reputation as a country that takes ethics seriously.

**DP0556360** Dr J Denier; Dr RM Kelso; A/Prof AR Simpson; Prof JA Liggett

**Title:** Understanding the fluid mechanics of unsteady friction

**2005 :** \$220,000  
**2006 :** \$105,000  
**2007 :** \$110,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Adelaide

**Summary:**

Unsteady fluids flows are common in the fields of technology, engineering and physiology. This project brings together a multi-disciplinary team to consider the issue of unsteady friction. The research will focus on understanding the behaviour of water in pipes when subject to very fast transient events (such as those which cause the common problem of water hammer in the home). The project will produce new results that will be used by water engineers to design improved techniques for the rapid non-invasive identification of leaks in underground pipelines. As such our research has the potential to contribute huge savings to Australia's increasingly valuable water resources.

**DP0556048** Prof GB Fincher; Em/Prof BA Stone; Dr JN Varghese; Dr M Hrmova

**Title:** **Three-dimensional structures, substrate specificities and catalytic mechanisms of polysaccharide**

**2005 :** \$200,000

**2006 :** \$160,000

**2007 :** \$160,000

**2008 :** \$110,000

**2009 :** \$110,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

Plant wall polysaccharides are extensively used for food and fibre, and are important dietary components in human nutrition. A precise knowledge of mechanisms used by plants to synthesize these polysaccharides is unavailable, but would reveal potential routes to manipulate their biosynthesis in important crop species. For example, the levels or structures of polysaccharides might be modified to improve their efficacy as anti-cancer agents in human diets, to enhance digestibility of animal stock feeds, or to synthesise pharmologically valuable compounds. Thus, economic, social and environmental benefits will flow to both producers and consumers.

**DP0557080** Dr JG Gardam; Prof AJ Bradbrook

**Title:** **The Recognition of Access to Energy Services as an Integral Component of the Human Rights and Sustainable Development Framework**

**2005 :** \$85,183

**2006 :** \$57,283

**Category:** 3901 - LAW

**Administering Institution:** The University of Adelaide

**Summary:**

This project will contribute to the fulfillment of Australia's international obligations as a member of the United Nations and as a party to a multitude of multinational treaties dealing with human rights and sustainable development. In addition the successful realisation of the project would lead to an increased demand for alternative energy technology and infrastructure (e.g. wind generators and solar collectors) that could result in the development of commercial opportunities for Australian companies and new industries in this country.

**DP0557546** Dr JR Gascooke; A/Prof MA Buntine

**Title:** **Energetics and dynamics of solvated biologically relevant molecules using liquid microjet and ion imaging technologies**

**2005 :** \$180,000

**2006 :** \$160,000

**2007 :** \$90,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** The University of Adelaide

**Summary:**

The shape of many biomolecules in solution plays a critical role in determining their biological activity and function. It is known that the bonds that form between the biomolecules and the water solvent control this shape. However, very little is known about the strength and structure of these bonds at different sites around the biomolecule. Many experiments have informed us about the strength of the bonds, others have told us where the bonds occur. This project will provide both pieces of information for the first time, allowing us to better understand, and therefore control, biological function. This work will assist in the development of new biotechnology processes, especially in the emerging area of proteomics.

**DP0559464** Dr P Gerrans

**Title:** **Philosophy and Cognitive Neuropsychiatry: Delusions as a case study for an integrative neurocomputational theory of rationality.**

**2005 :** \$30,360

**2006 :** \$30,360

**2007 :** \$30,360

**Category:** 3803 - COGNITIVE SCIENCE

**Administering Institution:** The University of Adelaide

**Summary:**

A cognitive model relevant to evaluating the complementary roles of cognitive behavioural therapy and pharmacological intervention in treatment of psychiatric disorders.

**DP0559763** Dr MP Hand; Mr AJ Reid

**Title:** **How responsive are continental interiors to the geodynamic evolution of plate margins? An Australian case study**

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

The outcomes of this project will advance our understanding of the evolution and dynamics of the Australian plate by improving knowledge of the way plate driving forces shaped the continental interior. This will lead to a refinement of existing geological models describing the history of the Australian continent, and will provide a valuable backdrop for the current focus on the contemporary state of the Australian plate. The study will also provide a framework for petroleum exploration models in the central Australian basins, since they rely crucially on the thermal and structural datasets that will be produced in this project.

**DP0559266** Prof RS Hill; Dr GJ Jordan; Dr TJ Brodribb

**Title:** Global differentiation of the conifer flora

**2005 :** \$140,000

**2006 :** \$110,000

**2007 :** \$110,000

**2008 :** \$110,000

**2009 :** \$110,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

ARF Dr TJ Brodribb

**Administering Institution:** The University of Adelaide

**Summary:**

Conifers are among the most widely recognised and well-loved group of plants. This project will place a global perspective on the evolutionary significance of the southern conifers. Furthermore conifers such as the Wollemi Pine, bunyas, kauris and huon pine are of considerable ecotourism value, and this project will provide a basis for interpretation of these important plants.

**DP0556016** Prof RR Hillis; Dr CK Morley; Dr MR Tingay

**Title:** Present-Day Crustal Stresses of NW Borneo: Neotectonics of an Active Collisional Margin

**2005 :** \$90,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

The key project benefit is to advance understanding of continental collision and the early evolution of mountain belts using a region with an unrivalled database from hydrocarbon exploration. The project will improve understanding of Australia's northern, collisional margins and petroleum exploration there, which is less advanced than in Borneo. The project has major ancillary benefits. It will strengthen international links between Australia, Brunei, Malaysia and Germany. It will provide high quality research training for the RA and PhDs whom will spend time at the Universities of Brunei and Karlsruhe and at Shell Brunei and Shell Malaysia. Finally the project will increase the institutional capacity for contract research in SE Asia.

**DP0559550** Dr KB Jensen; Dr BK Dredge

**Title:** The role of the neuronal Hu proteins in the regulation of the BMP signalling pathway

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2702 - GENETICS

APD Dr BK Dredge

**Administering Institution:** The University of Adelaide

**Summary:**

We aim to understand the critical decision of a neural progenitor to commit to becoming a neuron. The BMP signalling pathway is central in this decision. Neural progenitors appear to become insensitive to BMP signals, and this lack of signalling leads to neuronal differentiation. We hypothesise that neuronal identity is regulated by an unusual genetic switch' the translational regulation by the neuronal Hu proteins of two proteins in the BMP pathway. Verification of a post-transcriptional regulatory mechanism for cell fate determination would be a major discovery, and may prompt investigation of how to harness the neuron-inducing function of the Hu proteins to address the therapeutic need for new neurons in neurologic diseases.

**DP0558365** Dr CC Julian; Dr CL Welch

**Title:** The Marketing Performance of International Subsidiaries Post Merger and Acquisition

**2005 :** \$30,000

**2006 :** \$23,886

**Category:** 3502 - BUSINESS AND MANAGEMENT

**Administering Institution:** The University of Adelaide

**Summary:**

Globalisation is a fact of life, illustrated by Australia's attempt to establish a free trade agreement (FTA) with the US and current FTAs with Singapore and Thailand. It is imperative that Australia finds out why and how its firms perform after they have been taken over or merged with a foreign firm. Especially if the Australian firm is export active, because if the Australian firm starts to perform poorly after it has been merged/acquired by the foreign firm this could have a negative impact on Australia's Balance of Payments/Balance of Trade thereby making a study of this type most timely.

**DP0557699** Dr JM Kelly

**Title:** Genetic dissection of a regulatory deubiquitylation network

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Adelaide

**Summary:**

The potential impact of this work is widespread, because although it is known that ubiquitylation has regulatory consequences in multicellular eukaryotes, individual networks have not been completely described in higher eukaryotes. Knowledge gained about fundamental processes in the *A. nidulans* model system is directly applicable to fungi used in biotechnology in the food, beverage, enzyme and pharmaceutical production industries, and to fungal pathogens. Since the fungal genes that form the basis of this project are conserved in higher eukaryotes including humans, the knowledge will be transferable to these systems. A further benefit that cannot be overstated is the research education and training opportunities provided.

**DP0557124** Dr AG Kotoousov; Dr CH Wang

**Title:** Development of Advanced Fracture Mechanics Models and Novel Technical Tools for Integrity, Durability and Safety Assessment

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

**Administering Institution:** The University of Adelaide

**Summary:**

The proposed project will lead to the new understanding of fracture phenomena and structural integrity. It will create a range of novel computer based technical tools for life and integrity assessment of structures in the presence of cracks and other defects, so as to meet the high safety standards across a wide range of industries. The project will result in technology that will help to make Australian products stronger and more durable so they become more competitive with low cost overseas imports. All the research outcomes will have a direct benefit to Australian interests, including both public and private industries.

**DP0556112** Mr SP Mickan; A/Prof D Abbott

**Title:** TeraHertz Cell Cluster Imaging

**2005 :** \$180,000

**2006 :** \$170,000

**2007 :** \$160,000

**2008 :** \$150,000

**2009 :** \$140,000

**Category:** 2999 - OTHER ENGINEERING AND TECHNOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

With this program, Australia will benefit from the interaction between physics, engineering, biology and medicine to develop a new TeraHertz imaging system. The project will identify the factors that contribute to TeraHertz contrast in soft tissue cell cultures, thereby developing a non-invasive imaging system to show contrast between diseased and healthy cells. This is a fundamental step towards a system for diagnosing disease states of skin cells, for example, the early detection of melanoma. Ultimately, Australia will benefit from a new technology, and new diagnostic biomedical techniques, for rapid, non-invasive and reliable skin cancer diagnosis.

**DP0556634** Prof NM Naffine

**Title:** Who is Law For? An Analysis of the Nature of the Legal Being

**2005 :** \$30,000

**2006 :** \$30,360

**2007 :** \$35,360

**Category:** 3903 - JUSTICE AND LEGAL STUDIES

**Administering Institution:** The University of Adelaide

**Summary:**

The project will provide the first contemporary comprehensive scholarly treatise on 'the legal person' as this legal concept applies to natural beings and objects: from rational humans, to human foetuses to animals to trees. It will have a direct bearing on legal decision-making in some of the most sensitive and controversial areas of law and therefore will have a highly practical legal application. For example, the project critically evaluates the legal status of the embryo and so will be of immediate interest to national and international law reformers considering the legality of the new reproductive technologies, cloning and embryonic stem cell research.

**DP0560199** Dr GJ O'Brien; Dr JP Opie

**Title:** The Analog Mind: Connectionism, Consciousness and Mental Representation

**2005 :** \$60,720

**2006 :** \$47,160

**Category:** 3803 - COGNITIVE SCIENCE

**Administering Institution:** The University of Adelaide

**Summary:**

The aim of our project is to explore novel conjectures about the way information is coded and processed in the brain, and the manner in which the brain manufactures consciousness. This work may eventually pay rich dividends by reducing the incidence of mental illnesses, such as schizophrenia, that disturb conscious experience. It may also lead to the development of more powerful forms of computation in artificial neural networks. This will have a significant impact on the artificial intelligence industry, with obvious economic benefits for Australia.

**DP0556181** A/Prof DJ Oehlers; A/Prof MC Griffith; Prof G Monti

**Title:** **Ductile FRP retrofit of concrete frames subject to static and earthquake loading**

**2005 :** \$90,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Adelaide

**Summary:**

Australia needs to spend at least \$500 million annually on the repair and upgrading of concrete structures alone just to maintain our existing civil infrastructure. Furthermore, it has been estimated that more than 500 deaths and \$10 billion damage will be caused by a moderate earthquake in Sydney or Melbourne. Most of this damage will be due to the collapse of buildings. This research will develop a new form of ductile plating that will reduce the cost of retrofitting concrete bridges and buildings. This project will also help train two PhD students and one Research Associate and further enhance the existing collaboration between Australia and Italy.

**DP0559582** Dr BJ Phillips

**Title:** **RNS Hardware for Public-Key Cryptography and E-security**

**2005 :** \$75,000

**2006 :** \$50,000

**2007 :** \$35,000

**Category:** 2916 - COMPUTER HARDWARE

**Administering Institution:** The University of Adelaide

**Summary:**

In a world where electronic communication is ever-present, the security of electronic information, e-security, is an issue of the utmost concern for government, business and individuals alike. Public-key cryptography is a powerful tool in the e-security toolkit. Using this technology it is possible to confirm the identity of individuals, maintain the privacy of personal data and guarantee the authenticity of transactions.

The aim of this project is to design new public-key cryptography hardware to provide faster, more secure communications for computers, networks and smart cards. Achieving this will require innovations in the way computers perform arithmetic and how this arithmetic is realised as an integrated circuit.

**DP0556459** Prof W Powell; Prof M Sedgley

**Title:** **Integrating a physical and functional genetic map of *Prunus dulcis***

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Adelaide

**Summary:**

Genome wide physical mapping is the centrepiece of current genomics research in virtually all plant and animal species. The proposal seeks to champion the development of *Prunus dulcis* (Rosaceae) as a model perennial species towards parity with other plant model systems for gene discovery and validation. The Rosaceae represents a rich repository of genes of relevance to perenniality, adaptation, sustainable agriculture, health and nutrition and the bioindustries. Ultimately, comparative genomics across the family will advance molecular eco-genetics via dissection of traits determining adaptive response. Access to user-friendly molecular markers will also bring greater precision to breeding programmes.

**DP0557087** Prof W Powell

**Title:** **How common and what is the significance of cis-acting regulatory variation and genomic imprinting in plants?**

**2005 :** \$160,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Adelaide

**Summary:**

Plant based processes provide truly sustainable solutions to many of the challenges facing Australia. The proposed research will help elucidate how plants regulate variation in gene expression rather than changes in the structure of encoded proteins. This is an area of gene expression, that has not been approached before, that explains the plant's ability to respond to external stimuli. Variation between plant species in the number of genes does not fully explain the differences between them. This information will come not from sequencing genomes but from investigation of regulatory elements.

**DP0559991** A/Prof RJ Protheroe; Prof RD Ekers; Prof T Stanev; Prof E Zas; Dr J Alvarez-Muniz

**Title:** **LUNASKA, a theoretical and experimental project for UHE neutrino astrophysics using a giant radio observatory**

**2005 :** \$250,000  
**2006 :** \$150,000  
**2007 :** \$200,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The University of Adelaide

**Summary:**

There will be an increase in Australian visibility in the high energy astrophysics community and stronger links between and within the fields of radio astronomy and high energy astrophysics in Australia, and internationally. This project will enhance Australian participation in the international Square Kilometre Array. By making observations using the Australia Telescope we may discover the first UHE neutrino - this would have huge impact and prestige for Australia. The technology developed resulting from this project will contribute to Australia's IT base. Hosting an international workshop will benefit national prestige and economy.

**DP0556930** Prof JW Randles; Dr AM Rezaian

**Title:** **Role of plant host factors in the replication and pathogenesis of Tomato leaf curl virus (TLCV)**

**2005 :** \$80,000  
**2006 :** \$75,000  
**2007 :** \$75,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

Geminivirus infection is an emerging problem in the Australian tomato growing industry which is currently worth ca.A\$200m annually. Knowledge gained from this research will have direct benefit in safeguarding this industry by providing an insight into geminivirus replication and identifying molecular targets for virus control. More generally, the technology developed through this study will contribute to our basic understanding of virus replication in plants with a view to controlling virus diseases by direct molecular intervention with specifically engineered tools. We foresee potential industrial applications.

**DP0557125** Dr SD Reynolds; Prof RR Hillis

**Title:** **Present-Day Crustal Stress Field of North-Eastern Australia**

**2005 :** \$140,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

The key project benefit is to advance fundamental understanding of crustal dynamics in NE Australia and thus Australia as a whole. The project will improve our knowledge of both the nature and sources of the present-day crustal stresses in NE Australia. The project has implications for seismicity and neotectonics in NE Australia. Furthermore, the project has significant implications for both hydrocarbon and hot dry rock geothermal energy exploration and development.

**DP0558736** Dr GW Rouse; Ms E Kupriyanova

**Title:** **The puzzle of Metazoan life history evolution: are feeding larvae always primitive?**

**2005 :** \$90,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

Most marine animals have a complex life-cycles with alternating pelagic larvae and benthic adults. An theory about animal life-history evolution states that feeding larvae are always primitive and larval feeding is lost but not gained. This hypothesis is based in part on studies on the 'classical' trochophore of marine worms such as Serpulidae, a group with both feeding and non-feeding larvae. We intend to establish a detailed phylogeny for Serpulidae and assess the evolution of larvae in the group. If feeding larvae are shown to be secondary this will raise doubts about established theories of animal evolution.

**DP0559562** Dr GY Rychkov; Prof GJ Barritt

**Title:** **Activation mechanisms of store-operated calcium channels in liver cells**

**2005 :** \$100,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

Currently, one of the most active areas of research in biology involves the molecular mechanisms that control the activity of cells. Defining these will provide a deeper understanding of normal function and disease, and provide potential therapeutic targets. This group has an international reputation for its work and it makes a major input to maintaining Australia as a significant contributor to this field. While its research has broad application in biology, its specific focus, calcium signalling in the liver, will provide the basis for understanding liver function and disease and, potentially, for developing new treatments for liver disease associated with abnormal calcium homeostasis.

**DP0559706** Dr R Seracino; Dr MJ Masia; Dr SH Xia

**Title:** **Retrofitting unreinforced masonry walls with fibre reinforced polymer strips**

**2005 :** \$105,000

**2006 :** \$93,000

**2007 :** \$75,000

**Category:** 2908 - CIVIL ENGINEERING

**Administering Institution:** The University of Adelaide

**Summary:**

An efficient technique for increasing the safety of existing masonry structures under earthquake (and other) loading will be developed. This is essential to the safe continued use of existing infrastructure (avoid replacement = economic benefit). This new technique addresses many shortcomings in existing alternatives (increased performance, reduced cost). This research is particularly important in Australia where unreinforced masonry accounts for most domestic construction, much light commercial infrastructure, as well as many heritage and post-disaster buildings. It also reinforces Australia's high international standing in developing innovative retrofitting alternatives using advanced materials in this rapidly developing area.

**DP0557920** Prof MA Tester

**Title:** **Controlling accumulation of elements in the shoots of higher plants by manipulating processes in specific cell types in the roots.**

**2005 :** \$340,000

**2006 :** \$310,000

**2007 :** \$300,000

**2008 :** \$250,000

**2009 :** \$250,000

**Category:** 3002 - CROP AND PASTURE PRODUCTION

**Administering Institution:** The University of Adelaide

**Summary:**

This project will provide novel, fundamental understanding of the processes controlling accumulation of elements in the shoots of plants. As such, it will impact on our understanding of processes relevant to stress tolerance, plant nutrition, human nutrition and the removal of toxic metals from soils by plants. These are all areas of great importance to Australian agriculture, environmental sustainability and human health. The increased understanding arising from this project will underpin future work to increase agricultural productivity and the quality of life for all in the Australian and international communities.

**DP0558887** Dr J Tibby

**Title:** **European impact on Eastern Australian coastal lakes: understanding pre-impact conditions and post-settlement modification.**

**2005 :** \$120,000

**2006 :** \$76,000

**2007 :** \$70,000

**Category:** 2699 - OTHER EARTH SCIENCES

APD Dr J Tibby

**Administering Institution:** The University of Adelaide

**Summary:**

Coastal lakes are vulnerable to European impact, yet little is known about how they have been altered in the last 200 years. For example: Are blue-green algal blooms a natural occurrence in coastal lakes? How long have freshwater lakes been isolated from the ocean? Preliminary results indicate that, at key sites, blue-green algae were more abundant before European settlement and that coastal lakes thought to be permanently fresh have been exposed to the ocean within the past 200 years. By documenting change at representative sites, the project will identify which lake types are most vulnerable to impact. Results from the project will ensure that costly restoration efforts are not misplaced.

**DP0557496** A/Prof JN Timmis; Dr MA Ayliffe

**Title:** **The molecular basis of endosymbiotic evolution**

**2005 :** \$160,000

**2006 :** \$150,000

**2007 :** \$150,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Adelaide

**Summary:**

First: Timmis has a 20 year, pioneering reputation in this research area which has recently emerged as a major focus in evolutionary genetics, genomics and GM crop technology. Four years of recent ARC funding has enabled us to remain internationally competitive and significant papers and collaborative reviews in high-impact journals have resulted, to the benefit of Australia's reputation in biological science. Second: our recent results have caused major debate about containment of GM crops. The knowledge gained from this research will provide essential information to ensure against environmental and human problems associated with transgene escape from GM crops into wild species.

**DP0558318** Dr AJ van den Hengel; Dr P Torr

**Title:** Autocalibration without decimation

**2005 :** \$81,000

**2006 :** \$71,000

**2007 :** \$73,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Adelaide

**Summary:**

The insertion of computer generated characters into real footage, the removal of objects from video, and the recovery of 3-dimensional architectural or topographic models from photographs are amongst a growing number of processes used in industry which require highly accurate camera calibration. Autocalibration is thus a prerequisite for these and many other emerging image-based technologies. By developing expertise in this area, and particularly by enabling more flexible and efficient means of autocalibration, we expect to provide Australian industry with a valuable improvement in the state of the art and a competitive edge in a number of important application areas.

**DP0559415** A/Prof M Varghese; A/Prof PG Bouwknecht

**Title:** Global aspects of dualities in String Theory in the presence of background fluxes

**2005 :** \$91,000

**2006 :** \$86,000

**2007 :** \$81,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Adelaide

**Summary:**

String Theory, known to the general public as the "Theory of Everything", is currently an extremely active area of research internationally. It has not only stimulated considerable interaction between mathematical physicists and mathematicians, but also increased public interest in science through television programs and books. Unfortunately, the majority of the Australian scientific community has not yet caught up with these developments. Our recent papers, all published in premier journals in this field, have not only received widespread international attention but have also increased the profile of String Theory amongst Australia's mathematicians and mathematical physicists. The proposed project is expected to continue this trend.

**DP0558361** Prof RA Vincent; A/Prof IM Reid; Dr PT May; Dr MJ Alexander

**Title:** AN INTEGRATED STUDY OF ATMOSPHERIC WAVE GENERATION AND COUPLING

**2005 :** \$140,444

**2006 :** \$143,260

**2007 :** \$130,078

**Category:** 2606 - ATMOSPHERIC SCIENCES

**Administering Institution:** The University of Adelaide

**Summary:**

Small-scale atmospheric gravity waves play an important, but not well understood, role in determining the state of the atmosphere. Observations to be made in northern Australia in 2005-2006 will bring together different kinds of radars and other instruments to study rain production processes in thunderstorms. Results will be used in a high-resolution numerical model to test wave generation by storms and to study their impact on the atmosphere. The project will contribute to the improvement of weather radar measurements of rainfall and to improvement in numerical weather forecasting and climate prediction. It will provide high-quality training for postgraduate students in the use of state-of-the-art instrumentation and models.

**DP0556780** Dr ID Whittington; Dr SC Donnellan

**Title:** Phylogeny and radiation of flatworm ectoparasites from marine fish using morphology and genetics, with novel approaches to identify pathogenic species

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

Fish flukes (flatworm parasites) with direct lifecycles can weaken and kill captive fish and threaten lucrative industries like finfish aquaculture and public aquaria in Australia and globally. Traditional approaches and molecular techniques will identify monogenean flukes in a family containing known pathogenic species distributed worldwide. Knowledge of fish disease is paramount for quarantine, risk assessments for import/export and for managing pathogen outbreaks in aquaculture. Benefits include: economic/social improvements in regional/rural Australia where fish farms are expanding; international excellence and core research training in fish parasitology; profitable, exportable expertise; knowledge of endemic and shared pathogens.

**DP0557697** Dr ID Whittington

**Title:** **Marine flatworm parasites of elasmobranchs: a unique model for experiments exploring invasion strategies, biology and specificity to help understand parasitism**

**2005 :** \$66,000

**2006 :** \$62,000

**2007 :** \$60,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Adelaide

**Summary:**

Primitive parasites with simple life cycles from ancient hosts emphasise adaptations to parasitism. Experimental studies on live eggs and infective stages of different monogenean (flatworm) parasite species from the skin, gills and cloaca of southern fiddler rays will identify critical interactions early in parasite-host relationships that determine whether or not parasitism occurs. Basic and applied benefits include: development of a tractable experimental system for studying parasite-host relationships; strategies to control parasites in public aquaria and aquaculture; profitable and exportable expertise; excellence and research training in basic parasitology; contributions to Australia's natural heritage collections.

**DP0558878** Prof AG Williams

**Title:** **Advanced Studies of Non-Perturbative Quantum Electrodynamics (QED) and Relation to the Standard**

**2005 :** \$110,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The University of Adelaide

**Summary:**

The project is a high-precision study of nonperturbative quantum electrodynamics (QED). It will finally allow a detailed look into the inner workings of the "best theory we have". It will provide valuable guidance in understanding and constructing the "holy grail" of theoretical physics the so-called "theory of everything". It will place Australia at the cutting edge of fundamental theoretical research. Australian graduate and undergraduate students will benefit from participating in this work and the state-of-the-art expertise that they will develop has a clear social and economic benefit for Australia.

**DP0558437** Prof MA Williams; Dr SH Ambrose; Prof Dr UC Chattopadhyaya; Dr AL Deino; Dr SA Leroy; Prof Dr S

**Title:** **The environmental impact of an extreme event: the Toba mega-eruption, volcanic winter and the near demise of humans**

**2005 :** \$140,000

**2006 :** \$120,000

**2007 :** \$100,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Adelaide

**Summary:**

There is widespread concern among scientists, farmers and policy makers over the possible environmental, economic and social impacts of global warming. Certain greenhouse gases such as carbon dioxide contribute to such warming, but other gases and dust particles, especially those from volcanic eruptions, may trigger global cooling. This project will evaluate the impact of a major prehistoric eruption on global climate and regional plant, animal and human communities. We know that future eruptions will occur, so it is important to clarify the climatic and other effects of past eruptions. The project will also enhance our understanding of prehistoric cultural changes and extinctions.

## University of South Australia

**DP0559927** Prof J Billington

**Title:** **Advances in the Verification of Communication Protocols**

**2005 :** \$73,000

**2006 :** \$63,000

**2007 :** \$68,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** University of South Australia

**Summary:**

Australia's economy is becoming increasingly dependent on many complex distributed systems. Some important examples are the Internet, electronic commerce, financial networks, transportation systems, health care networks, telecommunication networks, defence systems, intelligent manufacturing systems and organisational workflow management systems. Failure in these systems can result in serious financial loss (in banking applications) and loss of life or serious accidents in safety critical areas (medical, transport and defence applications). It is thus of utmost importance that distributed systems are designed correctly. This project aims to advance the state of the art in verifying that distributed systems will work correctly.

**DP0559399** Dr JW Boland; Prof PG Howlett; Dr AV Metcalfe; Dr PT Adamson

**Title:** **Mathematical models for water management systems**

**2005 :** \$86,000

**2006 :** \$86,000

**2007 :** \$81,000

**Category:** 2302 - STATISTICS

**Administering Institution:** University of South Australia

**Summary:**

The Australian community is currently talking about schemes to return water to the Murray-Darling river system to combat increased salinity and dramatically reduced river flow. Many believe that vastly improved water management policies are essential to maintain agricultural well-being in Australia. Salinity and water quality depend directly on flow rates and are also important in smaller catchments. In this study we will use statistical rainfall models and stochastic dynamic programming to find practical water management policies that minimise the risk to water supply. We will develop an interactive simulation and management tool using a modern computer graphics package.

**DP0557964** Dr NK Dutta; A/Prof NR Choudhury; Prof S Holdcroft; Dr A Hill

**Title:** **New High Temperature Proton Conducting Polymer Electrolyte For Sustainable Energy Conversion Applications**

**2005 :** \$210,000

**2006 :** \$180,000

**2007 :** \$180,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

**Administering Institution:** University of South Australia

**Summary:**

This project will bring the following significant benefit to the Australian community and economy: i) Energy and Environmental benefit: will provide the nation with an ultimate solution to zero emission vehicles and urban pollution; ii) Global Standing: will position Australia to become a global leader in sustainable energy conversion technology through the efficient fuel cell systems development; iii) Intellectual Property (IP): will deliver the nation a strong intellectual property (IP) position in the frontier technology, and; iv) Training: will train 2 high quality graduates in an emerging and multidisciplinary area of research with commercial turnover of more than \$1000 million in Australia.

**DP0557310** Prof AJ Grant

**Title:** **Information Theory for Networks with Uncertain Topologies**

**2005 :** \$152,000

**2006 :** \$135,000

**2007 :** \$136,000

**Category:** 2805 - DATA FORMAT

**Administering Institution:** University of South Australia

**Summary:**

The contribution of Information and Communications Technologies to the National economy, has been widely recognized. ICT enables wealth creation, employment and exports, and underpins many innovation processes. Immediate project benefits will be: Contribution to the knowledge base and fundamental capabilities in high-speed wireless and sensor networks; Education of future Australian academic and industrial innovators; Raising the international profile of Australian research in the area of information technology. Applied development of the outcomes will lead to the generation of valuable intellectual property. Close links to Australian industry ensures that Australian ICT companies stand to gain commercial advantage.

**DP0559202** Dr J Liu; Dr C Liu; A/Prof MW Vincent

**Title:** **Constraints in XML Schema Integration**

**2005 :** \$92,000

**2006 :** \$80,000

**2007 :** \$81,000

**Category:** 2805 - DATA FORMAT

**Administering Institution:** University of South Australia

**Summary:**

This project will produce worldwide leading technologies for designing XML data integration system. With the technologies, the well designed integration systems will be able store data with rich semantics and thus provide accurate and understandable information to users. In this way, Australia and communities will be benefited both financially and informatively. The research of this project will also add to the research reputation of Australia in data integration areas. At the same time, the knowledge capacity of Australia on data integration will be enlarged which further improves frontier research activities in the area. Through the research of the project, PhD students will be trained.

**DP0558920** A/Prof CA Prestidge; Prof AM Evans; Prof T Rades

**Title:** **Physico-chemical and Biopharmaceutical Investigations of Novel Drug Delivery Systems for Oral Administration of Lipophilic Drugs**

**2005 :** \$100,000  
**2006 :** \$80,000  
**2007 :** \$80,000

**Category:** 2501 - PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Institution:** University of South Australia

**Summary:**

The new platform technology for carrying lipophilic molecules will be applicable to many molecules currently under development by Australian Industry and will inspire novel encapsulation approaches to new and existing drugs as well as functional foods and nutraceuticals. Improved oral bioavailability of anticancer drugs will improve the quality of life of patients, reduce health care costs and provide broader benefits to the community. The Australian biotechnology/pharmaceutical industries can share in a greater proportion of the US\$50 billion market for specialised drug delivery, which is increasing by 20% annually. Australia's scientific competitiveness will be strengthened in the fields of nano-encapsulation and colloidal delivery.

**DP0558861** Prof L Rasmussen; Dr IB Collings

**Title:** **Quality-of-Service-Based Adaptive Coding for Wireless Communications Networks**

**2005 :** \$81,000  
**2006 :** \$69,000  
**2007 :** \$72,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** University of South Australia

**Summary:**

The Information and communications technology (ICT) industry has direct contribution to the economy as well as being an enabler across many areas of potential growth. This project aims at solving a key problem currently inhibiting an entire class of wireless ICT applications with strict quality-of-service requirements.

Another important impact is the bridging nature of the project, cutting across traditionally separated disciplines within telecommunications. The cross-layer design methodologies are the first steps towards interdisciplinary work, opening up new areas of research with high potential of innovation. Establishing an R&D niche of excellence will inspire more efforts into these areas, providing a knowledge base for Australia.

**DP0560183** Prof M Stumptner; Prof M Schrefl; Dr DR Corbett; Prof F Wotawa

**Title:** **Model-based error location in Java programs**

**2005 :** \$66,000  
**2006 :** \$61,000  
**2007 :** \$66,000

**Category:** 2803 - COMPUTER SOFTWARE

**Administering Institution:** University of South Australia

**Summary:**

The construction of modern software requires extensive testing and debugging in addition to using appropriate specification, design, and verification techniques. Testing and debugging are very time-consuming and costly, drawing - according to recent articles - "typically 50% or more of the resources for software projects". By providing a new, flexible approach to the debugging of complex software, this project offers the potential of significant cost savings, highly beneficial to the ICT industry. Lessons learned from the demonstration prototype, can be directly carried over into commercial tool development. In addition, the project strengthens links to high quality European research laboratories.

**DP0560196** A/Prof BH Thomas; Dr W Piekarski

**Title:** **Through Walls Collaboration to Support Command and Control Operations with Eyes and Ears in the Field**

**2005 :** \$31,000  
**2006 :** \$31,000  
**2007 :** \$31,000

**Category:** 2801 - INFORMATION SYSTEMS

**Administering Institution:** University of South Australia

**Summary:**

Australia is a geographically dispersed country with locations of high concentrations of technology resources. Australia requires the ability to gather real time intelligence information in the field to support planning and operational decisions by a command team for military and civil defence operations. Currently Australia supports such operations in remote areas of the country and numerous overseas operations. A major research outcome is the design and development of interaction techniques for the mobile users in through walls collaboration systems to control and manipulate augmented reality information in the field across a number of application domains, such as medical, maintenance, military, search and rescue, and GIS visualization.

**DP0556377** Prof AH Winefield; Dr PH Delfabbro; A/Prof MF Dollard; Dr JC Metzger; Dr A Hammarstrom

**Title:** **Transition from school to work: A longitudinal investigation of unemployment, underemployment, alienation, social exclusion and mental health in young people**

**2005 :** \$53,512  
**2006 :** \$45,000  
**2007 :** \$55,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** University of South Australia

**Summary:**

This project will provide detailed insights into the early identification of young people most likely to experience poorer outcomes in the later years of school and in the transition to the workforce or higher education. The findings have implications for State and National policies relating to the healthy development of young Australians; the enhancement of school completion and retention rates, and school-based strategies to facilitate young people's transition to the workforce. The study will further gain comparative insights into the experiences of students in coeducational vs. single-sex environments, private vs. public schools, and in regional as opposed to metropolitan areas.

# Western Australia

## Curtin University of Technology

**DP0559113** Prof L Caccetta; Dr SP Hill; Dr TW Dixon

**Title:** **HYBRID METHODS FOR SOLVING LARGE-SCALE OPTIMISATION PROBLEMS**

**2005 :** \$96,000

**2006 :** \$78,000

**2007 :** \$81,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** Curtin University of Technology

### Summary:

Mathematical modelling and optimisation plays a crucial role in the advancement of modern business, science and technology. A significant benefit of this project is the development of a range of powerful computational tools for improving the productivity of Australian industry, including: agriculture; communications; defence; manufacturing; mining and petroleum; transport and logistics. These tools will be built upon advances in the fundamental theory developed by the research team. The resulting high quality publications and associated algorithms will greatly enhance Australia's international scientific reputation and provide Australian industry with new cutting-edge optimisation technology.

**DP0558053** Dr GN Curry; Ms G Koczberski

**Title:** **Contested Landscapes and Divided Communities. The Struggle for Place and Belonging in Papua New Guinea**

**2005 :** \$35,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 3704 - HUMAN GEOGRAPHY

**Administering Institution:** Curtin University of Technology

### Summary:

PNG, as Australia's nearest neighbour and major recipient of Australian foreign aid, is facing major challenges including a weakening state capacity to govern, a breakdown in civil society and escalating law and order problems. These processes, which led to civil conflict in Fiji and Solomon Islands, for example, remain largely misunderstood. Nevertheless, such events have major implications for our region's political and economic security. By generating a greater understanding of the contexts and factors contributing to these tensions the project will contribute to better informed policy making by the Australian government, especially in the area of international assistance.

**DP0559419** Prof RJ Donovan; Dr CM Roberts; Prof MT Ewing

**Title:** **The weighty issue of childhood obesity: an investigation of the role of junk food advertising**

**2005 :** \$120,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** Curtin University of Technology

### Summary:

Australian children have been getting continuously fatter since the 1970s. The direct health cost implications amount to \$830 million annually. Most fat kids also become fat adults, suggesting a future health crisis in Australia. Junk food advertising is extremely heavy during children's television and is thought to contribute greatly to childhood obesity because children are highly susceptible to the suggestions of ads. The present research will help policy makers decide the most appropriate regulation of food advertising to children, and has the potential to reduce the proportion of Australian kids who are fat, thereby saving billions of dollars in health costs.

**DP0559543** Prof RJ Donovan; Prof T Stockwell; Prof MT Ewing; Dr R Ouschan-Macrae

**Title:** **Using advertising to negatively reconstruct memories of risky and high-risk drinking amongst Australia's youth : a new intervention strategy**

**2005 :** \$95,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** Curtin University of Technology

### Summary:

The NHMRC recognises alcohol-related problems as one of Australia's most serious health problems. Binge-drinking in particular is endemic amongst the population, especially youth, with such behaviour resulting in enormous economic, social and emotional costs to our nation. This study works towards reducing binge drinking amongst youth by assisting the development of more effective counter-advertising campaigns that make young people's memories of binge-drinking less enjoyable & more unpleasant. It also assists relevant advertising regulators & key decision-makers to take action to ensure that alcohol ads do not spawn primarily attractive memories of binge-drinking experiences.

**DP0558700** Prof JD Gale; Dr MS Islam; Prof SR Phillpot

**Title:** **Lowering the barriers to a hydrogen technology: What slows proton conductors?**

**2005 :** \$80,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2506 - THEORETICAL AND COMPUTATIONAL CHEMISTRY

**Administering Institution:** Curtin University of Technology

**Summary:**

When hydrogen burns the only product is water, therefore making it the most attractive form of clean energy. Central to the technological use of hydrogen is the need for a material through which only this element can pass, both so that the energy can be extracted and for purification. At present high temperatures are needed to allow hydrogen to pass through solids that exhibit this sieving property. Through state of the art computational methods the movement through these materials can be observed so that the regions that slow the hydrogen down can be identified. From this understanding it will be possible to design more efficient ways of producing energy that can provide clean air for cities and reliable power for remote communities.

**DP0559994** Prof A Gavrilov

**Title:** **Acoustic observation of Antarctic ice rifting and calving events using remote hydroacoustic listening stations**

**2005 :** \$31,754

**2006 :** \$27,285

**2007 :** \$31,865

**Category:** 2405 - CLASSICAL PHYSICS

**Administering Institution:** Curtin University of Technology

**Summary:**

The calving activity of the Antarctic ice shelves is one of the major indicators of global climate change. Global warming induced by an increase in atmospheric CO<sub>2</sub> will affect the Antarctic Ice Sheet, primarily in form of disintegration of the Antarctic ice shelves surrounding the continent. The processes of calving on the ice shelves may lead to a substantial increase of sea level around the world, with devastating effects on the continental coasts and low-lying islands. The method of remote acoustic observations investigated in this project is a new approach to the problem of creating an efficient and cost effective system to monitor rifting and calving of the Antarctic ice shelves.

**DP0558648** Prof TA Kirkpatrick

**Title:** **English as a spoken lingua franca in ASEAN: a study of its linguistic and socio-cultural features**

**2005 :** \$40,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 3802 - LINGUISTICS

**Administering Institution:** Curtin University of Technology

**Summary:**

The project will collect the first corpus of Lingua Franca English in Asia. It will thus complement the two European LFE projects currently underway and will put Australia at the forefront of this new research. Given that the findings of the research have the potential to revolutionise the ways English is taught and learned throughout the ASEAN region, as it takes the focus away from the imposition of an external native speaker norm of English. The research thus places Australia in the forefront of culturally and contextually sensitive work into English language teaching and research. The project will also benefit all communities within Australia where English plays a role as a lingua franca.

**DP0556767** Prof BB Lamont; Dr SL Krauss; Prof NJ Enright

**Title:** **Quantifying long-distance seed dispersal and its role in the metapopulation dynamics of plants with contrasting life histories.**

**2005 :** \$150,000

**2006 :** \$130,000

**2007 :** \$130,000

**2008 :** \$130,000

**2009 :** \$130,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Curtin University of Technology

**Summary:**

This work will contribute to the assessment of best fire-management practices, enabling land managers to compare current fire practices against those required for conservation of genetic resources. Our quantification of Long distance seed dispersal (LDD) among species with different life history attributes will be a major theoretical contribution to the fields of population ecology and population genetics. LDD is also imperative if species are to survive the major shifts in climate projected under modelled climate change scenarios - species without effective LDD may have a greater probability of extinction due to climate change. Assessing LDD enables quantification of this significant aspect of the threat of climate change to biodiversity.

**DP0559204** A/Prof AH Lee; Dr V Burke; Dr KK Yau

**Title:** **Survival mixture modelling with random effects in public health**

**2005 :** \$63,700

**2006 :** \$64,780

**2007 :** \$67,060

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** Curtin University of Technology

**Summary:**

This interdisciplinary research aims to develop innovative methods and deliver effective tools for analysing non-standard survival data. Significance of the work lies in its novelty and the breadth of its practical applications. Evaluation of health outcomes has important implications in cancer prevention and control, hospital strategic planning, and post-stroke care management. The unique opportunity to examine long-term predictors of morbidity and mortality in a well-documented Aboriginal population will enhance the understanding of existing inequities in Aboriginal health. Demographic and lifestyle information related to the outcomes is pertinent to the development of policy and health promotion appropriate to Aboriginal communities.

**DP0558727** Dr Q Li; Dr XS Zhao

**Title:** Multi-scale Modelling and Simulation of Self-assembling Photonic Crystals

**2005 :** \$65,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** Curtin University of Technology

**Summary:**

By using bandgaps and introduced defect states, photonic crystals provide the opportunities to shape and mould the flow of light. A success in fabricating 3D photonic crystals with complete bandgaps in a controllable and large-scale fashion will revolutionise the information & telecommunication industry. This ability will provide Australia with a significant niche opportunity at the leading edge of this frontier technology. It builds on Australia's established strength in material science, photonics, and information & communication technology. The mathematical models, simulation platform, and fabrication methods developed in this project will also be applicable to creating other highly-structured, functional materials.

**DP0559408** A/Prof AD Lucey; Dr PR Eastwood; Dr DR Hillman; Prof DD Sampson; Dr T Balint

**Title:** Modelling and Measurement of Flow-Structure Dynamics in the Human Upper Airway

**2005 :** \$150,000

**2006 :** \$135,000

**2007 :** \$140,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** Curtin University of Technology

**Summary:**

Sleep disruption due to the common and disabling conditions of snoring and obstruction of the human upper airway can result in chronic fatigue, lost work and accidents caused by daytime drowsiness. To date the behaviour of the upper airway has not been adequately studied in terms able to reveal the mechanical causes of these conditions. This deficiency is addressed through the development and use of simulation tools and measurement techniques that will elucidate the flow-structure dynamics leading to new diagnostic and improved treatment methods. Simulating the effect of treatment on any individual will permit it to be chosen to maximise its efficacy for a problem that costs the nation an estimated \$2 Billion per year in lost productivity.

**DP0555882** Prof GG Madden; Prof RJ Cooper; Prof R Fildes

**Title:** Theoretically-motivated Long-term Internet Network Adoption Based on Short Time-series: Understanding the Diffusion of an Enabling Network Technology

**2005 :** \$45,000

**2006 :** \$45,000

**2007 :** \$45,000

**Category:** 3401 - ECONOMIC THEORY

**Administering Institution:** Curtin University of Technology

**Summary:**

A recent Government policy concerns innovation as a driver of long-term industry growth and a major determinant of global competitiveness. In particular, the Internet is a 'backbone' infrastructure for the conduct e-commerce, and enables efficiency benefits and product innovations to be realized in other sectors, e.g., banking, finance, health and tourism. This study estimates the network effect critical to forecasting Internet growth. Moreover, a structural model enhances understanding of underlying Internet dynamics and impacts on general economic conditions. Importantly, methods developed here apply to any network industry, and many non-network industries characterised by strong complementarity relations.

**DP0558976** Prof JD Majer; Dr RR Dunn; Dr T Barraclough

**Title:** Effects of ants and ant-mediated dispersal on speciation rates, biogeography and diversity of

**2005 :** \$90,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Curtin University of Technology

**Summary:**

This work seeks to improve our general understanding of longstanding questions in ecology in evolution, namely what are the processes that have allowed some groups to become diverse and others not, why does dispersal mode vary with geography, and how do speciation and extinction vary across space, time and taxon? In answering these questions, we will address some of the most fundamental questions in conservation, including what are the factors that make species geographically rare, which species are most at risk for climate change, and what are the factors that have led habitats like the Kwongan Heath and Fynbos to be so exceptionally biodiverse.

**DP0559035** Dr AS Perera

**Title:** **Junction Zones: Practices of Coexistence in Australasia and the Pacific**

**2005 :** \$45,000

**2006 :** \$30,000

**2007 :** \$45,000

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** Curtin University of Technology

**Summary:**

"Junction Zones" addresses three key national concerns post-2001: regional relations, border protection and security. As Australia faces an increasingly complex geopolitical environment, new interpretive and policy directions are needed to provide more nuanced analyses of the region, taking sociocultural as well as political and economic factors into account and engaging multiple disciplinary areas. The project contributes to these ends by considering alternative understandings of place, conflict and displacement; examining how differences are negotiated; and identifying emergent political relations, social identities and cultural forms. It proposes fresh conceptual and analytical tools for understanding and responding to the region.

**DP0558938** Dr S Piana

**Title:** **Computer simulation of DNA biochips**

**2005 :** \$90,415

**2006 :** \$86,806

**2007 :** \$86,898

**2008 :** \$86,991

**2009 :** \$87,086

**Category:** 2506 - THEORETICAL AND COMPUTATIONAL CHEMISTRY

ARF Dr S Piana

**Administering Institution:** Curtin University of Technology

**Summary:**

The DNA biochip technology has been a major breakthrough in cell biology and clinical analysis. Companies in Australia and in the rest of the world are now developing biochips for genome sequencing and point-of-care diagnosis. DNA biochips have the potential to provide simple, fast and accurate clinical analysis, thus enhancing the efficiency of medical treatments and reducing the costs of health care.

The structural properties of the immobilized DNA are critical for determining the DNA chip sensitivity and efficiency. A fundamental understanding of the molecular interactions at the surface of a biochip is therefore not only relevant for the scientific community, but can have direct implications for the design of improved DNA chips.

**DP0558174** A/Prof JP Piek; Mr L Smith

**Title:** **Motor coordination in infancy and its relationship to motor and psychosocial development in childhood**

**2005 :** \$50,000

**2006 :** \$40,000

**2007 :** \$30,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** Curtin University of Technology

**Summary:**

Few studies have examined the impact of early motor development on later development, even though there is evidence to show that these early movements influence later motor ability. Motor development can also impact on cognitive, emotional and social development. The current study has data on early motor ability in over 90 infants which includes children at risk of developmental disorders. We will carry out a longitudinal investigation of the relationship between early motor development in infancy on motor and psychosocial development in childhood. The results will provide information on early markers for developmental disorders and appropriate intervention techniques than can be initiated in infancy.

**DP0559111** Prof MO Tadé; Dr Y Tian

**Title:** **WAVELET-BASED MODELLING AND MODEL PREDICTIVE CONTROL OF COMPLEX MULTIDIMENSIONAL CRYSTALLISATION PROCESSES**

**2005 :** \$75,000

**2006 :** \$73,000

**2007 :** \$75,000

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** Curtin University of Technology

**Summary:**

The results of this project will directly contribute to a better understanding of crystallisation which is an important unit operation to achieve high purity separations. Many Australian industries for example, mineral processing, sugar processing, pharmaceuticals, etc will benefit from the results in order to enhance optimal operation and control to ensure globally competitive production which is on time, minimize wastes and raw materials and inventories. The leading edge results will increase the contributions of these industries to the Australian economy and our global competitiveness necessary to maintain our culture and the beauty of our environment.

**DP0559636** Dr H Wu

**Title:** **Production of hydrogen from biomass by integrated catalytic aqueous hydrolysis and reforming in subcritical water**

**2005 :** \$88,886

**2006 :** \$59,000

**2007 :** \$61,886

**Category:** 2906 - CHEMICAL ENGINEERING

**Administering Institution:** Curtin University of Technology

**Summary:**

The outcomes of this project will lead to the development of a novel process for efficient and cost-effective hydrogen production from renewable biomass using integrated hydrolysis and catalytic aqueous reforming at low temperatures. Such technological innovation will provide significant benefits to Australia as a whole for transition to a truly sustainable hydrogen economy. The novel reaction system and research methodologies proposed in this proposal will certainly enhance Australia's science and technology capability and international competitiveness, in the area of reaction engineering. Also of the national benefit is the successful training of a postgraduate at PhD level who will no doubt add to future scientific research workforce.

**DP0558792** A/Prof Y Wu

**Title:** **An innovative computational technique for the study and control of oscillation marks in continuous casting of steel**

**2005 :** \$68,000

**2006 :** \$61,000

**2007 :** \$61,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** Curtin University of Technology

**Summary:**

The project addresses an important problem in steel making industry. The success of the project will lead to a comprehensive understanding of the continuous steel casting process and the development of an innovative computational technique for the analysis of the process, which is important for the optimal control of the process. As Australia has a huge amount of mineral resources, improvement of the steel casting technology will result in great economic and social benefit. It will increase the revenue from the steelmaking industry and ensure the Australian steelmaking industry to be internationally competitive. The project will also lead to the production of a number of graduates with expertise directly useful to our local industry.

**DP0559226** Prof D Zhang; Dr JH Bromly; Prof AA Konnov

**Title:** **Investigations into the Mechanisms of Reactions between Alkanes and Nitric Oxide at Low**

**2005 :** \$60,000

**2006 :** \$58,000

**2007 :** \$60,000

**Category:** 2999 - OTHER ENGINEERING AND TECHNOLOGY

**Administering Institution:** Curtin University of Technology

**Summary:**

Energy is essential to human progress and Australia's economy is built on our energy-intense industry. In the foreseeable future, combustion of hydrocarbon fuels remains a major means of energy utilisation. The challenges are to reduce emissions and improve combustion operability. The outcomes of the present research will provide a scientific basis that enable new combustion and associated emission control technologies to be developed with potential to reduce engine knock, improve efficiency and reduce NOx emissions during the combustion of hydrocarbon fuels. This project will also offer an excellent opportunity to develop future combustion scientists and technologies through postgraduate research training.

## **Edith Cowan University**

**DP0558979** A/Prof A Bouzerdoum; Dr S Phung

**Title:** **Detecting, Locating and Tracking Human Faces using Skin Colour**

**2005 :** \$53,000

**2006 :** \$53,000

**2007 :** \$52,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** Edith Cowan University

**Summary:**

With growing concerns for national security and public safety, government agencies in Australia and around the world are taking strong measures to introduce biometric-enhanced official identification documents such as passports, visas, and ID cards. The proposed face detection and tracking system will play a key role in personal identification and human activity monitoring. The developed system will have a huge potential in surveillance, security, law enforcement, and ICT. This project will contribute to building a knowledge economy in Australia and help safeguard and protect Australia from terrorism and crime. Furthermore, its outcomes will enhance the reputation of Australia as a leader in frontier technologies and smart information use.

**DP0557797** A/Prof P Brock

**Title:** Colonialism, Christianity and the Indigenous Evangelist: Arthur Wellington Clah, His Life and Times

**2005 :** \$31,000

**2006 :** \$31,000

**2007 :** \$31,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Edith Cowan University

**Summary:**

1. This project will showcase Australian expertise in colonial studies and make an important contribution to international scholarship in this field. The project will contribute to our understanding of the social and intellectual dynamics of communities undergoing dramatic change as a result of outside influences and pressures.
2. It will contribute to a larger project which is investigating colonialism and religious change in Australia and the Pacific.
3. The findings of the project will inform scholarship of the colonial period in colonised regions in Australia, the Pacific and Africa, where indigenous peoples experienced similar pressures on their lives.

**DP0559707** A/Prof LR Green; Prof M Balnaves

**Title:** Australian responses to the images and discourses of terrorism and the other: establishing a metric of

**2005 :** \$36,000

**2006 :** \$60,000

**2007 :** \$50,000

**Category:** 4001 - JOURNALISM, COMMUNICATION AND MEDIA

**Administering Institution:** Edith Cowan University

**Summary:**

The world was changed on 9/11. Small-scale studies indicate half the Australian non-Muslim population is now anti-Muslim and up to 80% of Muslims are in a siege mentality. This research examines Australian perceptions of the other, of terrorism, of refugees and of fears about these. In seeking to analyse these influences upon contemporary society, the project investigates ways that policy can drive appropriate communication responses to racism and to social isolation, particularly in supporting fear-filled communities. Arguing that the global response to 9/11 is out of proportion to the events themselves, the study suggests strategies to support ethnically diverse groups that feel threatened by media discourses and adverse public opinion.

## Murdoch University

**DP0559547** Prof M Bellgard; A/Prof JK Kulski; Prof R Appels; Dr RH Taplin; A/Prof RR Barrero

**Title:** Devising sophisticated computational comparative genomic analysis strategies for animal and plant genomes

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** Murdoch University

**Summary:**

Given the significance of comparative genomic analysis, this research proposal brings together Australian scientists with a track record in comparative genomic analysis, bioinformatics, molecular biology and statistics to work on consolidating a computational framework for comparative genomic analysis and investigating transcriptome data by capitalising on international collaborations and involvement. The outcomes of this research will be of benefit to the national community through technology transfer (such as the identification of novel and functional genomic non-coding sequences), training (in bioinformatics related activities) and national coordination (of bioinformatics activities).

**DP0559206** Dr Y Chu

**Title:** The Democratisation of Documentary Cinema in China

**2005 :** \$40,044

**2006 :** \$35,044

**Category:** 4103 - CINEMA, ELECTRONIC ARTS AND MULTIMEDIA

**Administering Institution:** Murdoch University

**Summary:**

The Democratisation of Documentary Cinema in China has cultural, political, economic, and research benefits for Australia. Culturally, the Project provides an analysis of the ways China views itself and the world. Politically, the Project enriches Australia's understanding of how media control in China has been transformed from 1949 to the age of globalisation. Economically, the Project enhances Australia's chances of finding a niche in the world's largest documentary film market. As a contribution to research, the Project will produce the first in-depth study of Chinese documentary film, its industry and politics and so offers Australia a new perspective on how political change is reflected in one of China's leading media productions.

**DP0558594** Dr D Fursa; Prof AT Stelbovics

**Title:** CCC method: new applications to electron scattering from atoms and molecules.

**2005 :** \$120,000

**2006 :** \$120,000

**2007 :** \$120,000

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Administering Institution:** Murdoch University

**Summary:**

Achievement of the stated aims will be of enormous benefit to industry and laboratory research because at the present time no reliably accurate models exist for the range of the required scattering parameters. The modelling work will result in development of new software packages for supercomputers and will provide training for research associates, PhD and Honours students in an area where Australian theorists are preeminent.

**DP0556987** Prof RJ Hobbs; Ms L Lach; Prof JD Majer

**Title:** The roles of invasive ants in urban ecosystem dynamics and restoration

**2005 :** \$105,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Murdoch University

**Summary:**

The potential impacts of invasive ants are recognised worldwide, and we know that invasive ant species are already present in heavily disturbed areas in southern Australia, particularly in urban settlements. However, as yet, we have very little information on the actual and potential impacts of invasive ants on ecosystem processes. Urban bushland is seen as an important conservation and amenity resource, and there are increasing efforts to manage and restore these areas. This project aims to elucidate the likely impact of invasive ants on the maintenance and restoration of urban bushland, and hence provide guidance as to whether management and restoration needs to include invasive ant control.

**DP0559809** Prof MG Jones; A/Prof D Bird; Dr VA Vanstone

**Title:** Expression profiling of giant cells induced in host plant roots by root-knot nematodes

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2704 - BOTANY

**Administering Institution:** Murdoch University

**Summary:**

Root-knot nematodes cause crop losses of over \$400 million per annum in Australia. Control by toxic chemical nematicides is expensive and can pollute groundwater. Benefits from this research for the Australian community are: (i) it will ensure that Australian researchers stay at the forefront of research in plant nematology, (ii) it provides significant local and international linkages that will stimulate research outputs, and (iii) new knowledge will be generated on how plants respond to attack by nematodes - this will generate new intellectual property, leading to better control methods and reduced costs that will support rural communities, and reduce environmental pollution.

**DP0556550** Prof Dr WR Loader

**Title:** Attitudes towards Sexuality in Judaism and Christianity in the Hellenistic Greco-Roman Era: The First Comprehensive Analysis, in two volumes.

**2005 :** \$142,000

**2006 :** \$142,000

**2007 :** \$142,000

**2008 :** \$142,000

**2009 :** \$142,000

**Category:** 4402 - RELIGION AND RELIGIOUS TRADITIONS

APF Prof Dr WR Loader

**Administering Institution:** Murdoch University

**Summary:**

This study investigates how attitudes towards sexuality in early Judaism and Christianity developed and were shaped in interaction with Hellenistic culture which largely dominated their world. It thus provides information about a formative period which continues to influence attitudes towards sexuality in many communities today and will provide them with a useful resource in the form of a two volume work and an abridged account for exploring where such attitudes came from and how they developed.

**DP0559858** A/Prof DJ Macey; A/Prof JM Webb; Dr AP Lee; Dr L Brooker

**Title:** Cellular control mechanisms of matrix mineralization in the teeth of marine molluscs

**2005 :** \$80,000

**2006 :** \$78,000

**2007 :** \$80,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** Murdoch University

**Summary:**

These studies are significant as a foundation for the country's current focus on advanced materials and nanotechnology. The production of new materials is critically dependant upon understanding the crystallochemical control organisms, such as chitons and limpets, have over the precipitation of simple compounds, such as the calcium and iron oxides, phosphates and silica, often formed as nanoscale deposits. This study constitutes a systematic in situ exploration of the biomineralization processes that form these composite microstructures and as such will provide a new source of inspiration to the production of new biomaterials.

**DP0559209** A/Prof RH Reece

**Title:** The Life and Writings of Sir Charles Brooke, second Rajah of Sarawak (1829-1917)

**2005 :** \$32,000

**2006 :** \$20,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** Murdoch University

**Summary:**

The benefit of the project is an understanding of the processes and mentality which underlaid what was perhaps history's most successful experiment in enlightened European rule over Asian peoples during the Imperial era. There are lessons here here for Australians' relations with their Southeast Asian neighbours, notably Malaysia and Indonesia. In the British context, it will document and evaluate for the first time the achievement of one of the great figures of the Imperial era. Within Malaysia (and notably Sarawak) it will provide a major contribution towards an understanding of the 'White Rajah' era and its legacy of economic autonomy and political and cultural pluralism.

**DP0557290** Prof G Rodan; Dr K Jayasuriya; Dr VR Hadiz; Prof KJ Hewison; Dr BH Chua

**Title:** Contestation or Regulation - New Politics in Southeast Asia

**2005 :** \$50,000

**2006 :** \$25,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** Murdoch University

**Summary:**

By providing a greater understanding of the region's politics and societies the study can enhance all forms of Australian engagement with Southeast Asia. It offers insights into differential intra-regional capacities and orientations of political systems to absorb diverse social forces into the political process. This knowledge provides a basis for strategies to promote effective governance reform and other Australian aid programs. It will also assist policymakers seeking to influence the management of, or resolution to, conflicts threatening stability in the region.

## The University of Western Australia

**DP0558083** Prof PA Cawood; Dr CA Buchan; Dr ST Johnston; Dr AE Rapalini; Dr K Regenauer-Lieb; Dr RA Astini; Prof TM Kusky

**Title:** Driving Mechanisms of Mountain Building in Accretionary Orogens

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The University of Western Australia

**Summary:**

Accretionary mountain belts constitute major portions of the Earth's continental crust including the Yilgarn in Western Australia and the area east of Broken Hill constituting a third of the Australian land mass. Understanding the origin of the Permo-Triassic (300-230 Ma) mountain range that lay along the margin of Gondwana from Eastern Australia to South America will provide a new insight into our environment and stimulate international interest through collaboration amongst researchers around the world. Accretionary orogens are of economic importance as they host the Earth's major orogenic gold deposits and our work has potential to provide a new framework for linking mineralization and deformation events within these important settings.

**DP0557060** A/Prof L Cheng; Prof B Sumer; Prof J Fredsoe

**Title:** Numerical Modelling of Three-dimensional Scour below Offshore Pipelines

**2005 :** \$92,000

**2006 :** \$90,000

**2007 :** \$92,000

**Category:** 2912 - MARITIME ENGINEERING

**Administering Institution:** The University of Western Australia

**Summary:**

Australia's increasing offshore oil and gas exploration has demanded more accurate and reliable methods for evaluating the safety and serviceability of pipelines. Local scour around pipelines is one of the major causes of pipeline failures, and is a major concern in Australian waters. This project not only addresses these concerns in its direct application to the design and management of offshore pipelines, but also will contribute to the nation's development and competitiveness in offshore exploration, and produce high quality research students. The improved design and management of pipelines in Australian waters will reduce the risk of potential environmental damages caused by leaking gas and oil.

**DP0559744** A/Prof JM Dell; Prof L Faraone; Dr H Huang; Dr A Keating; A/Prof BJ Griffin; Dr BR Lawn; Prof JJ Talghader

**Title:** **Micro-electromechanical Systems (MEMS) and Nano-electromechanical Systems (NEMS) Technologies for Temperature Sensitive Semiconductors and Smart Materials**

**2005 :** \$230,000

**2006 :** \$207,000

**2007 :** \$215,000

**2008 :** \$215,000

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Institution:** The University of Western Australia

**Summary:**

The development of a generic MEMS/NEMS technology will place Australia at the forefront of MEMS science and technology and will form a platform for new and innovative products using new science developed from the capabilities to be established in this project. This project and the results it will generate will have significant impact in developing technologies that can transform Australian industry in biomedical and agricultural instrumentation and will be key to future optoelectronic defence systems for surveillance, and chemical and biological threat warning. It will have the potential to establish new industries, as well as generate disruptive technologies directly relevant to several industry sectors already established in Australia.

**DP0558407** Dr JC Dunn; A/Prof AJ Heathcote

**Title:** **Are two processes one too many? An investigation of the viability of the dual-process model of recognition memory.**

**2005 :** \$60,000

**2006 :** \$55,000

**2007 :** \$52,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Western Australia

**Summary:**

Memory is the glue that holds together our lives and personal identities. While psychologists are developing better and more sophisticated accounts of how it works, many deep questions remain. The present research examines some of these questions in relation to how memory can be decomposed into its component processes and how we are to understand these processes. An appropriate understanding of these questions is vital to the development of interventions (both psychological and pharmacological) designed to halt or even reverse memory decline associated with normal aging and age-associated brain disease (such as Alzheimer disease).

**DP0559737** Prof AV Dyskin; Dr AN Galybin

**Title:** **Fracture propagation through fragmented solids**

**2005 :** \$90,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2907 - RESOURCES ENGINEERING

**Administering Institution:** The University of Western Australia

**Summary:**

This project investigates fracture propagation in heavily fractured (fragmented) solids such as rock masses, ice covers, fractured coatings, mortar-free structures. It introduces new ideas and methods and has potential to result in a breakthrough science to achieve better understanding of the fundamental processes of fracturing fragmented materials that will advance knowledge and develop technological innovations. A particular outcome of the project will be in developing tools for designing new materials with enhanced failure resistance. Another application is in Resource Engineering and Earth and Planetary Science; the project will contribute to understanding of fracture propagation in the Earth's (and generally, planetary) crust.

**DP0558406** Dr I Einav

**Title:** **Continuum Damage Mechanics in Geotechnical Engineering**

**2005 :** \$72,629

**2006 :** \$63,000

**2007 :** \$74,467

**2008 :** \$60,167

**Category:** 2907 - RESOURCES ENGINEERING

APD Dr I Einav

**Administering Institution:** The University of Western Australia

**Summary:**

Mining and oil exploration are amongst the major industries in Australia and must address geotechnical problems in which growth in damage plays a central role. For example, failure of an offshore platform can occur under cyclic environmental loading, due to accumulated damage to the seabed soils. Design tools are therefore needed that incorporate continuum damage mechanics in modelling the response of geomaterials. The project will place Australia at the forefront in this field through the development of rigorous yet simple numerical models that achieve this, and thus underpin safe but economic geotechnical engineering solutions in the mineral resource industries.

**DP0558602** Dr J Gao; Prof Dr ML King; Prof D Tjostheim

**Title:** **Nonlinear and Nonstationary Time Series Econometrics: Theory and Applications**

**2005 :** \$125,000

**2006 :** \$100,000

**2007 :** \$130,000

**Category:** 3404 - ECONOMETRICS

**Administering Institution:** The University of Western Australia

**Summary:**

The outcomes of this project will not only complement but also enhance the existing research strengths of Australian researchers in time series econometrics. Such a research goal falls within the National Research Priority 3 (PG1). In addition, our models will be applicable in stabilizing the national financial market for more accurate forecasts. This falls within the National Research Priority 3 (PG5). The research outcomes will also provide novel models to respond to climate change and variability and to provide accurate warming estimates for improving the policy making process. This falls within the National Research Priority 1 (PG7)

**DP0558696** Dr F Garcia-Gonzalez

**Title:** **Causes and consequences of multiple mating: Benefits of polyandry, sperm competition, and reproductive costs.**

**2005 :** \$122,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

APD Dr F Garcia-Gonzalez

**Administering Institution:** The University of Western Australia

**Summary:**

The project will yield results that are at the forefront of research in evolutionary biology and that will have a significant international impact thereby placing Australia at the forefront of the international scientific arena. The undertaking of the project will foster strong linkages between Australian and European researchers that will lead to international collaborations that will promote excellence in Australian research.

Identifying sperm quality or male viability is a crucial issue for livestock production. A greater understanding of the mechanisms of sperm competition and the benefits of multiple mating can also benefit conservation biology since these issues are being applied to undertake strategic plans for endangered species.

**DP0559058** A/Prof EL Ghisalberti; Dr KW Dixon; A/Prof RD Trengove

**Title:** **Optimising synthesis, developing delivery systems and resolving the ecological significance of the chemical in smoke that promotes seed germination.**

**2005 :** \$120,000

**2006 :** \$115,000

**2007 :** \$120,000

**Category:** 3008 - ENVIRONMENTAL SCIENCES

**Administering Institution:** The University of Western Australia

**Summary:**

Discovery of the identity of the component in smoke (a butenolide) that promotes seed germination provides the research platform to deliver smoke-like efficacy for germination of native species used in horticulture, land restoration and biodiversity conservation. The study will investigate five key areas to deliver the national benefits of our discovery:

investigate efficacy of butenolide in seed germination; resolve mechanisms of dormancy release via butenolide; optimise synthesis pathways for production of butenolide and germination-effective analogues; investigate the ecological context and natural abundance of butenolide; resolve synthesis and delivery systems for horticulture and restoration.

**DP0556311** Dr JL Heazlewood

**Title:** **Protein modifications in plant mitochondria: towards functional proteomics**

**2005 :** \$105,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

APD Dr JL Heazlewood

**Administering Institution:** The University of Western Australia

**Summary:**

Energy production within plants in cellular structures called mitochondria is vital for their growth and development and is central to the early success of germinating and growing seedlings. This project intends to analyse mitochondria within plants using state of the art instrumentation and technologies. The findings from this research have the potential to directly flow into the plant biotechnology industry and could assist the future development of Australian agriculture through genetic improvements. The expertise developed by this work will ensure that Australia is well placed to exploit future advances in this field and to further generate the development of novel biotechnological applications in agriculture.

**DP0556257** Prof SJ Houghton; Prof K Durkin; Dr J West

**Title:** **Salience, Organisation and Management of Anxiety towards Time in Children with ADHD: A new model and intervention**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$55,000

**2008 :** \$55,000

**Category:** 3301 - EDUCATION STUDIES

**Administering Institution:** The University of Western Australia

**Summary:**

ADHD is a major educational and public health problem in Australia. In the past decade, prescriptions of medication for individuals with ADHD rose 26% nationwide, representing enormous human and economic liabilities. Over 25% of individuals with ADHD also suffer comorbid anxiety disorders. In such cases, the efficacy of stimulant treatment is significantly reduced. Addressing the role of time management and anxiety in the chaotic, impulsive, disorganised lives of young people with ADHD, this project offers significant benefits to the everyday functioning of children and adolescents in school and home, as well as substantial reductions in community expenditure on pharmacological interventions.

**DP0557349** Dr H Huang; Prof GW Stachowiak; A/Prof TB Kirk; Prof T Kuriyagawa

**Title:** **Nano/micro grinding mechanisms and technologies for brittle materials**

**2005 :** \$155,000

**2006 :** \$140,000

**2007 :** \$145,000

**2008 :** \$145,000

**2009 :** \$145,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

ARF Dr H Huang

**Administering Institution:** The University of Western Australia

**Summary:**

The successful completion of the project will solve a long standing problem, that is, the ductile removal mechanism in the machining of brittle materials and create a strong knowledge base for the development of technology and characterization techniques for nano/micro mechanical machining of such materials. This will strengthen UWA's research capability and international competitiveness in the field of nano/micro manufacturing. The pragmatic grinding technology developed for fabricating micro aspherical mould inserts and lenses will directly benefit the optics/photonics, microelectronics and biomedical industries in Australia. This will help to position Australia in the forefront of emerging industries in the new millennium

**DP0559109** Dr H lu

**Title:** **Bifurcation analysis with applications to design of power electronics systems**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2999 - OTHER ENGINEERING AND TECHNOLOGY

**Administering Institution:** The University of Western Australia

**Summary:**

This project represents a fundamental study of nonlinear dynamics in power electronics systems. We expect that this project will result in knowledge advancement and technological innovations. In particular, rigorous algorithms will be resulted for the identification and analysis of nonlinear phenomena in power electronics systems. Special attention will be paid to design applications of power electronics systems. The successful implementation of these methods and algorithms will definitely lead to development of frontier technology in engineering science, which is a National Priority Goal.

**DP0558737** Dr WJ Kennington; Prof MS Johnson

**Title:** **Testing the costs and benefits of gene flow**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$60,000

**Category:** 2702 - GENETICS

**Administering Institution:** The University of Western Australia

**Summary:**

The mixing of individuals from different populations has traditionally been viewed as beneficial because it maintains genetic variation and offsets the deleterious effects of inbreeding. However, this practice can also have detrimental effects on the fitness of populations. In this project field and laboratory experiments will test whether the benefits gained by mixing of individuals from different populations outweigh the costs or vice versa. In addition to providing information essential for the management of endangered species, the results will provide valuable insights on the processes that determine species' ranges and how new species evolve.

**DP0558970** A/Prof JJ Kinder

**Title:** **Enduring diversity: a history of multilingualism in Italy**

**2005 :** \$81,698

**2006 :** \$40,000

**2007 :** \$54,245

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Western Australia

**Summary:**

This project will question several assumptions which have shaped the official histories of language as well as the language policies of several major European countries. This will be a useful contribution to debates on social policy in a country like Australia with its varied migrant populations, since the place of languages other than English often arises in debates on education, immigration and provision of social services at State and Federal level. Italian is still the most widely spoken language in Australia after English, and a new understanding of the history of language in Italy will contribute to a deeper awareness of the realities and problems of migrants and their descendants here.

**DP0556991** Prof S Lewandowsky; Dr NJ Fay; Dr S Kirby

**Title:** **Evolution Of Knowledge: Transformations And Universals**

**2005 :** \$60,000

**2006 :** \$60,000

**2007 :** \$62,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The University of Western Australia

**Summary:**

This project has two principal benefits: A basic scientific outcome concerning the evolution of language and an applied outcome that can inform the design of graphical communication tools. The evolution of language is one of the most hotly debated issues in contemporary science, but to date it has escaped experimental examination. This project develops an experimental methodology that permits examination of the processes by which human knowledge evolves across generations of teachers and learners. In addition, by also examining the final content of evolution, and by determining what type of graphical symbols emerge out of communal evolution, the project can inform the future design of graphical communication tools (e.g., road signs).

**DP0558182** A/Prof AL Lynch

**Title:** **Medieval war in modern imagination**

**2005 :** \$20,000

**2006 :** \$20,000

**2007 :** \$20,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The University of Western Australia

**Summary:**

This project analyses for the first time the growth of medievalist imaginations of war in Australia from colonial times onward. It also investigates for the first time the influence of medievalism on Australian war literature and cinema, exploring how common themes in the representation of Australian war - male group loyalty, anti-authoritarianism, self-sacrifice and posthumous honour - relate to medievalist traditions. The project is of great relevance to current discussions of Australian national identity, and to the public conception of our military role in world and regional affairs, with special relevance to understandings of Australian masculinity, ethnicity and border defence.

**DP0558952** Prof GB Martin; Dr DP Blache

**Title:** **Stimulation of the mammalian reproductive system by olfactory pathways**

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 3004 - ANIMAL PRODUCTION

**Administering Institution:** The University of Western Australia

**Summary:**

This project answers fundamental questions about mammalian reproductive biology but, because we work with the sheep model, our findings can be applied to two of Australia's biggest export industries, wool and sheepmeat. Understanding the reproductive responses of our production animals to exteroceptive factors such as socio-sexual signals, photoperiod and nutrition is an important first step towards refining the management of breeding programs. It has been argued that this approach will also minimise, and perhaps even remove the need for, exogenous hormones and drugs for controlling the reproductive process.

DP0555889 Prof M McAleer; Dr S Hoti

**Title:** Quantifying Country Credit Risk Ratings and Volatility, and Measuring the Impact of Fundamentals

2005 : \$90,000

2006 : \$60,000

2007 : \$70,000

**Category:** 3404 - ECONOMETRICS

**Administering Institution:** The University of Western Australia

**Summary:**

National/community benefits include developing a superior quantifiable ratings method to the qualitative rankings produced by leading international country credit risk ratings agencies, measuring the impact of economic/financial fundamentals on risk ratings, and analysing their fluctuations across countries and risk categories over time. The project provides a solution to the major problems underlying qualitative country risk ratings, namely the irregularity and infrequency of their measurement, and emphasizes the practicality of the results. Expected outcomes include a clearer understanding of how to quantify qualitative rankings and their fluctuations, using information intelligently, and promoting an innovation and knowledge culture.

DP0555945 Prof M McAleer; A/Prof DV Marinova

**Title:** Modelling Dynamic Correlations in the Volatility of Patents and Technical Change

2005 : \$110,000

2006 : \$100,000

2007 : \$120,000

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** The University of Western Australia

**Summary:**

National/community benefits include a clearer understanding of the relation between patents and industrial innovation, measuring the effects of patents on technical change, economic growth and job creation, and analysing their fluctuations over time. The project analyses the variability in technological innovations, measures the impact of innovations on total output and key factors of production, namely labour, capital, energy and materials, and emphasizes the usefulness of the results. Expected outcomes include changing current ideas regarding output generation, understanding broad issues underlying patents and their variability, advancing multi-disciplinary knowledge, using information intelligently and promoting a culture of innovation.

DP0556008 Prof PW Miller

**Title:** Examining Overeducation and Undereducation in the Immigrant Labour Market: An International Case Study Approach

2005 : \$178,000

2006 : \$160,000

2007 : \$180,000

2008 : \$190,000

2009 : \$190,000

**Category:** 3402 - APPLIED ECONOMICS

APF Prof PW Miller

**Administering Institution:** The University of Western Australia

**Summary:**

Overseas research has shown that wages and job satisfaction are affected by the degree to which workers' skills are matched to the requirements of their jobs. Examination of this issue for Australia within an international case study approach will identify avenues through which the matching function of the labour market can be improved, and hence economic efficiency enhanced. This will benefit Australia in that it will provide a basis through which worker satisfaction, lifetime outcomes and aggregate output can be enhanced through a more effective use of our skill-base, and hence permit a strengthening of our social and economic fabric.

DP0557587 Dr AC Niemeyer; Prof CE Praeger

**Title:** Computing with large groups: probability distributions and fast randomised algorithms.

2005 : \$87,000

2006 : \$87,000

2007 : \$86,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The University of Western Australia

**Summary:**

Fast algorithms produced by the project will impact on the practical management of symmetry in large scale searches, which have important industrial applications. Hence the project addresses the Priority Goals Breakthrough Science and Smart Information Use. The project will enhance Australia's leading position in Computational Algebra. Implementations of our algorithms will be incorporated in the Computer Algebra system Magma, based at the University of Sydney, distributed world-wide, and used intensively in research and teaching. The project will attract international and Australian graduate students and postdoctoral researchers, and strengthen research activities in Australia by enhancing already strong international collaborations.

DP0557157 Prof CE Oxnard; A/Prof I Dadour; A/Prof R Napper; Prof P O'Higgins

**Title:** A New Approach to Studying Whole Bodies and Body Parts Applied to Problems of Forensic Science

2005 : \$132,000

2006 : \$80,000

2007 : \$81,000

**Category:** 2802 - ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Institution:** The University of Western Australia

**Summary:**

To bring to the study of whole humans and human body parts, new methods capable of major advances such as those already provided by DNA technology in the study of human tissues, cells and molecules. This will allow better identification of human groups, geographic populations, gender differences and ageing. To update facilities in forensic sciences strengthening Australian security systems thus helping fight terrorism and crime. To establish international collaborations for Australia, especially with Asia. To train young people, through Master's and Doctoral degrees programmes, in handling the new techniques and applying them to problems of forensic science

**DP0559840** Dr G Parish; A/Prof BD Nener; Prof UK Mishra

**Title:** Ion implantation doping of gallium nitride for high performance electronic devices

**2005 :** \$302,000

**2006 :** \$192,000

**2007 :** \$191,000

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Institution:** The University of Western Australia

**Summary:**

This project forms part of a long-term, international research program into the development of high-power, high-frequency electronics for high performance radar and communications systems. The advanced fabrication technologies and designs being investigated in this project fall well within the designated priority goal of Frontier Technologies. Gallium nitride technology is also of high interest to defence organisations, as radar and satellite-communications links, which operate at frequencies ranging from hundreds of MHz to tens of GHz, often have high power-amplification requirements. The project therefore also falls within the priority goal of Transformational Defence Technologies.

**DP0560063** Dr PA Podsiadlo; Prof GW Stachowiak

**Title:** Automated texture selection and classification methods for detection of osteoarthritis in knee

**2005 :** \$72,000

**2006 :** \$67,000

**2007 :** \$66,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Western Australia

**Summary:**

In Australia there are 1-2 million OA sufferers, a condition that costs approximately \$9 billion annually. This project will address an important problem of early detection and monitoring of OA and this remains in line with the National Research Priority 2. Potential outcomes of the project will result in better diagnosis and treatment of OA, reduced discomfort to the individual and saving to the national economy. This project will improve existing activity and rehabilitation programs such as exercise of lower limbs and it will help in developing diets for healthy people and OA sufferers.

**DP0556376** Prof CL Raston

**Title:** Integrated self assembly processes and spinning disc reactor technology

**2005 :** \$245,000

**2006 :** \$245,000

**2007 :** \$245,000

**2008 :** \$245,000

**2009 :** \$245,000

**Category:** 2599 - OTHER CHEMICAL SCIENCES

APF Prof CL Raston

**Administering Institution:** The University of Western Australia

**Summary:**

Spinning Disc Reactor technology is new to Australia and will have wide ranging applications in nano-technology and in developing benign industrial chemical processes with smaller footprint and significantly reduced capital outlay. The cutting edge research will foster collaboration with industry, and lead to establishing new industries in device technology, smart materials, health care products, catalysis and energy storage, through exploiting commercial opportunities. The project will provide excellent research training in a range of scientific skills and in professional development, and will involve overseas PhD exchange programs. The exciting research incorporating benign metrics will enhance public opinion towards science.

**DP0556992** Dr RE Read

**Title:** Representations of the Backs of Paintings: Analysis and History

**2005 :** \$44,000

**2006 :** \$20,000

**2007 :** \$20,000

**Category:** 4199 - OTHER ARTS

**Administering Institution:** The University of Western Australia

**Summary:**

Australia's regional status within the Western tradition of painting makes it a highly significant test case within the geographical criteria of the study. The paradoxical effects of closeness and distance in representations of the backs of paintings made its use here surprisingly frequent and strikingly ambivalent. Some painters obsessively repeat the motif as if to overcome remoteness from the tradition of Velásquez. Others employ it in fundamental questioning the institution of Western painting. Study of this dichotomy will improve understanding of Australian concepts of remoteness in space and time relative to other cultures. Interpretations will also enhance visual and verbal communication between art communities here and overseas.

**DP0556824** Dr J Shand; Dr CA Arrese; Prof RG Foster

**Title:** **The entrainment of circadian rhythms in marsupial mammals: behavioural and sub-cellular investigation of non-rod, non-cone ocular photoreceptors.**

**2005 :** \$90,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** The University of Western Australia

**Summary:**

Our investigation will provide a contribution to understanding the role that photoreceptors play in the mechanisms that control circadian rhythms and will ultimately lead to a better understanding of the basic physiology of sleep and circadian cycles, their contribution to learning and memory and their impact on waking performance. Targeted drug development and the design of lighting systems effective in regulating circadian rhythms will improve the quality of life and competitiveness of the many citizens who endure abnormal sleep/wakefulness schedules.

**DP0559839** Prof GR Shellam; A/Prof SA Robertson

**Title:** **Mechanisms of infertility induced in mice by vaccination with murine zona pellucida 3**

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 3202 - IMMUNOLOGY

**Administering Institution:** The University of Western Australia

**Summary:**

This research investigates the means by which a novel immunocontraceptive vaccine induces an infertile state in female mice. The vaccine stimulates an autoimmune condition which resembles certain naturally occurring ovarian diseases. By investigating how ovarian cellular interactions are maintained in normal ovaries and disrupted by the immunocontraceptive vaccine, we will learn a great deal about ovarian function in health and disease. Ultimately this information will be applied to improving the reproductive health of women.

**DP0556569** Prof LW Simmons; A/Prof JD Roberts

**Title:** **Sperm competition and the evolution of ejaculates**

**2005 :** \$170,000

**2006 :** \$130,000

**2007 :** \$130,000

**2008 :** \$130,000

**2009 :** \$130,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Western Australia

**Summary:**

This research will yield results that are at the cutting-edge in evolutionary biology, that will have a significant international impact, promoting the international profile of Australian science. The award will foster a world-class centre for research, and will train internationally competitive research scientists, adding to Australia's scientific capabilities. Through the development of IVF techniques in frogs, the research has the potential to contribute to conservation outcomes for Australia's native frog fauna via captive breeding programs. The research groups connections with local infertility clinics has the potential to inform those studying human sperm in a time of growing concern over rising human infertility.

**DP0559333** A/Prof TG St Pierre; Dr RC Woodward; Dr EP Gilbert; Prof JS Riffle

**Title:** **Magnetic Nanoparticles for Biomedical Applications**

**2005 :** \$90,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2915 - BIOMEDICAL ENGINEERING

**Administering Institution:** The University of Western Australia

**Summary:**

This project will develop biocompatible magnetic nanoparticles for future generations of therapeutic and diagnostic applications. Applications include the reduction in overall toxicity of chemo- and radio- therapy by magnetic target drug delivery, enhanced ability to detect and diagnose diseases using magnetic binding/sorting techniques and an enhanced ability to repair detached retinas. The development of these products provides the potential for the development of new commercial opportunities in biotechnology and biomedical science in which Australia has an excellent track record. The project will also enhance Australia's capabilities in both nanotechnological and biotechnological sciences.

DP0557093 A/Prof ME Tobar; Dr JG Hartnett; Prof C Salomon; Prof A Clairon; Dr C Locke; Dr PT Fisk; Prof P Guillon

**Title:** New High Precision Tests on the Standard Model of Physics and Relativity

**2005 :** \$252,000

**2006 :** \$175,000

**2007 :** \$176,000

**2008 :** \$200,000

**2009 :** \$110,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

QEII Dr JG Hartnett

**Administering Institution:** The University of Western Australia

**Summary:**

Precision microwave oscillators developed at UWA are among the most precise devices for testing the current theories in modern physics, such as relativity and the standard model. With new timely experiments in the laboratory at UWA and with our collaborators in France, we are searching for violations which may lead to a breakdown in the current understanding of physics. This project will strengthen Australian 'know how' and expertise, which will place us in a position to participate in current and future space missions. Moreover, this represents an opportunity to be involved as the only southern hemisphere users of the most accurate space clock ever developed.

DP0557849 Dr JL Tomkins

**Title:** Quantifying condition-dependence in sexual selection

**2005 :** \$150,000

**2006 :** \$130,000

**2007 :** \$130,000

**2008 :** \$130,000

**2009 :** \$130,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

ARF Dr JL Tomkins

**Administering Institution:** The University of Western Australia

**Summary:**

This research centres on testing evolutionary models of sexual selection. The project has relevance for understanding the role of mutations in reducing the fitness of populations and hence has implications for the conservation of endangered species and for human health. The research also investigates how investment in one trait, such as horns, will take resources away from another, like muscle. This has implications for animal production. The project utilises pest species as research models and will hence provide further understanding of pest life-history, knowledge critical to the success of control programmes. Australian science will further benefit through the research fellow's established collaborations with international scientists.

DP0557569 Prof DI Walker; Prof CM Duarte; Prof AI Robertson; Dr PF Grierson

**Title:** Understanding coastal biodiversity: The impact of marine production subsidies upon arid coastal environments

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Western Australia

**Summary:**

Many of the Earth's coastlines have productive seas next to arid terrestrial habitats. Much of the coastline of Western Australia is arid. Our project will determine if biodiversity in fringing terrestrial areas is controlled by the supply of marine plant material that is transported to land by waves, wind and birds. A consequence of increasing coastal usage is associated growing anthropogenic pressures on the coastal environment. Our aim is to enhance awareness of the interactions that occur between terrestrial and marine systems, and hence to increase the capacity of the public and private sector to manage marine and terrestrial ecosystems, and the interface between them.

DP0557148 A/Prof S Wang; Dr X Lou

**Title:** Optimum design of controlled drug delivery systems

**2005 :** \$91,000

**2006 :** \$69,000

**2007 :** \$71,000

**Category:** 2804 - COMPUTATION THEORY AND MATHEMATICS

**Administering Institution:** The University of Western Australia

**Summary:**

Controlled drug delivery systems are ideal to achieve localised release of drugs at an effective rate for a prolonged period. They have the merit of optimising drug absorption by a body, relieving patients from frequent administration and high dosage of drugs which often result in drug wastage, patients' inconvenience and more importantly the side effects that can be fatal. The success of this project will (1) enhance the Australia pharmaceutical industry's competitiveness in the global market, (2) provide good medication for the treatment of various diseases, promoting good health of Australians, (3) lead to new mathematical models and solutions that are also applicable to such fields as resources and environmental systems.

DP0556607 A/Prof R Weller; A/Prof DA Hedgcock

**Title:** Redesigning the Suburb: A Landscape Architectural Inquiry.

**2005 :** \$92,000

**2006 :** \$91,000

**2007 :** \$95,000

**Category:** 3101 - ARCHITECTURE AND URBAN ENVIRONMENT

**Administering Institution:** The University of Western Australia

**Summary:**

A Perth-based multi-disciplinary design project is to seek out ways in which new practices in suburban development can improve a sense of place in new suburbs in accord with community aspirations. Current development codes will be explored and challenged, focussing on infrastructure and ecology. Perth is a city in the bush, eating into its famous flora, but the outcomes of this project will just as easily apply to Queensland or Tasmania in regard to improving biodiversity, maintaining a sense of original topography, improving wise water use, and influencing the conception and construction of new suburban areas by the development industry.

DP0555929 Dr T Wernberg; Dr GA Kendrick; A/Prof RC Babcock

**Title:** Effects of physical disturbance on kelp-dominated reef communities across a broad temperate-tropical transition zone

**2005 :** \$70,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The University of Western Australia

**Summary:**

The outcomes of this project will improve the understanding of the interactions between physical disturbances, nutrient enrichment and climate change. This addresses the national research priority of an environmentally sustainable Australia (priority goals sustainable use of biodiversity and responding to climate changes) and will contribute directly to Australia's commitments on marine ecosystem management and conservation.

DP0557837 Dr B White; Dr RG Chambers

**Title:** Designing Better Landowner Contracts to Protect Australia's Environment

**2005 :** \$69,757

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The University of Western Australia

**Summary:**

There will be two main benefits from this project. First a reduction in the cost of protecting the environment and second, a greater awareness amongst regulators of the determinants of compliance costs and their variability amongst landowners. By making environmental contracts more efficient, this project will contribute towards making Australian agriculture more sustainable in terms of protecting biodiversity, conserving water and reducing the rate of soil loss.

## Tasmania

### University of Tasmania

DP0558295 Dr BJ Baird

**Title:** Reconfiguring intimate life: Gender and sexuality as sites of national redefinition in Australia since 1996

**2005 :** \$40,000

**2006 :** \$20,000

**2007 :** \$30,360

**Category:** 4203 - CULTURAL STUDIES

**Administering Institution:** University of Tasmania

**Summary:**

This project opens up current thinking about the nature of change in twenty-first century life in Australia by focusing on issues of gender and sexuality. It draws critical attention to a field of contest and re-negotiation of national identity and belonging, thus far not identified, that has far-reaching effects for the national fabric. It provides opportunities for thinking about sexual and reproductive relationships in ways that can be open to voices, stories and forms of belonging that signal a more generous, sustainable and healthy non-violent future.

The impact of the project will be on professional and scholarly training, teaching and research across a variety of disciplinary areas, as well as public debate.

DP0559050 A/Prof MS Barrett

**Title:** Young children's world-making through music: Young children's identity construction in and through

**2005 :** \$76,000

**2006 :** \$59,000

**2007 :** \$58,000

**Category:** 4101 - PERFORMING ARTS

**Administering Institution:** University of Tasmania

**Summary:**

The research addresses the National Research Priority Goal of 'A Healthy Start to Life' by providing new information on music's role in generating positive mental health and well-being outcomes for young children with a focus on their construction of identity in and through music. This research will impact on early childhood policy and practices in child-care and early learning settings. It will inform the development of programs that build strong self-identity, contribute to the emotional health of young children, and promote the social engagement of young children, factors that are foundational to subsequent success in formal schooling.

**DP0559760** Prof DR Chalmers; Dr D Nicol; Prof MF Otlowski; Prof L Skene

**Title:** Facilitation and Regulation of Research and Development Involving Human Genetic Databanks

**2005 :** \$100,000

**2006 :** \$100,000

**2007 :** \$164,000

**2008 :** \$112,904

**2009 :** \$125,693

**Category:** 3901 - LAW

**Administering Institution:** University of Tasmania

**Summary:**

Australia's medical biotechnology research feeds into our biotechnology industries, with flow-on benefits for national health and prosperity. Realisation of these benefits is contingent upon community protection and public trust. An effective and appropriate regulatory regime is a foundation requirement. This project aims to shape a national regulatory framework for human genetic databanks that both facilitates research and maintains highest ethical standards. By examining the balance between facilitation and regulation, assessing existing law reform proposals, making recommendations for further reform, and placing this analysis in the international context, this project will significantly benefit the nation and the research community.

**DP0556630** Dr R Chung; A/Prof AK West; Prof J Vickers; Dr M Chuah

**Title:** Using metallothioneins as a model for understanding cellular and biochemical interactions between neurons and astrocytes within the brain

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**2008 :** \$70,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY  
APD Dr R Chung

**Administering Institution:** University of Tasmania

**Summary:**

This research will reveal some of the changes that occur in the relationship between neurons and astrocytes as a consequence injury, aging or disease to the human brain. In national terms, it will contribute to the concerted effort by Australian scientists to understand how and why neurons die following brain injury or in neurodegenerative diseases. These are significant community issues in both economical and social terms. Furthermore, this research contributes directly to the Designated National Research Priorities by identifying some of the earliest cellular processes associated with aging or disease of the brain, and will provide clues to promoting healthy aging.

**DP0559778** Dr GJ Davidson; Dr DR Cooke; Dr C Deyell

**Title:** Cracking the sulfate isotopic composition problem in ancient hydrothermal systems: application of the Carbonate-Associated Sulfate (CAS) method

**2005 :** \$65,000

**2006 :** \$65,000

**2007 :** \$60,000

**Category:** 2603 - GEOCHEMISTRY

**Administering Institution:** University of Tasmania

**Summary:**

Successful exploration of the deep Earth for valuable ores requires better knowledge of ore formation conditions, to feed to predictive deposit models. Our work shows great promise of improving the quality of this raw data. Smarter ore deposit prediction would likely exert its influence over the next ten years, rather than be immediate. It will increase exploration efficiency, saving tens of millions of dollars currently devoted to unproductive exploration. Exploration and mining are conducted primarily in regional Australia, and a healthy mining industry is therefore directly benefits hinterland communities. It also benefits all Australians through the payment of royalties and contributions to Australia's GDP from mineral exports.

**DP0559613** Prof JM Dickey

**Title:** Transient Astronomical Sources at Radio Frequencies

**2005 :** \$116,194

**2006 :** \$119,694

**2007 :** \$81,994

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** University of Tasmania

**Summary:**

Australian radio telescopes are among the finest and most modern anywhere in the world, and they are the only such instruments that can study the Southern Hemisphere sky. The University of Tasmania operates two radio observatories, at Hobart, Tas, and Ceduna, SA, that are used together to detect astronomical pulses arriving simultaneously at the two sites. The techniques of interference suppression, dispersion searching, fast sampling over broad bandwidths, and high speed data transmission between Ceduna and Hobart that will be implemented in this project have direct applications in science and the communications industry. The students who will develop this equipment will carry over their expertise to the private sector.

**DP0558459** Prof TD Dwyer; A/Prof A Ponsonby; Prof A Carmichael; Dr D Bridge; Ms AJ Jacob

**Title:** Does binocular vision training enhance literacy among primary school children with poor reading?

**2005 :** \$70,000

**2006 :** \$140,000

**2007 :** \$78,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** University of Tasmania

**Summary:**

One in ten Australian children can not read well despite adequate intelligence and opportunity. This project aims to find out the extent that these reading problems reflect poor binocular vision (the eyes not working well together) and evaluate new treatments.

**DP0558842** A/Prof RM Ferrell; Dr J Biddle

**Title:** Feminist theory meets indigenous art

**2005 :** \$100,000

**2006 :** \$77,000

**2007 :** \$78,000

**Category:** 4102 - VISUAL ARTS AND CRAFTS

**Administering Institution:** University of Tasmania

**Summary:**

Aboriginal reconciliation is high on the social and cultural agenda in Australian life. The place of art in this political moment has been critical - the culture of Australian indigenous people has come to international attention, and won recognition, largely through art works. This reflects in many cases a political strategy on the part of indigenous communities to use art to depict their traditional Dreamings, of which the world was ignorant. But underlying this, is the assumption made in Aboriginal philosophies that the art is the knowledge it portrays, which in turn evokes title to land through the law of Dreaming, of belonging to 'country'. To better understand this negotiation advances debate on issues surrounding reconciliation.

**DP0557803** Dr RM Guijt

**Title:** Disposable microdevices for fast ion analysis

**2005 :** \$75,000

**2006 :** \$60,000

**2007 :** \$60,000

**2008 :** \$55,000

**Category:** 2504 - ANALYTICAL CHEMISTRY

APD Dr RM Guijt

**Administering Institution:** University of Tasmania

**Summary:**

The design and fabrication of a microdevice for ion chromatography will introduce Australia to the field of miniaturised total analytical systems ( $\mu$ TAS). The availability of infrastructure, technology and experience in the  $\mu$ TAS area will provide the foundation for specialised commercialisation of sophisticated, chip-based analytical instruments. These instruments have important applications in forensic, clinical and environmental chemistry.

**DP0557820** A/Prof GM Hallegraeff; Dr PD Nichols; Mr L MacKenzie

**Title:** Synergistic interactions between reactive oxygen species, free fatty acids and neurotoxins as the fish-killing mechanism of Australian gymnodinoid dinoflagellates

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2704 - BOTANY

**Administering Institution:** University of Tasmania

**Summary:**

Provide the scientific basis for sound management and mitigation strategies to prevent algal bloom impacts on aquaculture, fisheries and the environment.

**DP0557922** Dr NO Jackson; Dr BS Felmingham; Dr MM Walter

**Title:** Will older workers change their retirement plans in line with the Government's calls for later retirement?

**2005 :** \$165,000

**2006 :** \$32,000

**2007 :** \$35,000

**Category:** 3705 - DEMOGRAPHY

**Administering Institution:** University of Tasmania

**Summary:**

The study will inform and contribute to the integration of retirement policy reform across all tiers of Government. It will especially project probabilities of change in workforce and retirement behaviour, and evaluate the likely efficacy of policy measures aimed at encouraging labour market participation among older workers and reversing current trends to early retirement. The study is timely because population ageing in Australia is just becoming a factor in labour market considerations, but its effects (which differ markedly by region) will soon escalate.

**DP0559246** Prof CR Johnson; Prof LL Blackall

**Title:** **Community-level selection: Empirical tests in a microbial system.**

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** University of Tasmania

**Summary:**

Given the profile of the question of community-level selection as a long-running controversy, the main benefit of the proposed work, which will critically test the idea in an empirical system, will be to increase recognition of Australia's position as a research nation in evolutionary biology. In exploring mechanisms of floc formation, a key component of wastewater treatment, the work will establish important foundations for improving the efficiency of wastewater treatment. Improvement in performance of only a few percent will bring important economic savings. This is evidenced by recent commitment of >\$US 230 billion to improving the efficiency of wastewater treatment in Germany, Italy and Spain over 5 years.

**DP0555984** Dr V Kamenetsky

**Title:** **Unmixing in Magmas: Melt and Fluid Inclusion Constraints on Identity, Timing, and Evolution of Immiscible Fluids, Salt and Sulphide Melts**

**2005 :** \$134,190

**2006 :** \$149,262

**2007 :** \$155,724

**2008 :** \$151,682

**2009 :** \$135,967

**Category:** 2601 - GEOLOGY

APF Dr V Kamenetsky

**Administering Institution:** University of Tasmania

**Summary:**

Much of the research proposed herein genuinely breaks new ground in both the fields of igneous petrology and ore deposit geology. It will contribute to Australia maintaining a leading role (as identified in 'Towards 2005 - a prospectus for research and training in the Australian Earth sciences') in the burgeoning field of melt inclusion research, and serve as a training base for young researchers keen to learn the techniques and methodologies involved. The possible outcomes of the project are of wide interest to geoscientists, and may benefit the Australian economy in that they help to predict whether the magmas have experienced exsolution of a metal-rich fluid.

**DP0559803** Prof AJ Kellow; Prof PG Carroll

**Title:** **Australia and the OECD: A Neglected Arena in Multi-level Governance**

**2005 :** \$45,000

**2006 :** \$45,000

**2007 :** \$30,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** University of Tasmania

**Summary:**

Issues such as trade liberalisation and the development of international agreements are of considerable importance for domestic policy within Australia. Development of such ideas and policies often serve as the basis for subsequent agreements in the multilateral system through policy transfer or the strategy of 'forum shopping'. Australia's interests as a middle power lie in a rules-based system, and thus its ability to maximize its effectiveness in shaping those rules is of paramount importance. This project will contribute knowledge which will serve directly this goal, by enhancing our understanding of the OECD as an arena of multilevel governance and Australia's participation within it.

**DP0559696** Dr JA Reynolds

**Title:** **Time and Politics: A Rapprochement of Analytic Political Philosophy and Post-structuralism**

**2005 :** \$20,000

**2006 :** \$20,000

**2007 :** \$20,000

**Category:** 4401 - PHILOSOPHY

**Administering Institution:** University of Tasmania

**Summary:**

The most obvious benefits of this project will be academic, in that it will enrich contemporary political philosophy and advance theoretical work on the post-structuralism of Derrida and Deleuze. I will also be consulting with philosophers across Australia of both analytic and 'European' persuasion, and encouraging such a dialogue contributes to what is an emerging movement to break down the oppositional thinking that has pervaded the Australian philosophical community. Finally, the findings of this project will also be used to instigate new ways of thinking regarding political issues afflicting Australians and the world, particularly in regard to refugees and reconciliation.

DP0557840 A/Prof AM Richardson; Dr CM Austin; A/Prof P Horwitz; Dr KA Crandall

**Title:** Evolutionary, macroecological and phylogenetic patterns in Australasian freshwater crayfish

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** University of Tasmania

**Summary:**

This project connects Australian systematists to a worldwide project that involves all of the world's living experts on freshwater crayfish evolution in a coordinated effort to answer some very important evolutionary questions. It involves a group of invertebrate animals that are not only readily recognisable, but which in Australia includes the world's largest and the world's most terrestrial crayfish species. Information gained from the project will contribute to the management of crayfish biodiversity, identification of threatened species and tools to identify these prominent and important members of Australian freshwater ecosystems.

DP0559874 Dr S Shabala; Dr JP Bowman; Dr T Ross

**Title:** Integrating electrophysiology and molecular biology to understand the role of cell membranes in bacterial responses to chill and osmotic stress

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** University of Tasmania

**Summary:**

Modern food manufacture is driven by competing demands: consumers prefer foods that are 'natural', i.e. having received minimal processing and containing less preservatives, and last, but are safe. Thus, a challenge is to find minimal sets of treatments and preservatives that limit microbial growth.

Current methods to for determining limits to microbial growth are time and consuming and empirical. We will assess the potential of a new method (MIFE) to rapidly measure limits of bacterial growth under combinations of treatments. At the same time we will study how cells, and in particular how the cell membrane, responds to these stresses to provide insights for the development of new, minimal - yet safe - food preservation technologies.

DP0557260 Dr RE Vaillancourt

**Title:** Genetic legacy of climate change in Australian temperate forests

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2702 - GENETICS

**Administering Institution:** University of Tasmania

**Summary:**

This work will make a significant contribution to the understanding of the Quaternary history of the forests of south-eastern Australia. Finding the location of glacial refugia is crucial to the development of long-term conservation strategies, as they are areas of high genetic and species diversity. Understanding the evolutionary processes that affect genetic diversity and gene flow of these keystone species (*Nothofagus cunninghamii*, *N. moorei*, *Acacia melanoxylon*, *Eucalyptus viminalis*) will help their long-term management.

DP0556508 Dr J Weller

**Title:** Mobile signals and the environmental control of flowering - a comparative genetic analysis

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2704 - BOTANY

**Administering Institution:** University of Tasmania

**Summary:**

The results from this project will add to our basic knowledge of the way in which environmental factors influence flowering in plants. The timing and duration of flowering is a critical determinant of yield for many crop species, and of market value for many ornamental species. A better understanding of the basic genetics and physiology of flowering will thus be relevant for plant breeders and horticulturalists seeking to modify flowering responses to suit particular production strategies, and will help to maintain the strong position of Australia as a world leader in applied aspects of plant/environment interactions. It will also strengthen the international reputation of Australia for high-quality basic research in plant development .

## Northern Territory

### Charles Darwin University

**DP0558350** Dr BW Brook; A/Prof PJ Whitehead

**Title:** Plant-herbivore interactions: a model two-species system from northern Australia

**2005 :** \$150,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Charles Darwin University

#### Summary:

The proposed research addresses a critical aspect of magpie goose ecology. Understanding the interaction between the birds and the bulbs is critical to respond effectively to past and threatened losses of important sedge habitats to sea level rise. This knowledge will inform management of the Kakadu World Heritage Site and an iconic waterfowl of great cultural and economic significance. In addition to their importance as a Gondwanan relic and sole member of the Family Anseranatidae, the species is an important food-source for Aboriginal people, and tourists travel to the Kakadu wetlands to witness huge dry season congregations.

**DP0559093** A/Prof KA Christian; A/Prof FG De Boer; Prof CR Tracy

**Title:** Competition between regulatory processes in Amphibians: Testing the effects of physical and physiological factors on thermoregulation and hydoregulation

**2005 :** \$80,000

**2006 :** \$70,000

**2007 :** \$70,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** Charles Darwin University

#### Summary:

Regulation of body temperature is important for many animals, and it influences processes such as growth and reproduction. However, it is not clear to what extent wet-skinned animals can control body temperature because of evaporation. Understanding this about frogs is crucial to understanding their habitat requirements and the effects of climate change, habitat modification, and the invasion of cane toads on their populations. Amphibians are in decline worldwide, and research into the basic ways that these animals interact with the physical environment is needed before effective management plans can be produced. The unique physiological characteristics of Australian frogs make this is the best place in the world to do this research.

## Australian Capital Territory

### The Australian National University

**DP0556211** Dr BH Andrews; Dr JA McCoy

**Title:** Singularities and surgery in geometric evolution equations

**2005 :** \$96,000

**2006 :** \$91,000

**2007 :** \$96,000

**2008 :** \$70,000

**Category:** 2301 - MATHEMATICS

APD Dr JA McCoy

**Administering Institution:** The Australian National University

#### Summary:

The analysis of geometric evolution equations is a very active area of mathematical research internationally. The applications of such systems to physical problems such as crystal growth and flame propagation are also of great interest in the broader scientific community. The proposed research addresses questions central to the understanding of curvature flows. The project will yield internationally significant results in theoretical mathematics, with applications in physics, engineering and image processing. These results will enhance Australia's reputation for high quality theoretical mathematical research with real world applications.

**DP0558185** Dr CH Arns; Prof PT Callaghan

**Title:** Transport properties from Nuclear Magnetic Resonance

**2005 :** \$93,708

**2006 :** \$102,000

**2007 :** \$101,314

**Category:** 2907 - RESOURCES ENGINEERING

APD Dr CH Arns

**Administering Institution:** The Australian National University

#### Summary:

Australia is embarking on the development of major gas fields offshore western Australia. These developments are very costly (~1Billion) and tools to manage the risk in development are well sought after. NMR response is the only tool offering a good correlation to permeability, one of the major factors whether oil/gas recovery is economical. The actual rocks studied will be selected to make the results of the study of immediate value to Australian oil and gas producers.

DP0558836 Dr M Asplund; Prof DL Lambert; Dr C Allende Prieto; Prof B Gustafsson

**Title: Stellar abundances as records of stellar nucleosynthesis and galactic evolution**

**2005 :** \$120,000

**2006 :** \$110,000

**2007 :** \$117,000

**2008 :** \$110,000

**2009 :** \$110,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

Astronomy is a center-piece for Australian science and this project builds on this tremendous success. By attempting to answer basic questions like "when and where are the various chemical elements like carbon and iron produced?" and "how was our own Galaxy formed?" our program will stimulate interest in the natural sciences in the general public. We will gain access to international observational facilities of which Australia is not a member to a monetary value of several million dollars. In addition, the proposed project will train students and postdoctoral fellows in cutting-edge science as well as equipping them with extensive skills in computing, data analysis, project management, and effective communications.

DP0556338 Prof MG Banwell

**Title: Generation of Novel Fermentation Products and their Exploitation in the Synthesis of Biologically Active Organic Compounds with Therapeutic Potential**

**2005 :** \$280,000

**2006 :** \$250,000

**2007 :** \$250,000

**2008 :** \$250,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

Collections of new micro-organisms and their metabolites suitable for use in the chemical synthesis programs will emerge from the proposed research. This will provide a potentially highly-valuable national resource that could serve the needs of many laboratories around Australia by allowing them to establish more direct routes to target molecules being sought in the development of new therapeutic agents and/or materials. The combined application of molecular biological, microbiological and chemical synthesis techniques in a concerted manner in the one location will lead to a raft of new opportunities for the biotech and pharmaceutical industries in Australia.

DP0557643 Prof GR Barne; Prof K Louie

**Title: A Historical and Cultural Analysis of Qigong in Contemporary China**

**2005 :** \$80,010

**2006 :** \$80,387

**2007 :** \$100,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The Australian National University

**Summary:**

This project will assist Australians to understand important developments in contemporary Chinese society, enhancing the basis of our bilateral relationship, especially in discussions of human rights and refugee issues. A better knowledge of qigong will also promote social and religious understanding in Australia where qigong practice is a significant feature of some sectors of society. This project will complement and enhance Australia's already strong international reputation in contemporary Chinese Studies and foster future collaborations and networks. Finally, it will also give unique insights, from a particular Australian perspective, on the impact of the international media on the creation of China issues in a global context.

DP0557143 Dr TT Barrows

**Title: Cosmogenic isotopes in glacial landscapes: climate change and production rates**

**2005 :** \$120,000

**2006 :** \$90,000

**2007 :** \$80,000

**Category:** 2601 - GEOLOGY

APD Dr TT Barrows

**Administering Institution:** The Australian National University

**Summary:**

By dating glacial deposits near Australia, we will provide new insights into climate change in our region. A better understanding of the factors that control climate change in our region will be of benefit to all Australians. We will use a tool called exposure dating that has become very important in understanding a variety of processes at the Earth's surface, many of which are poorly understood in the Australian region. Our research will ensure that Australia remains at the leading edge of the application of this technique and is included in future international research programs.

DP0558315 Prof PG Board; Dr MG Casarotto

**Title: Cellular uptake of glutathione transferases and their development as cell transfection agents**

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 3203 - MEDICAL BIOCHEMISTRY AND CLINICAL CHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

The function and survival of all cells requires the importation of a vast array of biochemical agents. In order for this to occur, these agents must be transported across the cell membrane wall. We are investigating a novel delivery system involving the enzyme glutathione transferase (GST). By investigating how GSTs cross membranes, we will be able to develop a new technology for the delivery of biologically active molecules into cells. This exciting new technique will have applications in research and in the delivery of therapeutic drugs for the treatment of a range of diseases.

**DP0559260** Dr HS Booth; Prof SR Wilson

**Title:** **Sequence to Sequence: Rigorous Statistical and Mathematical Analysis of Biological Sequence Data**

**2005 :** \$121,000

**2006 :** \$87,000

**2007 :** \$101,000

**Category:** 2399 - OTHER MATHEMATICAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

Comparative genomics is fundamental for developing an understanding of genes and their function. For example, using statistical and computational techniques, it was recently demonstrated that 60% of genes are conserved between fly and human. When the human gene that confers susceptibility to Parkinson's disease was transferred into the fly it caused symptoms similar to those seen in humans. The future development of 'personalized medicine' will rely upon understanding the function of human genes, as will progress in the agricultural sector. Rigorous statistical analysis and development of appropriate bioinformatic methods are crucial to biological sequence analysis in comparative genomics.

**DP0556821** Prof RW Boswell; Dr C Charles; Dr AL Dicks

**Title:** **Development of new membrane-electrode assemblies for low temperature fuel cells**

**2005 :** \$413,000

**2006 :** \$253,000

**2007 :** \$232,000

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Institution:** The Australian National University

**Summary:**

New electrodes and electrolytes for low temperature fuel cells will herald in a new epoch in the hydrogen economy for Australia. The IP developed in this project will form the basis for new transportation systems that do not lead to chemical pollution in Australia's cities. The new materials and processing techniques will lead to cheaper and more efficient fuel cells, allowing their use in portable computers, small electrical appliances, public transport and in private cars in about ten years.

**DP0558628** Prof RW Boswell; Dr WT Li

**Title:** **Preparation of silica-based thin film materials with large optical nonlinearity**

**2005 :** \$112,000

**2006 :** \$99,000

**2007 :** \$104,000

**Category:** 2914 - MATERIALS ENGINEERING

APD Dr WT Li

**Administering Institution:** The Australian National University

**Summary:**

There is currently a lack of advanced thin film materials suitable for fabricating integrated electro-optic devices to use in optical telecommunication. Such materials will be produced, and their application will be developed through this project. The physical mechanism of the marvelous optical nonlinearities of the materials will also be investigated. Thus the achievement of this project will bring great advancement in both scientific knowledge and technologies for Australia, and provide huge opportunities to boost Australian telecommunication industries, which are developing quickly in recent years.

**DP0558817** Dr JL Braun; Dr A Pulford; Dr P Cummins

**Title:** **A new rheological model for Australia to improve seismic hazard estimates and study the region's recent tectonic history and landform evolution**

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The Australian National University

**Summary:**

Australia is currently being squeezed between three active mountain belts, the Himalayas, the Papua New Guinea Highlands and the Southern Alps in New Zealand. We propose to integrate a large number of geological and geophysical databases that have been collected over the past few decades to develop a three-dimensional rheological model of the Australian continent, that is a model that predicts where and how Australia is deforming today. Combined with new, targeted field work, this model will be used to predict where earthquakes are likely to take place but also to study how our old continent is affected by these active mountain belts to create the present-day landscapes in which we live.

DP0559688 Prof FH Briggs; Dr M Colless; Dr JN Chengalur

**Title:** Star Formation and Gas Consumption in High Redshift Galaxies

2005 : \$100,000

2006 : \$80,000

2007 : \$80,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

The research addresses fundamental issues in the nature of the Universe and how our present world came to be. The spirit of exploration is contagious, and Australia's successes in astronomy are a source of national pride. Observations of hydrogen gas have long been recognised as a key to following galaxy formation and evolution, and they are a key driver for building the Square Kilometre Array telescope, a project which could be sited in Australia. The SKA project is a multi-billion dollar project, which would bring international recognition and prestige. Development of the scientific expertise to motivate this project is an important part of establishing Australia's leadership role.

DP0557499 Dr JJ Brocks; Prof AH Knoll

**Title:** Reconstruction of anoxic and toxic conditions in Australian lakes and ancient oceans

2005 : \$150,000

2006 : \$140,000

2007 : \$125,000

2008 : \$125,000

2009 : \$125,000

**Category:** 2603 - GEOCHEMISTRY

QEI Dr JJ Brocks

**Administering Institution:** The Australian National University

**Summary:**

Sustainable water quality is a critically important issue for Australia's economic and social development. To be able to predict and plan the future of Australia's lakes and estuaries, it is crucial to understand their ecological past and to determine their state prior to and post-European settlement. This project develops and applies novel methodologies to reconstruct the history of cyanobacterial blooms, eutrophication and anoxia in Australian waterways. It will help to identify human impact on water quality. The new methodologies, applied to ancient sedimentary rocks, will also yield information about the effect of environmental changes on early life on Earth, enforcing Australia's position in the study of global geochemical cycles.

DP0559439 Dr DH Broom; Dr JM Dixon; Dr C Banwell; Dr CE Forth; Prof GG Giles

**Title:** The Weight of Modernity: Mitigating Obesity

2005 : \$60,000

2006 : \$61,000

2007 : \$28,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** The Australian National University

**Summary:**

Health scientists have warned about the implications to the nation's health if the rise in obesity continues as is predicted and the National Obesity Taskforce puts the cost of obesity at \$1.3 billion per year. The Taskforce recognises the need to 'address the broader social and environmental determinants of poor nutrition and sedentary lifestyles'. By analysing the multiple social trends contributing to the rise of obesity and another major disease of the twentieth century (CHD), we will highlight the barriers and opportunities that must be acknowledged in order to mitigate obesity, particularly in disadvantaged populations.

DP0559650 Dr JR Butler; Prof S Colagiuri; Ms AE Walker

**Title:** Chronic Disease Prevention and Treatment - Cost-Benefit Model Systems to Assist with Priority Setting

2005 : \$107,500

2006 : \$100,000

2007 : \$115,000

2008 : \$101,000

2009 : \$101,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The Australian National University

**Summary:**

The key benefit of the proposal to develop linked chronic disease models that are able to account for comorbidities will be that a much more accurate picture of the health and financial implications of chronic diseases will be obtainable than with the traditional 'disease-by-disease' based studies. Such a global approach is particularly relevant to analysis of chronic disease prevention and/or treatment, because the lifestyle related risk factors are common to many such diseases. Overall, the linked models will be able to improve on current decision making processes, providing a more complete view of chronic disease costs and benefits - either today, or in future - under different prevention or treatment scenarios.

DP0556923 Dr IH Campbell; A/Prof PW Reiners

**Title:** Application of Double and Triple Dating of Zircons to Sediment Provenance Studies and to Quantifying Recycling in Sedimentary Rocks

2005 : \$50,000

2006 : \$50,000

2007 : \$50,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The Australian National University

**Summary:**

Double and triple dating are exciting new ANU-Yale breakthroughs that can be used to more accurately identify the source of sediment in rivers and sedimentary rocks than is possible using existing techniques. They have fundamental applications in the study of erosion, tracing the source of heavy minerals in titanium deposits and in determining the source of sedimentary sequences that host oil. Under favourable circumstances double dating can be used also to date sediments that are devoid of fossils, which has direct application in oil exploration.

**DP0558688** Prof PF Cane

**Title:** **Merits Review of Governmental Decision Making: Principles, Theory and Practice**

**2005 :** \$92,356

**2006 :** \$50,000

**2007 :** \$90,000

**Category:** 3901 - LAW

**Administering Institution:** The Australian National University

**Summary:**

This project will significantly enhance the quality and impact of decisions by federal courts and tribunals and raise the level of public policy debates in areas such as immigration. The concept and practice of merits review is fundamental to legal regulation of government by federal courts and tribunals. In a society that subscribes to the rule of law as a core value, accurate understanding of this concept and of the way knowledge about merits review is communicated to administrators is essential. It will help eliminate inefficient and costly uncertainty and misunderstanding about what the law requires, and make a significant contribution to protecting the rights of individuals.

**DP0555887** Prof AL Carey; Dr FA Sukochev

**Title:** **Noncommutative geometry: new frontiers**

**2005 :** \$49,866

**2006 :** \$81,000

**2007 :** \$81,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The Australian National University

**Summary:**

This project is at the leading edge of fundamental mathematics and will result in important scientific advances. As a result

Australian science will be seen to be at the forefront internationally. This area of mathematics is having a high impact at the moment so that research training is an important aspect. There will be PhD students trained as part of the project and honours students exposed to the latest advances. Australians would normally need to go to leading international centres such as Paris to partake in projects of this nature. That high profile research of this kind can be done in Australia will enhance our capacity to retain scientific talent.

**DP0556302** Miss F Cirstea

**Title:** **Singular phenomena for nonlinear partial differential equations arising in applications**

**2005 :** \$64,570

**2006 :** \$60,867

**2007 :** \$60,367

**2008 :** \$60,367

**Category:** 2301 - MATHEMATICS

APD Miss F Cirstea

**Administering Institution:** The Australian National University

**Summary:**

The development of nonlinear Partial Differential Equations (PDEs) in Australia is recognized worldwide through the outstanding contributions of mathematicians from the ANU, University of Sydney and other top Australian Universities. This project undertakes research in the PDEs field and follows directions of very current interest at an international level. Beyond the ANU, the project will enhance expertise in Australia in very active areas of mathematics research related to applications in physics, biology and other applied disciplines. Moreover, it will foster collaboration with mathematicians of international standing from Australia and abroad.

**DP0559291** Dr LG Cook

**Title:** **The role of ecological specialisation in insect-plant macroevolutionary processes: a molecular phylogenetic approach across three kingdoms**

**2005 :** \$98,000

**2006 :** \$85,000

**2007 :** \$80,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

APD Dr LG Cook

**Administering Institution:** The Australian National University

**Summary:**

Flowering plants and phytophagous insects are major components of the world's biodiversity and their evolution has been closely linked. This project will increase our knowledge of insect-endosymbiont-plant interactions and enhance our understanding of the origin, generation and maintenance of much of the world's biodiversity. A broader understanding of how insects, their symbionts and plants have co-evolved should improve our understanding of why and how some insects are able to become pests whereas others do not. Scale insects (the model system in this study) are important pests, both ecologically (Christmas Island interaction between coccids, rainforest plants and crazy ants) and economically (e.g. citrus mealybug).

**DP0557430** Dr ML Coote

**Title:** **Computer-Aided Design of Agents for Controlling Free-Radical Polymerisation**

**2005 :** \$130,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2506 - THEORETICAL AND COMPUTATIONAL CHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

This project will provide cutting-edge fundamental research of importance to free-radical polymerisation. This process is the basis of a multi-billion dollar industry worldwide, and is very important to the Australian economy. The project will help to expand the applicability of the reversible addition fragmentation chain transfer (RAFT) polymerisation process, which is a significant new CSIRO-invented method for controlling free-radical polymerisation. In doing this, the project will facilitate the design and development of a range of new polymer products, with applications in biotechnology and nanotechnology. This research will help to keep Australia at the forefront of this important field.

**DP0558626** Prof DA Deacon

**Title:** **Judith Anderson 1897-1992: Voice and Emotion in the Making of an International Star**

**2005 :** \$70,000

**2006 :** \$52,000

**2007 :** \$43,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The Australian National University

**Summary:**

Australian-born Dame Judith Anderson was considered one of the greatest actors of the twentieth century. Renowned for her thrilling voice and portrayal of deep emotion and illicit sexuality and power, she influenced how women looked, spoke, and felt from the early 1920s through her roles on Broadway and in Hollywood films. This biography will preserve and make accessible a valuable part of our cultural heritage. It will give Australians and Americans a better understanding of the two-way cultural relationship between their two countries. It will help place Australian scholarship at the cutting edge of historical research on twentieth century auditory culture.

**DP0558183** Dr T Di Matteo

**Title:** **Physics of Risk: new tools to survey the Australian market and beyond**

**2005 :** \$75,000

**2006 :** \$70,000

**2007 :** \$75,000

**Category:** 2405 - CLASSICAL PHYSICS

**Administering Institution:** The Australian National University

**Summary:**

The lives of most Australians depend on the dynamics of financial markets that affects investments, savings, business, employment, growth, wealth and -ultimately- the daily functioning of our society. Understanding, monitoring and managing the dynamics of financial markets is of crucial importance to policy-makers, financial institutions and businesses that are increasingly faced with managing risk, planning strategies and taking decisions in an increasingly complex market-place. The project is also of importance to the continued evolution of physics in this country contributing to the emergence of a strong new area of statistical physics concerned with the 'real world' in a manner hitherto unknown.

**DP0558573** Prof JS Dryzek; Dr SJ Niemeyer

**Title:** **The Micropolitics of Deliberation**

**2005 :** \$150,000

**2006 :** \$110,000

**2007 :** \$105,000

**Category:** 3601 - POLITICAL SCIENCE

APD Dr SJ Niemeyer

**Administering Institution:** The Australian National University

**Summary:**

This project will show how deliberative mechanisms can be designed and employed in Australia's system of governance (and in other countries), thereby improving the quality of citizen participation in Australian democracy and indicating more effective means of public consultation in policy making. The project will develop applied expertise on these issues, which can be put to use in the context of widespread current interest in deliberative consultation in government (especially in natural resource management).

**DP0557780** Prof AF Dulhunty; A/Prof DR Laver; Dr MG Casarotto

**Title:** **INTRINSIC PROPERTIES OF THE PORE FORMING DOMAIN OF THE RYANODINE RECEPTOR CALCIUM CHANNEL**

**2005 :** \$150,000  
**2006 :** \$105,000  
**2007 :** \$105,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The project is to understand how a calcium ion channel is able to regulate muscle performance. The ion channel, known as the ryanodine receptor, is essential for human and animal survival. The results of the project will be integral to understanding muscle performance in humans and will have long term implications for Australian sports physiology and sports science. The project will also be integral to understanding muscle performance and development in animals and will have repercussions for the Australian livestock and racing industries. The results may lead to the development of new insecticides since insect mobility depends on ryanodine receptor activity. This will benefit to Australian agriculture.

**DP0558816** Dr M Edwards

**Title:** **Role of form information in motion processing**

**2005 :** \$33,000  
**2006 :** \$47,000  
**2007 :** \$37,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The study of the mind, and its relationship to the brain, is currently at the forefront of new developments in science. In the international setting, visual psychophysics is playing a major role in this development. The present project will help maintain Australia's international competitiveness in this rapidly growing field. Also, given how important being able to accurately perceive motion is to our ability to safely interact with the world, there are a number of potential applied benefits of the proposed research. These benefits range from areas like road safety to clinical neuropsychology.

**DP0559159** Dr SM Eggins; Dr CV Murray-Wallace; Prof JF Wehmiller

**Title:** **A new approach to the U-series dating of fossil molluscs - a major advance for the earth and archaeological sciences**

**2005 :** \$90,000  
**2006 :** \$75,000  
**2007 :** \$80,000

**Category:** 2603 - GEOCHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

The development of a reliable method for accurately determining the age of fossil shells represents a breakthrough in the ability to date marine shoreline, lake, and other shell-bearing deposits (e.g. middens). This will present new opportunities for research of significant national benefit, particularly into the effects of climate change, including linked sea-level change and melting of ice sheets, the impact of sea-level change on coastal zones, and shifts in the amount and variability of rainfall in different regions. The method may also be used to estimate the frequency and size of large storm and tsunami events, earthquake risk, and the timing of prehistoric human migration and associated environmental impacts.

**DP0559055** Prof DJ Ellis; Dr AG Christy

**Title:** **An experimental study of trace element equilibria during metamorphism**

**2005 :** \$80,000  
**2006 :** \$70,000  
**2007 :** \$60,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The analytical methods and experimental data to be developed will enable an Australian team to become world leaders in determining pressures and temperatures of mineral growth that correspond to a range of depths and temperature gradients in the Earth that is wider than accessible previously. Obtaining this information from small zones within single grains will allow determination of rates of change, and give us a detailed picture of how the host rock has evolved, even from very small samples. One application would be checking the origin of relatively common minerals for whether they could be associated with diamonds.

**DP0556526** Dr HA Evans

**Title:** **Social exclusion and teenage motherhood in Australia**

**2005 :** \$40,000  
**2006 :** \$35,000

**Category:** 3705 - DEMOGRAPHY

**Administering Institution:** The Australian National University

**Summary:**

Our current understanding of teenage motherhood paints a very grim picture of the lives of teenage mothers and their babies. An over-reliance on the welfare system and social isolation lead to inadequate opportunities for education, employment and productive relationships and are responsible for enhancing social exclusion and weakening a society's social and economic fabric. This project provides great benefit to both the Australian community and individual teenage mothers and their children. A deeper understanding will lead to better design of support systems and programs for young mothers and their children.

**DP0557394** Prof GD Farquhar

**Title:** **Oxygen-18 in water, carbon dioxide, and organic matter: a tool for linking plant biological processes, hydrology and climate change**

**2005 :** \$140,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2704 - BOTANY

**Administering Institution:** The Australian National University

**Summary:**

The globe is warming but pan evaporation is decreasing, because the world is dimming. We do not understand why. Stable, naturally occurring oxygen isotopes in plants (for example, tree rings) and in the carbon dioxide of the atmosphere vary and record climatic changes and physiological responses. Bringing these disparate areas of research together will help us to interpret the changes and responses. Such information is needed for planning future water requirements in Australia (agriculture, natural ecosystems, dams) and around the world. The isotopic composition of tree rings and of the atmospheric carbon dioxide is affected by that in water of leaves, and the processes linking them will be studied in detail.

**DP0556635** Dr TA Faunce; Prof P Drahos; Prof D Henry

**Title:** **The Impact of International Trade Agreements on the Regulation and Provision of Medicines in Australia**

**2005 :** \$145,000

**2006 :** \$100,000

**2007 :** \$140,000

**Category:** 3212 - PUBLIC HEALTH AND HEALTH SERVICES

**Administering Institution:** The Australian National University

**Summary:**

This Project will provide policy makers and the community with previously unavailable detailed information and regulatory options (through scholarly publications, reports to government agencies and a publicly accessible website) concerning the effects of Australia's international trade commitments on access to medicines. It will develop a strategic modelling system and a continuing research group with unique expertise for evaluating the health impacts of future trade negotiations by Australia and other nations. The Project particularly benefits aged and poor Australians who are more reliant on medicines for health and for whom such costs represent a significant component of domestic expenditure.

**DP0558452** Dr CE Forth

**Title:** **Civilisation, Masculinity, and the Body**

**2005 :** \$35,000

**2006 :** \$35,000

**2007 :** \$35,000

**Category:** 3799 - OTHER STUDIES IN HUMAN SOCIETY

**Administering Institution:** The Australian National University

**Summary:**

By considering their relationship to broader Western concerns, this project examines the deep cultural origins of Australian masculinity and national identity. Much of the bush myth and the Anzac legend are grounded in assumptions that 'true' manhood thrives outside of soft, sedentary and unhealthy cities, either in playing fields, battlefields, or the bush. Since Australia experienced growing anxieties about urban life and emphasized the importance of physical development along with most other Western countries, a project such as this helps situate this national experience within a broader cultural development. This is on the forefront of new scholarship that integrates the Australian experience with global culture.

**DP0558699** Dr P Frijters; Dr M Shields

**Title:** **Policy-Related Lessons from the Econometric Analysis of Life Satisfaction Data in Australia**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The Australian National University

**Summary:**

Our analyses will provide important information to policy-makers aiming to design policies that improve Australia's economic and social fabric. In particular, we will inform on the response of Australians to major life-events such as unemployment, ill-health or marital dissolution, but also exogenous shocks including drought and terrorism. Major focus will be on differentiating the determinants of life satisfaction between rural and urban communities in Australia, and investigating the response of these communities to drought conditions. Moreover, we believe that a detailed international comparison using German and UK data will provide unique evidence on the relative quality of life in Australia and the role of culture and institutions.

DP0556371 Dr RA Fry

**Title:** Securitised Real Estate and Private Dwellings: International and Domestic Linkages and Implications for the Macroeconomy.

2005 : \$35,000  
2006 : \$35,000  
2007 : \$35,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The Australian National University

**Summary:**

Cycles in the housing market and its interaction with other economic and financial market variables may have enormous effects on the Australian economy. Despite this there is little research on the interactions between housing and the macroeconomy. This project examines these issues. The implications of the research extend to three broad areas. The first is monetary policy by understanding housing prices, inflation and interest rates linkages. Second, constructing formal models including housing may provide a means of testing the implications of policies such as the first home owner grant or reductions in housing specific taxes. Finally, financial markets may benefit by understanding of the role of property in a diversified portfolio.

DP0558357 Dr K Glass; Prof NG Becker

**Title:** New mathematical and statistical methods that inform the control of infectious disease outbreaks

2005 : \$65,922  
2006 : \$69,698  
2007 : \$66,698

**Category:** 2302 - STATISTICS

**Administering Institution:** The Australian National University

**Summary:**

Emerging infectious diseases are an ever-present threat to our community, as highlighted by the recent SARS epidemic and current fears concerning avian influenza. The research proposed by this project will help policy makers implement effective border control and outbreak control against a variety of emerging and re-emerging infectious diseases, including SARS, influenza and the deliberate release of an infectious disease such as smallpox. The project will enhance preparedness through a better understanding of the relative merits of different control strategies, and provide new methodology that can dynamically guide border and outbreak control in the midst of an outbreak by making effective use of data.

DP0558818 Dr EE Gray; Dr R Kippen; Dr HA Evans

**Title:** Do Australian parents want both a son and a daughter?

2005 : \$45,000  
2006 : \$40,000

**Category:** 3705 - DEMOGRAPHY

**Administering Institution:** The Australian National University

**Summary:**

From the late 1990s, policy makers became more aware of the importance of fertility in influencing population age structure and growth rates in Australia. The proposed project will augment our understanding of fertility dynamics both current, and over high and low fertility regimes. It will also highlight an important factor in fertility decision-making. There is considerable speculation on the impact of shifting gender-role attitudes on sex preference, but evidence supporting this is mixed. By developing a deeper understanding of the factors influencing progression to having more children we will be better able to predict fertility trends and provide support to Australian parents.

DP0557596 Prof DH Green; Dr AC Hack

**Title:** Carbon and Hydrogen in Melts and Fluids in Planetary Interiors

2005 : \$100,000  
2006 : \$100,000  
2007 : \$100,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The Australian community will benefit by the ownership of widely used high impact research in published earth science. This research defines the melting behaviour of silicate-rich materials (terrestrial planets, rocky-moons, meteorites) within the solar system. The research will be required for interpretation of Martian samples and will help to ensure that Australian laboratories participate in 21st Century investigations of the Solar System by virtue of their leading roles in understanding volcanism and melting behaviour at high pressures and under variable oxidation states. The research will address a national priority in sustainability of earth resources i.e. knowledge underpinning formation of Australian mineral resources.

DP0556070 Prof PG Hall

**Title:** Theory and Applications of Computer-Intensive Statistical Methods

2005 : \$153,244  
2006 : \$153,606  
2007 : \$152,620  
2008 : \$152,000  
2009 : \$152,000

**Category:** 2302 - STATISTICS

APF Prof PG Hall

**Administering Institution:** The Australian National University

**Summary:**

The availability of powerful computing equipment has had a dramatic impact on statistical methods and thinking. It has motivated development of novel approaches to data analysis, whose conception and appreciation, even their application, often demand sophisticated and complex theoretical methods. In this context, the project will develop new approaches to solving non-standard statistical problems. These techniques will either have direct application to solving practical problems of national or community concern, or provide a better understanding of the nature of such problems.

**DP0558099** Prof AR Hardham

**Title:** **Biogenesis of secretory organelles and the function of adhesins secreted during the establishment of plant disease**

**2005 :** \$120,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2703 - MICROBIOLOGY

**Administering Institution:** The Australian National University

**Summary:**

Many agriculturally important crops and Australian native plants are susceptible to diseases caused by species of Phytophthora, a fungus-like organism that lives in the soil. Economic losses due to Phytophthora diseases are estimated to exceed \$200 million per annum and the scale of environmental damage in natural ecosystems is huge. Currently, control of Phytophthora diseases largely depends on a very small number of effective chemicals and there is an imminent risk of the development of pathogen resistance. This research will increase our understanding of how Phytophthora spores infect host plants and will identify suitable targets for the development of novel, environmentally safe chemicals that inhibit disease development.

**DP0558038** Dr JM Hemmi; Dr UR Zimmer; Dr J Zeil

**Title:** **To flee or not to flee: surviving on incomplete information**

**2005 :** \$100,000

**2006 :** \$85,000

**2007 :** \$85,000

**Category:** 3207 - NEUROSCIENCES

**Administering Institution:** The Australian National University

**Summary:**

Even lowly animals, like the Australian fiddler crabs we will be investigating, are surprisingly competent in making the right decisions in complex situations. They actively acquire information and make good use of it to assure their immediate safety and their long term gains. Animals are exquisitely honed by evolution and we would benefit greatly by understanding what makes them so competent: on a theoretical level, we may learn about efficient rules of good decision making and on a practical level, we may be able to design more flexible, robust and clever machines. Besides being useful in this wider context, the results of our research will thus also contribute to a new and 'sophisticated' appreciation of the cognitive design of animal.

**DP0559257** Prof B Higman

**Title:** **A Creole Landscape: Jamaica in Space and Time**

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$40,000

**Category:** 4301 - HISTORICAL STUDIES

**Administering Institution:** The Australian National University

**Summary:**

Comparative analysis, over time and space, enables a richer understanding of the long-term consequences of changing attitudes to landscape and their impact on the exploitation of resources. Compared to Australia, the process of creolization, moving beyond acculturation and multiculturalism, is far advanced in Jamaica, leading to a redefinition of concepts of the native, the exotic and the feral, and of ideas about conservation and wilderness. Explanation of such differences can provide important lessons for policy and planning. The project will develop and refine a methodology with potential for broad application, including Australia.

**DP0556236** Prof AF Hill; Prof MI Bruce

**Title:** **Towards Nano-circuits: 2 and 3-Dimensional Carbon-Wired Nano-architectures**

**2005 :** \$135,000

**2006 :** \$110,000

**2007 :** \$110,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

Whilst Australia has a world-class profile in organotransition metal chemistry, main-group chemistry is under-represented, despite the enormous technological importance of materials based on these elements. In addition to the fundamental breakthrough science to be explored, the project will provide a training vehicle for 5 young scientists in both main group and organometallic chemistry. The target compounds involve an essentially unique marriage of the fields of main-group and transition metal chemistry to provide complex nano-architectures based on the modular interconnection of metals and non-metals by carbon wires at the molecular level - nanoscopic counterparts of macroscopic circuit components.

DP0557065 Prof DJ Hinde; Dr M Dasgupta; Dr M Freer; Prof JA Tostevin; Dr K Hagino

**Title:** Breakup and Fusion of Stable and Radioactive Nuclei

2005 : \$220,000

2006 : \$180,000

2007 : \$200,000

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Administering Institution:** The Australian National University

**Summary:**

All Research Priority areas use tools based on nuclear physics research. Further advances will come from new A\$1bn accelerators of radioactive nuclei. Exploiting our new ideas, we will develop a unified framework allowing prediction of the products of nuclear reactions with stable and radioactive nuclei, giving a better understanding of the fundamental process of nuclear fusion, and of radioactive beam applications. Early participation in a significant new area of research will strengthen Australia's capacity to exploit future opportunities with these accelerators. Top-level research training in nuclear physics, a subject with strategic implications for Australia, will help in the forthcoming international shortage of nuclear experts.

DP0556073 Dr JJ Hope

**Title:** Detection and Control of Ultracold Atoms

2005 : \$135,000

2006 : \$135,000

2007 : \$135,000

2008 : \$100,000

2009 : \$100,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** The Australian National University

**Summary:**

Australia is at the forefront of research into atom lasers, a device that may be as important to science and technology this century as the laser was in the last. This project will provide important theoretical tools for developing the atom laser from an object of intrinsic interest to a useful tool. It will develop Australian scientific expertise in this area, and provide training for the next generation of Australian scientists.

DP0557608 Ms JE Hope; Dr D Nicol; Prof J Braithwaite

**Title:** Co-operative intellectual property management and technology transfer for the Australian biotechnology industry

2005 : \$109,079

2006 : \$114,000

2007 : \$108,507

**Category:** 3901 - LAW

APD Ms JE Hope

**Administering Institution:** The Australian National University

**Summary:**

The Australian biotechnology industry rests on a framework of internationally competitive research and should be well placed to capture a significant share of expanding global markets. However, existing intellectual property (IP) management strategies do not make the most of this potential because they raise barriers to much-needed co-operation among industry players. By developing and refining new co-operative IP management models in an Australian context, this project offers direct economic benefits (more efficient industry structures), improved social and economic benefits (better and cheaper biotechnology products and services), and an opportunity for Australia to take the lead in developing innovative approaches to IP management.

DP0559673 Prof KA Houghton; A/Prof CA Jubb

**Title:** Australia's Regulatory Response to Recent Corporate Collapses and Perceived Auditing Deficiencies

2005 : \$45,000

2006 : \$30,000

2007 : \$20,000

**Category:** 3501 - ACCOUNTING, AUDITING AND ACCOUNTABILITY

**Administering Institution:** The Australian National University

**Summary:**

The corporate collapses of recent years have cost shareholders and other stakeholders hundreds of millions of dollars. However, various reforms in accounting and governance are coming into force. As these reforms differ markedly from those in other jurisdictions (notably the USA), Australian based research is essential in understanding the effectiveness of the changes in moderating certain corporate behaviour. This research provides a measure of efficacy of these reforms in terms of measures of "manipulation" of corporate earnings. The results of the research will provide evidence of the efficacy of the reforms and pointers to further enhancements.

DP0558721 Prof TH Hull; Dr ID Utomo

**Title:** Using national surveys to uncover and assess potentially harmful sexual practices in Southeast Asia

2005 : \$120,000

2006 : \$110,000

2007 : \$100,000

**Category:** 3705 - DEMOGRAPHY

**Administering Institution:** The Australian National University

**Summary:**

Studies in Southeast Asia have revealed a wide variety of sexual practices carrying risks to the reproductive health of women and men. This proposal builds on that base to design methods for population level analysis of behaviour and attitudes. It will address key hypotheses related to gender and the assessment of risk, harm and disadvantage. The Australian Aid program and national health departments will use the data on unhealthy practices for reproductive health programs. Major beneficiaries include individuals who will be guided away from unhealthy practices, and medical providers who will have more evidence to guide their practice.

**DP0556082** Dr J Hunt

**Title:** **The Maintenance of Genetic Variation by Antagonistic Sexual Selection**

**2005 :** \$175,000

**2006 :** \$130,000

**2007 :** \$130,000

**2008 :** \$130,000

**2009 :** \$130,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

QEII Dr J Hunt

**Administering Institution:** The Australian National University

**Summary:**

The principle outcomes of my proposed research are fundamental knowledge, training of young scientists and the improvement of Australia's research capacity and profile. My research will have a major impact on two major branches of evolutionary biology that are seldom integrated - sexual selection and quantitative genetics. My research will enable me to establish myself as an independent researcher. Moreover, my collaborations with one of the leading research laboratories in the UK, will teach me several modern techniques that I can disseminate to Australian students participating on the proposed project.

**DP0558974** Prof JE Hutchinson; Prof MF Barnsley

**Title:** **A new generation of fractals: theory, computation, and applications particularly to digital imaging**

**2005 :** \$153,000

**2006 :** \$103,000

**2007 :** \$102,000

**2008 :** \$100,000

**2009 :** \$100,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The Australian National University

**Summary:**

The project develops the mathematical and algorithmic foundations of superfractals and applies these results to a number of different areas, including in particular, digital imaging. For example, the "third generation" of mobile communications (3G), combines wireless mobile technology with high data transmission capacities. Currently the requirement for extensive bandwidth is a problem for efficient use. Superfractals and the associated colouring algorithm could be used to develop a new system to produce synthetic content for wireless devices that would require only low bandwidth.

**DP0558865** Dr AD Jayalath; Dr CR Athaudage

**Title:** **Design and analysis of optimum space-frequency-time codes for multi-rate OFDM Systems**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The Australian National University

**Summary:**

This research work contributes to the ones of the major national research priorities, the frontier ICT technology. It addresses the issues of a frontier ICT technology. Output of the project will place the Australia in the map of 4-th generation mobile and wireless communications research. These results will also influence the implementation aspects of future mobile communication systems and attract the attention of the international community. Other major national benefit of the project is the training of PhD students and the production of potential researchers for 4G research.

**DP0555943** Dr MD Jennions

**Title:** **What is the genetic relationship between attractiveness, fighting ability and fertilization success in field crickets?**

**2005 :** \$90,000

**2006 :** \$80,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The Australian National University

**Summary:**

The persistence of extravagant male sexual features like horns and bright colours remains a puzzle. There are many theoretical explanations but empirical tests are still rare. This study, which uses selective breeding, will provide insight into the genetic basis of male sexual attractiveness and dominance. Although focused on an endemic field cricket the potential results have wider implications. They may be applicable to many animals of importance to the community, including livestock, domesticated animals, pests and native wildlife. All these animals are subject to selection pressure created by humans. This study will help us understand how selection on one trait (e.g. weight) may influence the evolution of another (e.g. lifespan).

**DP0556422** Dr A Kipnis

**Title:** **Quality and the Culture of Hierarchy, Governance and Socialization in Contemporary China**

**2005 :** \$56,434

**2006 :** \$50,000

**2007 :** \$35,000

**Category:** 3703 - ANTHROPOLOGY

**Administering Institution:** The Australian National University

**Summary:**

China is a key country for Australia in terms of economic, military, and cultural exchange, and mutual cooperation on regional issues. By contributing to understandings of the social and cultural bases of Chinese governance, this project will enhance the abilities of Australians involved in Chinese affairs in all fields. Understanding the dynamics of social hierarchy and local governance in China will also contribute to the project of imagining more equitable forms of governance in Australia. Finally, the project involves the training of two Australian postgraduate students in the severely under-represented sub-discipline of the anthropology of China.

**DP0559433** Prof K Kirk; Dr S Broer; Dr SM Howitt

**Title:** **Amino acid transporters and the chloroquine resistance transporter of the intracellular malaria parasite**

**2005 :** \$93,000

**2006 :** \$86,000

**2007 :** \$86,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The Australian National University

**Summary:**

This work entails an ongoing collaboration between three independent research groups with highly complementary expertise and experience. It will make a significant contribution to the maintenance of Australia's scientific capabilities and training opportunities. The project will yield important insights into the biology of the causative agent of a major human disease, and the mechanism by which the malaria parasite has developed resistance to antimalarial drugs. Although not yet endemic in Australia, malaria is a serious problem in the local region and this work will help Australia meet its obligations to carry out high-quality research that advances our knowledge in this area.

**DP0558316** Prof YS Kivshar

**Title:** **Left-handed metamaterials and negative refraction**

**2005 :** \$240,000

**2006 :** \$236,536

**2007 :** \$231,000

**2008 :** \$168,386

**2009 :** \$160,386

**Category:** 2405 - CLASSICAL PHYSICS

**Administering Institution:** The Australian National University

**Summary:**

This project will establish and support the first team in Australia working in the field of left-handed metamaterials, artificial materials in which waves behave in a unique and counter-intuitive way. The project will promote this new field, enhance its rapid development, and facilitate emerging novel technologies in Australia. It will also lead to close international collaborations with active theoretical and experimental groups, and bring important expertise to Australia. We believe our initial efforts of purely fundamental nature and extensive collaboration with the overseas groups will have a significant impact on the development of this field and related novel technologies in Australia, attracting strong interest from industry.

**DP0559340** Dr P Kluth

**Title:** **Structural Characterization of Ion Beam Synthesized Metallic Nanocrystals using Advanced Synchrotron based Analytical Techniques**

**2005 :** \$100,000

**2006 :** \$73,000

**2007 :** \$75,000

**Category:** 2918 - INTERDISCIPLINARY ENGINEERING

APD Dr P Kluth

**Administering Institution:** The Australian National University

**Summary:**

Metallic nanocrystals formed by ion implantation represent a highly relevant class of nanomaterials with significant potential applications in communication technology. A detailed understanding of the structure of such crystals, as proposed in the project, will yield considerable information for efficient utilization of ion beam synthesized nanocrystals. This will enhance Australia's strength in nanotechnology and materials science and create the potential for technical innovation. Furthermore, this project will produce significant know-how in synchrotron based analytical techniques which is invaluable with respect to future research at the forthcoming Australian synchrotron facility.

**DP0556186** Dr C Knellwolf

**Title:** **Exploration and Nation: the Cultural Impact of Exploration Literature from the Cook Voyages to the 'Novara' Circumnavigation**

**2005 :** \$35,000

**2006 :** \$30,000

**2007 :** \$30,000

**Category:** 4202 - LITERATURE STUDIES

**Administering Institution:** The Australian National University

**Summary:**

This comparative analysis of the cultural impact of the Cook voyages and the lavishly state-sponsored 'Novara' expedition will improve our understanding of the international entanglements that affected the course of our history. Examining the broad cultural impact of publications about Pacific exploration will offer valuable new insights into the cross-fertilisations between colonisation and the formation of 19th-century nation states. A detailed study of how European nations employed the publication industry in their competition for colonial control will illuminate the conflicts over the boundaries of nation and empire and enhance the understanding of prominent issues in Australian humanities research.

**DP0558206** Dr MM Kohonen

**Title:** **Wet Granular Materials: A Three-Dimensional Study Using X-Ray Microtomography.**

**2005 :** \$100,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

APD Dr MM Kohonen

**Administering Institution:** The Australian National University

**Summary:**

Wet granular materials are of immense economic importance in industries such as mining, agriculture, pharmaceuticals, and food processing. It has been estimated that operations involving the storage, handling and transport of granular materials account for over a third of the capital costs and over half of all the operating costs involved in process industries worldwide. An improved understanding of the dramatic effects of liquid on the cohesion, flow and mixing of granular materials will be of benefit to Australian industry both in terms of helping to reduce costly problems, such as caking and segregation, and in terms of the development of better particulate-based products, such as ceramics and pharmaceuticals.

**DP0557645** Dr P Lam

**Title:** **Continuous Variable Quantum Information Experiments**

**2005 :** \$125,126

**2006 :** \$130,126

**2007 :** \$142,126

**2008 :** \$185,126

**2009 :** \$194,126

**Category:** 2404 - OPTICAL PHYSICS

QEII Dr P Lam

**Administering Institution:** The Australian National University

**Summary:**

Quantum information is a research field that exploits the richness of modern quantum theory for measurement, communication and information processing. This fellowship aims at using quantum optics to demonstrate a range of exciting communication and metrological applications that are otherwise impossible with classical physics. Example applications are: Quantum teleportation - a method for the noiseless transport of quantum information; Quantum cryptography - a crypto-communication system that has absolute security and; Nano-imaging - optical imaging techniques that offer resolution beyond the diffraction limit. These "quantum technology" are predicted to revolutionize information and communication technologies.

**DP0558800** Dr NE Langmore; Dr SC Griffith

**Title:** **The influence of breeding synchrony on avian reproductive strategies**

**2005 :** \$100,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2707 - ECOLOGY AND EVOLUTION

**Administering Institution:** The Australian National University

**Summary:**

Australia has a strong international reputation for research on avian evolutionary biology, in part, because of our diverse and unique avifauna. This research will resolve one of the more contentious issues in this field concerning the influence of breeding synchrony on a range of reproductive behaviours. Our experimental approach incorporates a series of new and innovative techniques and will help maintain Australia's leading role in this area. The project will provide intensive training for students and also promote awareness about Australia's bird life to a wide audience, including rural communities who have a critical role in the long-term preservation of many species.

**DP0558962** Prof BR Lewis; Prof Dr W Ubachs

**Title:** **Quantum Mechanics and Planetary Atmospheres**

**2005 :** \$150,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2506 - THEORETICAL AND COMPUTATIONAL CHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

The project will increase the visibility and status of Australian research, by the participation of researchers and students in a wide international collaboration, covering experiments, theory, and computation, which will solve a fundamental research problem that has previously defied understanding. The resulting nitrogen model will be relevant to the important fields of global and planetary atmospheric change, and will find immediate application in the analysis of results from the NASA missions, Voyager, Cassini, and (later) New Horizons. In the experimental part of the project, an Australian-first extreme-ultraviolet laser facility will be developed which will provide research opportunities complementary to the Australian

Synchrotron.

**DP0557574** Dr DB Lindenmayer

**Title:** **Enhancing biodiversity conservation in Australia: new insights and general principles from powerful new ecological syntheses**

**2005 :** \$160,000

**2006 :** \$150,000

**2007 :** \$140,000

**Category:** 3008 - ENVIRONMENTAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

The innovative ecological syntheses in the exciting project aim to build Australia's national research capacity to greatly increase the effectiveness of biodiversity conservation strategies. The new insights, knowledge and practical solutions gained from this important research initiative will be critical for future visions and management of Australian landscapes. Without them we risk depleting the nation's biodiversity - which is a key issue given Australia's megadiversity status. Hence, this project addresses National Research Priority #1 - An Ecologically Sustainable Australia given its fundamental importance for key goals such as managing the nation's biodiversity and understanding natural systems.

**DP0559128** Ms JP Marler

**Title:** **Benchmark Studies of Positron Interactions with Helium**

**2005 :** \$75,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

APD Ms JP Marler

**Administering Institution:** The Australian National University

**Summary:**

Australia has been at the forefront of experimental studies of electron-driven processes and theoretical descriptions of positron interactions. A new experimental program to study experimental low energy positron atomic physics provides a perfect synergy of these two areas of expertise. The field is a relatively new and emerging one and is focused around a number of new experimental approaches, such as those being developed at the Australian National University. This set of experiments, on positron interactions with helium, will provide new experimental evidence to further our understanding of fundamental quantum processes and place Australia at the forefront of the field.

**DP0557692** Dr U Mathesius

**Title:** **Are flavonoids metabolic regulators of plant development?**

**2005 :** \$84,252

**2006 :** \$84,252

**2007 :** \$84,252

**2008 :** \$84,252

**2009 :** \$84,252

**Category:** 2704 - BOTANY

ARF Dr U Mathesius

**Administering Institution:** The Australian National University

**Summary:**

This project will investigate the mechanisms of action of flavonoids, which are abundant and diverse plant products contained in all fruits and vegetables. We have very little knowledge on the range of activities this large class of natural compounds has in plants.

This research will investigate the role of flavonoids in regulating plant development to identify flavonoids and their target proteins and genes that could alter plant development in specific ways to create improved crops. This project will also strengthen Australia's expertise in proteomics, an important tool for the advancement of knowledge and application in biotechnology.

**DP0556160** Prof VG Matheson Hooker; Prof MB Hooker

**Title:** **ISLAM AND ISLAMIC LAW IN REGIONAL INDONESIA**

**2005 :** \$87,000

**2006 :** \$63,000

**2007 :** \$60,000

**Category:** 4402 - RELIGION AND RELIGIOUS TRADITIONS

**Administering Institution:** The Australian National University

**Summary:**

This project is the first qualitative and quantitative analysis of the interpretation of Islamic law in a range of non-metropolitan areas of Indonesia. It will identify key issues of concern and analyse the directions and advice being provided by local religious leaders. The analysis of the relationship between definitions of Islamic law in the regions with State definitions will provide the basis for a more accurate assessment of the process and degree of syariah implementation in Indonesia. Only when this is understood can meaningful assessments be made about the nature of Islam in the world's largest Muslim nation.

**DP0555928** Prof DE McClelland; Dr MB Gray; Prof N Mavalvala; Dr SE Whitcomb

**Title:** **Beyond the standard quantum limit.**

**2005 :** \$160,000

**2006 :** \$130,000

**2007 :** \$130,000

**Category:** 2404 - OPTICAL PHYSICS

**Administering Institution:** The Australian National University

**Summary:**

Achievement of a limit never before reached in measuring the position of a macroscopic object will produce a new world record for Australia, breaking that limit is akin to breaking the 4 minute mile - a feat previously thought impossible. Not only will this create national pride in our ability to innovate, but the optical technology developed with the opening of the new field of sub-quantum interferometry has the potential to generate tangible benefits for Australian industry. This proposal will produce scientists highly trained in technologies related to emerging industries such as photonics.

**DP0559039** Prof MT McCulloch; Dr KE Fabricius; Dr JM Lough

**Title:** **Impact of increased sediment and nutrient discharges on the long-term sustainability of the Great Barrier Reef**

**2005 :** \$160,000

**2006 :** \$140,000

**2007 :** \$150,000

**2008 :** \$145,000

**2009 :** \$110,000

**Category:** 3008 - ENVIRONMENTAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

The Great Barrier Reef, one of Australia's greatest natural assets, is under increasing threat from extreme climatic events caused by global warming and from land-based pollution. This research will identify the main sources of sediment and nutrient pollution caused by river runoff and by how much this has increased above 'natural levels'. We will discover how the very sensitive offshore coral reefs have responded to increased pollution and whether this is the cause of the very devastating crown-of-thorn-starfish infestations. Understanding the long-term effects of land-based pollution on the ecology of coral reefs in the GBR will thus provide a scientific basis to help ensure that it has a sustainable future.

**DP0559042** Prof MT McCulloch; Dr C Pelejero; Prof RB Dunbar; Dr M Taviani

**Title:** **DEEP SEA CORALS AS HIGH RESOLUTION RECORDERS OF SOUTHERN OCEAN NUTRIENT CHEMISTRY AND CIRCULATION**

**2005 :** \$110,000

**2006 :** \$75,000

**2007 :** \$85,000

**Category:** 2604 - OCEANOGRAPHY

**Administering Institution:** The Australian National University

**Summary:**

There is compelling evidence that the Earth has been warming dramatically since the end of the 19th century as a consequence of increasing atmospheric CO<sub>2</sub>. This study aims to understand the long-term role of the Southern Ocean as a 'store-house' for CO<sub>2</sub>, and its significance in controlling changes in the Earth's climate. We will use coral skeletons from the deep oceans as archives of ocean circulation and nutrient levels. This information will help unravel how biological activity in the Southern Ocean has responded during previous episodes of climate change, and how this has controlled the levels of CO<sub>2</sub> in the Earth's atmosphere. This will provide a better understanding of greenhouse warming and its effect on our future climate.

**DP0557156** Prof PF McDonald; Ms JA Baxter; Dr PD Brandon

**Title:** **Measurement and explanation of family change in Australia in comparative perspective: a longitudinal approach**

**2005 :** \$200,000

**2006 :** \$169,500

**2007 :** \$172,000

**2008 :** \$172,000

**2009 :** \$172,000

**Category:** 3705 - DEMOGRAPHY

APF Dr PD Brandon

**Administering Institution:** The Australian National University

**Summary:**

As other similar countries are now well-advanced in the use of longitudinal analysis of family change, the Australian research proposed here will provide a better comparative view of the efficacy of Australian policies and programs related to families. Policy based on static analysis is more limited because it conceives people's family lives as being static where the reality is dynamic. We have little understanding of the causes and consequences of this dynamism in Australia. Such an understanding is essential if policy is to enable people to make choices that lead to positive pathways to self reliance and supportive family structures.

**DP0558217** Dr CR McFarlane

**Title:** **Resolution of the Pb-diffusion in monazite paradox using a high-temperature contact aureole**

**2005 :** \$45,130

**2006 :** \$39,270

**Category:** 2603 - GEOCHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

This research will enhance our understanding of the thermal evolution of ancient mountain belts through time. Australian geoscientists are recognized internationally for their contributions to this field and the result from this study will further

enhance our understanding of the evolution of Australia's crust. Because numerous ore deposits throughout Australia are hosted in ancient rocks, documenting the timing of mineralization with respect to the thermal evolution of the host rocks may help to predict the location of mineral deposits in these settings; and each new mineral discovery contributes to the future prosperity of Australia and its communities.

**DP0557791** Prof AG McIntosh

**Title:** HARMONIC ANALYSIS AND BOUNDARY VALUE PROBLEMS FOR ELLIPTIC SYSTEMS

**2005 :** \$60,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The Australian National University

**Summary:**

It is of the utmost necessity for Australia to develop the theoretical expertise needed in the current era. The type of mathematics under investigation here is closely allied to that needed in much of the current boom in communication technology and medical research. The training which would be provided to the research associates is considerable, and would flow on to produce the expertise needed to keep the coming generation involved in modern technological development. I will maintain my large collaborative effort with leading mathematicians from the US, France and other countries, thus helping to keep Australia at the forefront of a significant field of research.

**DP0558873** Prof J McMillen; Dr G Airo-Farulla; Prof PN Grabosky

**Title:** A comparative analysis of gambling regulation in Australian states and territories

**2005 :** \$155,000

**2006 :** \$130,000

**Category:** 3602 - POLICY AND ADMINISTRATION

**Administering Institution:** The Australian National University

**Summary:**

This project will be the first systematic and comprehensive evaluation of Australian gambling regulation. Research is in response to incidents of regulatory failure, fragmentation and inconsistency in the gambling regulatory frameworks of states/territories and calls by the Productivity Commission for rigorous and independent review. It will develop an evaluative framework to analyse current gambling regulations, performances and capacities in the face of challenges such as crime, problem gambling and cross-jurisdictional gambling. Research will allow identification of Australian and international benchmarks for gambling regulations that prevent crime and encourage social responsibility.

**DP0556531** Dr AR McWilliam; Dr DJ Fitzpatrick

**Title:** **Waiting For Law: Land, Custom and Legal Regulation in East Timor**

**2005 :** \$95,000

**2006 :** \$75,000

**2007 :** \$80,000

**Category:** 3901 - LAW

**Administering Institution:** The Australian National University

**Summary:**

The project contributes to a national research priority: safeguarding Australia. Conflicts over customary lands have played important roles in the 'arc of instability' to our North, including in relation to natural resources (Aceh, West Papua, Bougainville) and land alienated or leased to "outsiders" (Solomon Islands, Vanuatu, Fiji). Developing an effective model for regulating customary lands in East Timor will (1) safeguard our considerable aid and military assistance contributions to East Timor, (2) serve Australia's interest in regional stability and sustainable development, and (3) offer potential comparative lessons for land and resource-related conflicts in Indonesia and the South Pacific.

**DP0559465** Dr S Mendelson; Prof G Schechtman; Dr N Tomczak-Jaegermann; A/Prof A Litvak

**Title:** **Asymptotic Geometric Analysis and Learning Theory**

**2005 :** \$131,000

**2006 :** \$101,000

**2007 :** \$101,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** The Australian National University

**Summary:**

Learning Theory is used in various real-world applications in diverse research areas, ranging from Biology (e.g. DNA sequencing) to Information Sciences. Therefore, having a deep understanding of fundamental questions in Learning Theory, and in particular, pin-pointing the parameters that make a learning problem hard would have a significant practical impact. This projects aims to achieve this goal, and in addition, we expect it would have a high theoretical value, as the questions we shall address are of independent interest to pure mathematicians.

**DP0558510** Dr X Meng; Prof RG Gregory

**Title:** **Private Responses to Demographic Change and Pension Reform in Urban China**

**2005 :** \$115,000

**2006 :** \$110,000

**2007 :** \$100,000

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The Australian National University

**Summary:**

Social, economic, and political stability in China is important for Australia and its business community due to the sheer size of China and its market. The rapid aging and significant social welfare reform is a potential instability source. This project contributes to the improvement of policy making in this area, which will enhance China's long term stability. This study provides detailed information on Chinese household behaviour in pension financing, which may be helpful to the Australian business sector in making judgments on important economic relationships in the Chinese insurance market.

Australia is also facing a changing age structure and seeking financial solutions. Our study may feed into improved research in this area.

**DP0559065** Dr FP Mills

**Title:** **Photochemistry of the Middle Atmospheres of Venus and the Earth**

**2005 :** \$100,000

**2006 :** \$85,000

**2007 :** \$75,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

Ongoing changes in the Earth's atmosphere, such as ozone depletion, demonstrate the need to understand the processes that control atmospheric chemistry. The proposed research will improve the fidelity of photochemical models, provide additional insight into the recent evolution of the Venus atmosphere, and examine how atmospheric chemistry and climate change interact(ed) on Venus. This research will improve our understanding of long-standing issues, such as how much water might have been present on Venus in the recent past. The research program will provide an opportunity for Australian science to participate in at least one spacecraft mission to Venus.

**DP0556613** Prof RG Mulgan

**Title:** The accountability priorities of federal parliamentarians and whether they are reflected in the Commonwealth budgetary and reporting framework.

**2005 :** \$25,000  
**2006 :** \$25,000  
**2007 :** \$30,360

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** The Australian National University

**Summary:**

Senate committees provide the main forum in which elected representatives can directly scrutinise the actions of public officials. The project, by providing new detailed evidence about the accountability priorities of Senators, will contribute to ongoing debate about how to improve the quality of information provided by government agencies to Parliament. It will provide a valuable counterbalance to the dominant views of the Department of Finance and Administration which do not necessarily reflect the interests of the wider public. The quality of public information and of democratic governance will therefore be significantly enhanced.

**DP0556210** Dr SL O'Connor; Ms K Szabo

**Title:** Transformations and Persistence in the Holocene in East Timor: Unpacking the Island Southeast Asian Neolithic and Metal Age Cultural Packages

**2005 :** \$117,000  
**2006 :** \$114,000  
**2007 :** \$80,000

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY  
APD Ms K Szabo

**Administering Institution:** The Australian National University

**Summary:**

This project will be of great benefit in understanding culture interaction and change in our region. The close relationship between Timor and Greater Australia throughout the Holocene, and its place in Southeast Asia link it both east and west through time. In addition to understanding the nature of interaction between communities, we seek to understand how the Timorese responded, through time, to environmental variability and how this affected local culture. Furthermore, our particular focus on production technologies, as well as testing theories of migration and replacement for the Neolithic, allow us to see the nature of innovation within Timorese society.

**DP0557654** A/Prof RJ Pace; Prof S Styring; Prof MW Parker

**Title:** Catalytic Electron Transfer in Photosystem II of Plants and Bacteria.

**2005 :** \$165,000  
**2006 :** \$165,000  
**2007 :** \$165,000  
**2008 :** \$160,000  
**2009 :** \$160,000

**Category:** 2499 - OTHER PHYSICAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

Large scale hydrogen production from electricity and abundant water sources, such as sea water, represents the ultimate goal for the research described here. This is part of an overall scheme, called 'Artificial Photosynthesis', to generate clean renewable energy. Although the present project is but one step in this ambitious program, it directly addresses a key hurdle which must be overcome to make the project feasible. This is the efficient electrical conversion of water into hydrogen and oxygen, a two part process of which the latter is the most chemically difficult. The project aims to 'steal nature's secrets', by deciphering and then technologically mimicking the highly efficient means by which plants carry out these processes.

**DP0557755** Dr A Peters

**Title:** Food and sex: ecological and sexual roles of a functional ornament, the red bill of the sooty oystercatcher

**2005 :** \$120,000  
**2006 :** \$95,000  
**2007 :** \$95,000

**Category:** 2707 - ECOLOGY AND EVOLUTION  
APD Dr A Peters

**Administering Institution:** The Australian National University

**Summary:**

Little is understood about the significance of ornaments in species where both sexes are equally ornamented. Using sooty oystercatchers as a model, in a novel integrative approach I will investigate the role of their bright red bill as a signal of mate qualities, as well as the consequences of sex differences in bill and diet. Although sexual diet specialisation is common, few studies have examined its function. Sooty oystercatchers are one of only seven waders to breed in Australia and one of our most visible coastal birds. Since their life history is largely unknown, aside from the academic benefits, this project will also yield valuable information on breeding and foraging requirements of this locally common but declining species.

**DP0557294** Dr N Piper; Prof P Drahos; Prof CD Shearing

**Title:** **Nodal Governance and Human Security**

**2005 :** \$120,923

**2006 :** \$40,719

**2007 :** \$100,568

**2008 :** \$67,553

**2009 :** \$67,553

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** The Australian National University

**Summary:**

Australia is in a region where a number of countries fail to provide their people with security in basic areas such as health and community security. Understanding the security problems of Australia's neighbours is vital, but not easy. This pathbreaking project will help Australians involved in working with these countries to gain an interrelated understanding of the problems facing our neighbours. The benefits that flow from this include an improved planning capacity for dealing with security issues in the region, better use of the resources that we provide, and strengthened relationships with our neighbours. We will do this while placing Australia at the head of an emerging, highly exciting field of study centred on human security.

**DP0558339** Dr MJ Platow; Dr RA Eggins

**Title:** **The stifled voice of discontent? Toward a social-psychological understanding of voice suppression and the emergence of subversive action**

**2005 :** \$40,000

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The Australian National University

**Summary:**

This research will provide the first psychological insight into how reactionary sub-groups and ultimate subversive action can develop from denying people the chance to voice their views to relevant authorities. By studying both the desire to have this voice and the effects of not getting it, our work will help explain individual and collective behaviours that, to many, appear irrational if not heinous and morally corrupt. In this manner, we will be able to address the ARC Research Priority 4: Safeguarding Australia, Protecting Australia from Terrorism and Crime. Moreover, as we expect this research to yield timely and influential discoveries, it will help maintain Australia's position as a world leader in the field of social psychology.

**DP0556115** Dr GD Price; Dr FJ Woodger

**Title:** **Active bicarbonate transporters from cyanobacteria: physiological properties, genetic regulation, and introduction into plants for crop improvement**

**2005 :** \$130,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

APD Dr FJ Woodger

**Administering Institution:** The Australian National University

**Summary:**

An intriguing set of membrane transport proteins that accumulate bicarbonate into marine cyanobacterial cells will be investigated. These proteins support the crucial process of photosynthetic carbon dioxide fixation in marine cyanobacteria (blue-green algae), which are major contributors to global carbon dioxide sequestration and form one of the foundations of the marine food web. These bicarbonate 'transporters' will also be transferred into a model plant system to test whether the efficiency of photosynthesis can be improved, with corresponding gains in the water-use efficiency of these plants. If successful this technology will have profound global implications for improving crop production in semi-arid areas.

**DP0556282** Dr N Rawlinson

**Title:** **Exploring deep Australia: 3-D imaging of the lithosphere beneath south-east Australia using multiple high density seismic arrays**

**2005 :** \$120,000

**2006 :** \$110,000

**2007 :** \$75,000

**Category:** 2602 - GEOPHYSICS

APD Dr N Rawlinson

**Administering Institution:** The Australian National University

**Summary:**

The successful completion of this project will significantly improve our knowledge of the seismic structure of the Australian lithosphere, and hence improve our understanding of how the Australian continent came to be formed. In addition, the tomographic imaging methods that will be developed and applied to the individual and combined seismic arrays have a direct relevance to the seismic imaging techniques used by the exploration industry. Finally, the creation of a combined dataset comprising records from ~300 stations will help keep Australia at the leading edge of observational seismology, as other countries (e.g. U.S.) begin to deploy very large seismic arrays.

**DP0558228** Dr AP Rendell

**Title:** Use of Interval Arithmetic and GRID Computing in Computational Molecular Science: Bounding Errors and Locating Global Minima

**2005 :** \$72,000  
**2006 :** \$90,000  
**2007 :** \$71,000

**Category:** 2805 - DATA FORMAT

**Administering Institution:** The Australian National University

**Summary:**

Catastrophic failure of the Ariane 5 rocket in 1996 and the inability of Patriot missile systems to reach their targets during the 1991 Gulf war were both attributed to numerical computing errors. Less dramatic, but in a similar vein, this project aims to study the numerical stability of contemporary computational molecular science applications. The focus will be on linear scaling electronic structure codes, methods that are critical to the study of nano- and bio-materials, and are therefore of great importance to our economic future and medical well being. The project will build expertise within Australia in the area of interval arithmetic, an area that is currently poorly represented.

**DP0559172** Dr MC Ridgway

**Title:** Amorphisation of Semiconductor and Elemental Metallic Nanocrystals by Ion Irradiation

**2005 :** \$132,000  
**2006 :** \$115,000  
**2007 :** \$120,000

**Category:** 2914 - MATERIALS ENGINEERING

**Administering Institution:** The Australian National University

**Summary:**

This proposal is consistent with Research Priority 3: Frontier Technologies for Building and Transforming Australian Industries and Priority Goals: Breakthrough Science, Advanced Materials and Frontier Technologies. We seek to understand and develop a unique methodology for modifying and tailoring the structure of semiconductor and metallic nanocrystals in ways not achievable within the bulk phase. Our results and accompanying scientific insight will broaden the applicability of these materials in advanced technologies, enhance the national research profile, increase the domestic knowledge base and yield skilled, young scientists trained to utilize the Australian Synchrotron when commissioned in 2007.

**DP0558955** Dr AV Rode; Prof B Luther-Davies; Dr AG Christy

**Title:** Nanoclusters with Extraordinary Properties Made out of Ordinary Materials

**2005 :** \$125,000  
**2006 :** \$100,000  
**2007 :** \$100,000

**Category:** 2402 - THEORETICAL AND CONDENSED MATTER PHYSICS

**Administering Institution:** The Australian National University

**Summary:**

Ultrafast laser deposition - a process pioneered by the Applicants - has already demonstrated record yields in the production of carbon-based nano-clustered materials with better control over the size of the nano-particles than any other process. This project aims to improve fundamental understanding of the ultra-fast laser deposition method of nano-fabrication through theoretical and experimental studies, which accurately correlate the ablation conditions to the structural, electronic, magnetic and optical properties of resulting nano-particles. The results will be applied to efficiently produce nano-clustered materials with tuneable properties for a wide range of new technologies such as spintronics, biophotonics, and nanoclinics.

**DP0558438** Prof MD Ross; Dr AH Terrill

**Title:** Languages in Deep Time: the Papuan languages of Island Melanesia and their wider relationships

**2005 :** \$75,000  
**2006 :** \$75,000  
**2007 :** \$75,000

**Category:** 3802 - LINGUISTICS

**Administering Institution:** The Australian National University

**Summary:**

With its natural focus on the islands of the Southwest Pacific, and the associated mainland of New Guinea, the project has particular relevance for the understanding of the origins of our nearest neighbours. It is envisaged that the results of this project will generate considerable interest outside specialist circles, demonstrating Australian achievements in science on the international stage.

**DP0559049** Dr S Roundy; Mr K Taylor

**Title:** Self-Powered Wireless Sensor Networks, Enabling an Intelligent Agricultural Environment

**2005 :** \$89,098  
**2006 :** \$80,000  
**2007 :** \$86,198

**Category:** 2905 - MECHANICAL AND INDUSTRIAL ENGINEERING

**Administering Institution:** The Australian National University

**Summary:**

Most animal production enterprises could be considerably more productive if the physiological status of each animal were to be continuously monitored, and the appropriate adjustments were made in real time. The proposed project will develop technologies that will enable continuous, real-time monitoring resulting in more efficient use of Australia's resources. Furthermore, research on wireless sensor networks, or ambient intelligence as it is sometimes called, is at the forefront of wireless communications and indeed ICT technology. This project will benefit Australia's ICT community both by training new professional and research leaders in this area, and by developing technologies that will further enable this rapidly growing field.

**DP0556700** Dr D Rubatto; Dr J Hermann

**Title:** **Accessory minerals and trace elements as monitors of partial melting and high-grade metamorphic processes in the crust.**

**2005 :** \$160,000

**2006 :** \$160,000

**2007 :** \$150,000

**2008 :** \$120,000

**2009 :** \$120,000

**Category:** 2601 - GEOLOGY

QEII Dr D Rubatto

**Administering Institution:** The Australian National University

**Summary:**

The proposed project addresses: "How do continents work?", which has been identified as a key question in the national strategic plan for geosciences. The development of new monitors for high-grade metamorphic processes and partial melting will help to understand and explore the continental crust and will provide crucial information on deep earth resources (National Research Priority 1.6). Another direct potential benefit to Australia from this work is an enhancement of the country's international research reputation. The ANU is one of the world-leading research institutions in geochemistry, geochronology and experimental petrology and the outcomes of this project will ensure that Australia remains at the forefront in these disciplines.

**DP0556942** Dr A Samoc; Dr MJ Samoc

**Title:** **Polymer optical fibres with controlled molecular orientation for photonic applications**

**2005 :** \$146,000

**2006 :** \$126,000

**2007 :** \$116,000

**Category:** 2917 - COMMUNICATIONS TECHNOLOGIES

**Administering Institution:** The Australian National University

**Summary:**

The objective of the proposed research is to boost the advantage of Australian scientists and engineers working in the field of photonics by investigating new physical principles and new ways of fabricating specialty plastic optical fibres. Such fibres can be used in optical devices, to improve transmission and processing of signals in data communications, for improving efficient operation of power industry, in biophotonics.

**DP0557055** Prof M Sawer; Prof B Hindess

**Title:** **Democratic Audit of Australia: The Second Wave**

**2005 :** \$140,000

**2006 :** \$120,000

**2007 :** \$170,000

**Category:** 3601 - POLITICAL SCIENCE

**Administering Institution:** The Australian National University

**Summary:**

The Democratic Audit asks 'How democratic is our country and its government?' This project will give the community a comprehensive survey of the strengths and weaknesses of Australian democracy, tracking changes since the 2004 report. It will also provide more detailed findings on major questions that confront Australian governments now like the regulation of political financing and the impact on politics of new technologies like the internet. Using audit data, the project will produce a major scholarly analysis of the relationship between democratic values and the institutional choices made in Australia. Because a central objective of the Audit is to promote public debate, all Audit findings are published and placed on the Audit website.

**DP0559024** Prof BP Schmidt; Dr BA Peterson; Dr PA Price; Prof SR Kulkarni

**Title:** **Probing the Universe with Exploding Stars**

**2005 :** \$110,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2401 - ASTRONOMICAL SCIENCES

**Administering Institution:** The Australian National University

**Summary:**

This work is asking some of the broadest questions in Cosmology and seeks to understand the fundamental nature of the Universe we live in. The research proposed here is intended to capture the imagination of potential young scientists and technologists and ultimately will lead to more Australians undertaking studies in these crucial areas. This program will also train a number of young scientists in problem solving, computer programming, and image processing.

**DP0556641** Dr L Seabrooke

**Title:** Closing the Political Legitimacy Gap: The International Monetary Fund and Tax Reform, 1965-2005

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 3601 - POLITICAL SCIENCE

APD Dr L Seabrooke

**Administering Institution:** The Australian National University

**Summary:**

This project investigates how the International Monetary Fund (IMF) can improve its poor success with tax reform programs in borrowing states. It does so by analysing the success and failure of IMF tax reform programs in 20 borrowing states with varied regional, political, and economic characteristics between 1965 and 2005. This research has national and community benefit for two reasons. First, Australia has a close relationship with the IMF and an obligation to assist it with issues of global political and economic concern. Second, as problems with fiscal sustainability are strongly associated with international political and economic instability, Australia must develop its knowledge base on the politics of successful tax reform.

**DP0556517** Mr AC Searle

**Title:** Global Gravitational Wave Astronomy

**2005 :** \$80,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2499 - OTHER PHYSICAL SCIENCES

APD Mr AC Searle

**Administering Institution:** The Australian National University

**Summary:**

To listen to the universe with gravitational waves needs a global array of gravitational wave observatories, and one of these must be in the southern hemisphere - in Australia. By definitively answering outstanding questions about an Australian gravitational wave observatory - Where should it be? How sensitive? What astronomy will it aid? - we make the case for the international community to help build this observatory, investing hundreds of millions of dollars in rural Australia and keeping Australia on the cutting edge of all branches of astronomy. As a flagship client of advanced data GRID technologies, we will also shape the growth of Australian knowledge of, and infrastructure for, next-generation communications technologies.

**DP0556092** Dr MF Shannon; Dr PT Georgel

**Title:** New models for the role of chromatin in controlling inducible gene expression

**2005 :** \$135,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2702 - GENETICS

**Administering Institution:** The Australian National University

**Summary:**

This proposal aims to test novel models of how packaging of DNA in the nucleus plays a fundamental role in gene expression. Understanding these concepts is important in the context of successful gene therapy where major hurdles need to be overcome. This work also has implications for somatic cell therapy since it is important to understand how genes are expressed in order to successfully reprogram cells. Both of these areas are important to the Biotechnology industry. Answering questions about higher order chromatin structure in gene transcription will provide cutting edge, innovative knowledge that will have international significance.

**DP0556868** Dr AP Sheppard; Prof WV Pinczewski

**Title:** A dynamic pore-network model for fluid displacements in porous media

**2005 :** \$90,000

**2006 :** \$88,000

**2007 :** \$90,000

**Category:** 2907 - RESOURCES ENGINEERING

**Administering Institution:** The Australian National University

**Summary:**

The project will have a major impact on the up-stream oil and gas industry nationally and worldwide. It will allow data crucial to the development and optimization of oil and gas fields to be obtained from reservoir fragments and unconsolidated core, greatly reducing the levels of uncertainty associated with field developments. This has great commercial and strategic significance for Australia, where future potential reserves are located in remote offshore deep water areas where technological uncertainties are a major obstacle to timely development.

**DP0558151** Dr MS Sherburn

**Title:** Domino Approaches to Polycyclic Natural Products

**2005 :** \$160,000

**2006 :** \$100,000

**2007 :** \$100,000

**Category:** 2503 - ORGANIC CHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

Organic molecules are the basis of all known life forms. The majority of our medicinal agents are organic molecules. Organic molecules are made up of atoms, connected together by bonds. Usually, these molecules are constructed by making one bond at a time. We are trying to make this laborious job quicker and more efficient by forming lots of bonds at once. Research of this kind is the basis for the development of new pharmaceuticals. Australia doesn't have many people who are able to do this kind of thing. We will train four to six people in this area of research.

**DP0556874** Prof MJ Spriggs; Dr SH Bedford

**Title:** **Northern Vanuatu as a Pacific Crossroads: The archaeology of discovery, interaction and the emergence of the ethnographic present**

**2005 :** \$180,000

**2006 :** \$140,000

**2007 :** \$170,000

**Category:** 4302 - ARCHAEOLOGY AND PREHISTORY  
APD Dr SH Bedford

**Administering Institution:** The Australian National University

**Summary:**

The project addresses the National Research Priority Goal of "Understanding our Region and the World". Supporting research programs with smaller Pacific Island neighbours such as Vanuatu fosters Australia's relationship with those countries generally. This research will strengthen our knowledge of the region's deep human past. It will advance Australia's understanding of its nearest neighbours as well as provide those neighbours with information they can use to shape their own views of their past and its relationship to their present. The proposed research has direct relevance to on-going debates within world archaeology and related disciplines.

**DP0559306** Prof MV Srinivasan; Dr MR Ibbotson

**Title:** **How do bees orchestrate smooth landings?**

**2005 :** \$110,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2705 - ZOOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The results should pave the way for the development of novel, biologically inspired strategies for the control of landing in unmanned aerial vehicles. Endowing aircraft with the capability of autonomous flight and landing has been a major challenge in engineering technology. There is now considerable interest, nationally and world wide, in the development of small, intelligent, autonomous airborne vehicles for application in a number of areas of defense, surveillance and space exploration. The proposed research will help Australia maintain a leading edge in uncovering important biological principles of flight control that can be translated into useful technological applications.

**DP0556310** Prof BJ Stapleton

**Title:** **Causation and Liability for Wrongs: A Globalised Analysis**

**2005 :** \$46,470

**2006 :** \$40,000

**2007 :** \$40,000

**Category:** 3901 - LAW

**Administering Institution:** The Australian National University

**Summary:**

All Australians pay when fundamental legal concepts are unclear. Practitioners' advice to clients becomes difficult, costly and uncertain. Disputants are more likely to litigate, putting unnecessary pressure on over-stretched court resources. Australians pay for courts through taxes and pay indirectly when commercial litigants push their higher legal costs down into the prices they charge. Drawing on materials world-wide this project will produce a globally-applicable elaboration of two especially problematic concepts, causation and the extent of liability. Such clarification should reduce waste in the Australian economy while ensuring a basic requirement of justice: that like cases are treated alike. Assessment of damages.

**DP0558853** Dr H Strang; Prof LW Sherman

**Title:** **Restorative Justice and the Life Course: Victims and Offenders in Longitudinal Perspective**

**2005 :** \$145,000

**2006 :** \$72,000

**2007 :** \$145,000

**2008 :** \$80,000

**2009 :** \$85,000

**Category:** 3701 - SOCIOLOGY

**Administering Institution:** The Australian National University

**Summary:**

Reduction of crime and its effects is a major priority for Australia. Restorative justice represents one of the most promising policy innovations currently available for prevention of repeat offending and for benefiting victims of crime. Apart from the justice dimension, it has much wider community application from school bullying to peace building after civil war. Our study will provide knowledge about its actual economic and social benefits (or adverse effects) - nationally and at the community level. This knowledge is vital to answer the questions: 'Is it effective? Should it play a major role in our society ? as well as identifying areas in which current use can be improved to the benefit of victims of crime and the broader community.

**DP0558202** Prof RD Terrell; Prof TJ Brailsford; Prof A Chen; Prof B Brogan; Prof S Wu; Dr J Penm

**Title:** Investment Evaluation and Price Formation in Markets for Oil and Mineral Resources

**2005 :** \$65,000

**2006 :** \$65,000

**2007 :** \$50,000

**Category:** 3503 - BANKING, FINANCE AND INVESTMENT

**Administering Institution:** The Australian National University

**Summary:**

The project will examine and quantify price movements and the associated risk of mineral and oil prices leading to the development of better risk management models. The findings will help Australian exporters and importers understand and manage price risks more effectively. The investment community also benefits from the quantification of these risks, in particular, managers of large pension and mutual funds. The aim of the proposed models is better forecasting of global mineral and oil price movements leading to improved management of economic policy in this important sector.

**DP0557122** Dr SG Tims; Dr LK Fifield; Mr GJ Hancock; Dr R Bartley; Dr P Wallbrink

**Title:** Plutonium - A new tracer of sediment transport into the Great Barrier Reef Lagoon

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The Australian National University

**Summary:**

This work will quantify one of the most controversial threats to the Great Barrier Reef Marine Park, namely the amount of sediment reaching the reef as a consequence of human activities. It will have economic implications for this major Australian tourist attraction, as well as the commercial fishing and agricultural and horticultural industries in the region. The direct economic value associated with these industries exceeds \$1 billion per annum, and around 1 million people visit the inshore areas every year. Management of the park will benefit through improved understanding of the transport of sediment from the rivers to the lagoon and inner reef areas, and the fraction of the sediment attributable to anthropogenic practices.

**DP0557885** Prof R Tyers; Prof F Menezes

**Title:** Economy-wide consequences of regulation and privatisation policy regimes

**2005 :** \$123,485

**2006 :** \$123,000

**2007 :** \$135,131

**Category:** 3402 - APPLIED ECONOMICS

**Administering Institution:** The Australian National University

**Summary:**

The spread of regulation across the majority of the economy necessitates that regulatory policy and approaches account for affects on GDP, employment, innovation and the growth rate. This project will offer policy institutions, including the ACCC, the Productivity Commission and the Treasury, an analysis of these effects and develop new computer models suited to future use to explore economy-wide implications. This need arises even in sectoral regulatory agencies, however, most particularly where service industries, such as telecommunications, are dominated by one or a few firms whose performance has major effects on the costs and innovativeness of firms in other sectors.

**DP0557889** Prof R Tyers; Prof TJ Hatton; Dr S Khoo; Em/Prof RC Duncan; Dr M Tani; Dr Q Shi

**Title:** Economic consequences for Australia of global demographic change

**2005 :** \$100,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 3705 - DEMOGRAPHY

APD Dr Q Shi

**Administering Institution:** The Australian National University

**Summary:**

In addition to addressing the economic implications of declining fertility and mortality in Australia this study will analyse major changes in demographic behaviour in regions on which Australia's economic health depends and the consequent changes in the flow of migrants into Australia. A new mathematical model of global population change will be integrated into the standard GTAP-dynamic model of global economic performance to provide a useful tool for future analysis of Australia's population and economic policies. The analysis will contribute to policy development and the models will be widely available to policy institutions for their use.

DP0556686 Dr L Veracini

**Title:** The Indigenous Histories of Settler Societies

**2005 :** \$72,280

**2006 :** \$71,085

**2007 :** \$70,000

**Category:** 4301 - HISTORICAL STUDIES

APD Dr L Veracini

**Administering Institution:** The Australian National University

**Summary:**

Until recently, Australia was officially engaged in Aboriginal Reconciliation. Yet the position of Aboriginal Australians in the wider society has not improved significantly. In this context, history and the way history is discussed are very important issues. The Australian community will benefit from an increased awareness of global trends regarding some inclusion of indigenous understandings in representations of national identity. The Australian community will benefit as well from a comparative analysis of the ways in which indigenous histories are produced and received. This project will provide an inclusive analysis of comparable debates and an assessment of the degree of recognition being acquired by indigenous communities elsewhere.

DP0557047 Dr M Vos; Prof Dr CA Chatzidimitriou-Dreismann

**Title:** Quantum Entanglement of Protons Studied by Electron Scattering at High Momentum Transfer

**2005 :** \$75,000

**2006 :** \$125,000

**2007 :** \$80,000

**Category:** 2403 - ATOMIC AND MOLECULAR PHYSICS; NUCLEAR AND PARTICLE PHYSICS; PLASMA PHYSICS

**Administering Institution:** The Australian National University

**Summary:**

Eighty years after the establishment of quantum mechanics protons in matter are still largely seen as 'classical' particles, that do not interfere in ways known to occur for light and electrons. There are indications from neutron and electron scattering experiments from solids that, for extremely short time scales, (one-millionth of a nanosecond), this picture is too simple. The proposed experiment seeks to establish this fact for molecules in the gas-phase. As the chemical bond is formed at similar time-scales these experiments will improve our understanding of chemical reactions, and hence be of great value for the chemical industry.

DP0557398 Dr KJ Weber

**Title:** High Temperature Silicon Nitride for Improved Silicon Photovoltaics

**2005 :** \$70,000

**2006 :** \$60,000

**2007 :** \$63,000

**Category:** 2909 - ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Institution:** The Australian National University

**Summary:**

The project is expected to make a significant contribution to the development of a vibrant and highly competitive photovoltaics industry in Australia, since the results of the research are expected to lead to improved manufacturing processes. A strong photovoltaics industry will lead to the creation of significant numbers of jobs and export earnings. There is a large and rapidly expanding overseas market for solar panels. In addition, the large scale deployment of photovoltaic systems will help to reduce greenhouse gas emissions and thus mitigate the magnitude and severity of the effects of global warming.

DP0559135 Prof AH Welsh

**Title:** Bootstrap methods for data with multiple errors

**2005 :** \$97,000

**2006 :** \$85,000

**2007 :** \$87,000

**Category:** 2302 - STATISTICS

**Administering Institution:** The Australian National University

**Summary:**

This project will provide new methods for data analysis and quality research training. The results will benefit researchers in statistics and users of statistics who encounter data with multiple errors and who need to make inferences from these data. The many areas from which such data arise (including medicine, genetics, chemistry, education, social surveys etc) mean that Australia and Australian Industry will also ultimately benefit from the research. The strengthening of international links and the training of highly trained researchers will also benefit the Australian community.

DP0557634 Dr M Wenzel; Prof NT Feather; Dr MJ Platow

**Title:** How do we seek justice after hurt, offence or terror? Retributive and restorative responses

**2005 :** \$105,000

**2006 :** \$100,000

**2007 :** \$110,000

**Category:** 3801 - PSYCHOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The project will address a neglect of the concept of restorative justice in psychology. It will add to the leadership on this issue of Australian researchers from other disciplines and contribute to Australia's worldwide reputation in this field. The project will determine when people are motivated to use restorative justice. Hence, it will contribute to the effective implementation of restorative justice practices, for them to be considered legitimate and able to contribute to the reduction of crime, to reconciliation after conflict and international peace. The research seeks to make a contribution to a safer, more cohesive Australia and inform its missions for conflict resolution (in the region) and thus reduce causes of terrorism.

**DP0556085** Prof A Wierzbicka

**Title:** **The English Language: Meaning, History and Culture**

**2005 :** \$150,000

**2006 :** \$150,000

**2007 :** \$120,000

**2008 :** \$150,000

**2009 :** \$120,000

**Category:** 3802 - LINGUISTICS

**Administering Institution:** The Australian National University

**Summary:**

The theory developed by the CI (and her colleague Cliff Goddard) contributes to Australia's prestige on the academic scene world-wide and attracts many graduate students to this country. This project should further strengthen its influence.

Australia is a multicultural society, united (but also divided) by the English language. Educating Australians of all backgrounds about the cultural assumptions and values embedded in English is a matter of vital national and community interest. The outcome of this project will be an important resource for intercultural training in Australia and other English-speaking countries. The project will enhance Australia's capacity to interpret itself to the world.

**DP0557267** Prof SB Wild; Dr ML Coote

**Title:** **Quantum-chemical design of stereoregular polyphosphines for nanowires**

**2005 :** \$160,000

**2006 :** \$148,000

**2007 :** \$150,000

**Category:** 2502 - INORGANIC CHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

In this project we will be designing and producing stereoregular polyphosphines that can self-assemble gold and silver complexes that mimic the molecular architectures of DNA and certain proteins. The longer gold complexes will behave as insulated nanowires, and are an exciting prospect for the development of nanotechnological devices. The shorter silver and gold complexes are expected to have significant antitumour properties. This project, which will use a unique theoretical/experimental approach to design the stereoregular polyphosphines, will enhance Australia's international scientific reputation, and will contribute to technological advancement in the national priority areas of nanotechnology and biotechnology.

**DP0559604** Dr IS Williams

**Title:** **In search of the sources of southeastern Australian granites: a Hf, O and U-Pb isotopic study of single zircons**

**2005 :** \$120,000

**2006 :** \$100,000

**2007 :** \$110,000

**Category:** 2603 - GEOCHEMISTRY

**Administering Institution:** The Australian National University

**Summary:**

Some researchers suggest that the composition of granites can be used to map their source regions 15-35 km below the Earth's surface; others disagree. Our research is designed to resolve the matter, providing a firmer basis for using granite compositions to infer crustal structure and assist in mineral exploration. The research will require the development of new analytical techniques which will greatly enhance the capacity of SHRIMP, a uniquely Australian frontier technology, in a variety of new fields, e.g. biology, environmental studies and ore genesis, each of which ultimately contributes to the social and economic well-being of the Australian community.

**DP0557392** Prof RE Williamson

**Title:** **The cellulose synthase complex of the Arabidopsis primary cell wall**

**2005 :** \$85,000

**2006 :** \$75,000

**2007 :** \$75,000

**Category:** 2701 - BIOCHEMISTRY AND CELL BIOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The polysaccharide cellulose is the basis for the wood and cotton fibre industries of Australia and much of our research on the mechanism of synthesis has been supported by those industries over the past decade. The present project focuses on the proteins making cellulose and how they organised into functional complexes that are able to make cellulose. The knowledge it provides, together with that from other projects, will move us towards the situation where we can manipulate the rate at which cellulose is produced and change its detailed properties. This opens the way to industry producing fibres with more desirable properties and producing novel cellulose-based materials tailored to specific applications.

**DP0558189** Dr GM Yaxley; Prof DH Green; Mr C Spandler

**Title:** **Mantle Heterogeneity: an exploration of the melting behaviours of compositional heterogeneities in the Earth's Mantle**

**2005 :** \$90,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2601 - GEOLOGY  
APD Mr C Spandler

**Administering Institution:** The Australian National University

**Summary:**

This research represents an important national benefit in the provision of a valuable opportunity for further training and development of a very talented young earth scientist through request for an Australian Postdoctoral Fellowship. This is of particular importance in an era when many potential and actual research leaders are leaving the country for overseas positions. In addition, Australia's long-term international leadership in high pressure experimental investigations of the earth will be enhanced as a result of the outcomes of the proposed research, which will resolve fundamental and currently hotly debated issues concerned with our planet's geochemical evolution through geological time.

**DP0558499** Dr GC Young; Dr JA Long

**Title:** **Australia's exceptional Palaeozoic fossil fishes, and a Gondwana origin for land vertebrates**

**2005 :** \$100,000

**2006 :** \$90,000

**2007 :** \$90,000

**Category:** 2601 - GEOLOGY

**Administering Institution:** The Australian National University

**Summary:**

The 370 million-year-old Gogo deposit in WA has produced the World's best-preserved fossil fishes of Devonian age. New discoveries of related forms in eastern and central Australia document the deep history of Australia's unique vertebrate fauna, and provide new evidence on the evolution of the first jaws and limbs in vertebrates. They indicate that the first land animals may have evolved on the Australian landmass. These remarkably preserved, information-rich skulls and braincases of some of the oldest known vertebrate fossils provide unique data on early evolution of the head and brain; they are held in national collections as a significant contribution to both National and World Heritage.

**DP0557018** Dr J Zeil; Dr RA Peters

**Title:** **Moving to be seen: a comprehensive analysis of movement-based signal design**

**2005 :** \$90,000

**2006 :** \$80,000

**2007 :** \$80,000

**Category:** 2707 - ECOLOGY AND EVOLUTION  
APD Dr RA Peters

**Administering Institution:** The Australian National University

**Summary:**

Papers on visual motion processing and animal signal design regularly feature in major journals, and the programs of international conferences. We can thus be confident that theoretical advances will attract international attention. We will develop further state-of-the-art methods in motion analysis, with our overall approach likely to serve as a framework for future research programs, although our techniques will have applications outside of biology. In addition, we will learn much about the social behaviour of a group of native reptiles about which relatively little is known. Research on the social behaviour of animals is readily comprehended by non-specialists and plays an important role in attracting young people to careers in science.

**University of Canberra**

**DP0559788** Prof RA Bartnik

**Title:** **Energy, Cosmic Censorship and Black Hole Stability**

**2005 :** \$65,000

**2006 :** \$56,000

**2007 :** \$60,000

**Category:** 2301 - MATHEMATICS

**Administering Institution:** University of Canberra

**Summary:**

Human progress is achieved by confronting fundamental questions, at the leading edge of knowledge. This project will lead to better understanding of space-time physics, and of the properties of singular solutions of non-linear hyperbolic equations. Such equations govern a wide range of physical phenomena, including fluid flow, weather and electromagnetic fields.

**DP0560192** Dr A Daly; Prof AM Harding; Prof PE Lewis

**Title:** **Social Inclusion and Exclusion Among Australia's Children: A Spatial Perspective**

**2005 :** \$50,000

**2006 :** \$50,000

**2007 :** \$50,000

**Category:** 3702 - SOCIAL WORK

**Administering Institution:** University of Canberra

**Summary:**

Numerous studies have shown that socio-economic disadvantage experienced by children has major adverse effects on health and well-being that persist for the rest of their lives. This project will deliver major national benefits by providing quantitative evidence and analysis of the current spatial distribution of various forms of disadvantage and social exclusion among Australia's children and of any changes to these spatial patterns during the past 15 years. This enhanced evidence base will assist all levels of government in decisions about needs-based planning of government services and in the development of possible policy responses.