

**New South Wales**

**The University of New South Wales**

**DP0772239** Prof PF Alexander

**Approved Project Title** **A study of the writings of Alan Paton, a major literary and political figure**

**2007 :** \$65,097

**2008 :** \$60,152

**2009 :** \$32,794

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The University of New South Wales

**Project Summary**

The outcome of this project will constitute an important contribution to the current debate in Australia and other Western countries about ethical responses to violence. Alan Paton is a major South African literary and political figure who faced extremism both from his country's government and its opponents. The proposed study of his letters will be an important addition to the literary corpus of one of Africa's foremost thinkers and writers, and will constitute an advance upon and contribution to the body of knowledge about the cultural history of Africa in the twentieth and twenty-first century. The project will raise the profile of Australian scholarship in the field of African literature and history.

**DP0772223** A/Prof MV Apte; Prof A Shulkes; Prof JS Wilson; A/Prof R Pirola

**Approved Project Title** **Do pancreatic stellate cells play a role in pancreatic exocrine secretion?**

**2007 :** \$90,000

**2008 :** \$88,000

**2009 :** \$85,000

**Primary RFCD** 3206 MEDICAL PHYSIOLOGY

**Administering Organisation** The University of New South Wales

**Project Summary**

3 major national benefits: 1)Alignment with research priority goals of preventative health care and ageing well ageing productively. Elucidation of mechanisms of action of CCK and the interaction of PSCs and acinar cells in mediating pancreatic secretion will help refine our approach to the prevention and treatment of disorders related to the above processes viz. maldigestion, malabsorption, obesity and pancreatic cancer. 2)Enhancement of Australia's reputation in gastrointestinal (GI) research through a unique collaboration between internationally recognised researchers in GI and pancreatic biology. 3)Training opportunities for Australian research students and scientists in physiology, gastroenterology and pancreatology.

**DP0773971** Prof AP Avolio; Prof JR Cockcroft; Dr IB Wilkinson

**Approved Project Title** **Effect of modification of structural and cellular properties of the arterial wall on functional stiffness of large arteries**

**2007 :** \$100,000

**2008 :** \$100,000

**2009 :** \$90,000

**Primary RFCD** 3210 CLINICAL SCIENCES

**Administering Organisation** The University of New South Wales

**Project Summary**

The Australian population is ageing, becoming more obese and showing earlier onset of age-related conditions such as high blood pressure, heart failure and inflammatory disorders. All these conditions are associated with possible increase arterial stiffness. Inflammatory disorders in Australia affect one in six people, increasing to one in five in the next decade. An equal proportion is affected by cardiovascular disease. This combined effect poses a massive burden on the national health budget. This project aims to investigate basic mechanism leading to degeneration of function of larger arteries and therapies to reverse the process and reduce cardiovascular risk in the community.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0769972** A/Prof C Barner-Kowollik

**Approved Project Title** **Defining Polymer Structures in Radical Polymerization Systems: Chain Birth, Chain Growth and Complex Macromolecular Architectures**

**2007 :** \$230,000

**2008 :** \$215,000

**2009 :** \$220,000

**2010 :** \$215,000

**2011 :** \$220,000

**Primary RFCD** 2505 MACROMOLECULAR CHEMISTRY

APF A/Prof C Barner-Kowollik

**Administering Organisation** The University of New South Wales

### Project Summary

The project underpins and extends Australia's leading position in the development and application of novel methods to generate advanced polymeric materials. By carefully studying the reaction pathways underpinning the polymerization processes, an in-depth picture of the polymerization is obtained. The research outcomes will strongly benefit the preparation of the coming generations of intelligent polymer materials of a highly controlled structure, responsive to their environment, with an even broader range of applications than existing polymers. In addition, the project has a substantial educational component providing training embedded in cutting polymer science for several honours and 1 PhD student.

**DP0769981** A/Prof C Barner-Kowollik; Dr M Stenzel

**Approved Project Title** **Novel Complex Architecture Polymers via a Combination of RAFT Chemistry and Pericyclic Reactions: Synthesis and Characterization**

**2007 :** \$125,000

**2008 :** \$110,000

**2009 :** \$120,000

**Primary RFCD** 2505 MACROMOLECULAR CHEMISTRY

**Administering Organisation** The University of New South Wales

### Project Summary

The project aims at advancing the synthetic limits and broadening the synthetic scope of living free radical polymerization and thus enhancing the library of polymer structures available for applications ranging from drug delivery to opto-electronics. Current material design for these applications is yet to reach its full potential through innovative synthetic approaches. The proposal critically underpins and further advances Australia's leading position in both breakthrough science as well as advanced materials. Due to its significant scientific breadth and large coverage of both synthetic and physical aspects of polymer science, the project also provides a significant platform for research training at both honours and PhD level.

**DP0770271** Dr AJ Barnier; A/Prof J Sutton

**Approved Project Title** **From autobiographical memory to collective memory: An interdisciplinary study of individual and group cognition**

**2007 :** \$110,000

**2008 :** \$90,000

**2009 :** \$90,000

**2010 :** \$60,000

**2011 :** \$60,000

**Primary RFCD** 3801 PSYCHOLOGY

ARF Dr AJ Barnier

**Administering Organisation** The University of New South Wales

### Project Summary

Remembering our past is crucial to our identity and well-being, both as individuals and in groups. Investigating the role of social groups in memory, this project offers 4 benefits: (1) it builds Australia's capacity for high-level, innovative memory research; (2) it pioneers an interdisciplinary approach, genuinely integrating philosophy and psychology, to strengthen Australia's international reputation in these fields; (3) it identifies social supports for healthy remembering, thus 'Promoting and Maintaining Good Health' ('Ageing well, ageing productively'); (4) it offers fresh, sophisticated ways to address public debates about the role of memory in productive, fulfilling lives, 'Strengthening Australia's social and economic fabric'.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772731** A/Prof GF Barrett; Dr TF Crossley; Dr Y Tseng

**Approved Project Title** **Understanding the Saving Behaviour of Australian Households: Private Retirement Provision and the Policy of Forced Saving**

**2007 :** \$100,000

**2008 :** \$100,000

**2009 :** \$100,000

**Primary RFCD** 3402 APPLIED ECONOMICS

**Administering Organisation** The University of New South Wales

### Project Summary

The outcomes from the research on Australian retirement saving behaviour will generate a range of national benefits. First, the collaboration of researchers across institutions, and internationally, will enhance and promote Australian research skills. Second, Australian research will be placed at the forefront of an important, international field. Third, the research will make fundamental contributions to the evidence base for the design of public policies to ensure Australians have access to adequate resources in retirement. This is an urgent public policy concern due to the rapid ageing of the Australian population: the fraction aged over 65 years is forecast to double from 10% to 20% over the next 40 years.

**DP0771614** Prof R Bishop

**Approved Project Title** **Control of the Enantiomeric Self-Resolution Process**

**2007 :** \$80,000

**2008 :** \$80,000

**2009 :** \$80,000

**Primary RFCD** 2599 OTHER CHEMICAL SCIENCES

**Administering Organisation** The University of New South Wales

### Project Summary

The availability of enantiopure molecules is crucial in chemistry and medicine. Enantiomeric self-resolution on crystallisation provides pure left- and right-handed molecules from 1:1 mixtures of the two. It is the simplest and cheapest means of obtaining enantiopure molecules, but its occurrence in any given case cannot normally be predicted. The understanding and control of the self-resolution process gained through this project will represent a major breakthrough in organic and pharmaceutical chemistry. This technological advance will make pure handed molecules available readily and cheaply, thereby allowing chemical, pharmaceutical and biological developments to be made by Australian industry.

**DP0770539** Prof MA Bradford

**Approved Project Title** **Time-dependent dynamic, creep and shrinkage response of curved structural members**

**2007 :** \$159,217

**2008 :** \$158,775

**2009 :** \$134,093

**Primary RFCD** 2908 CIVIL ENGINEERING

**Administering Organisation** The University of New South Wales

### Project Summary

This project concerns curved structural members, such as bridge beams, that are subjected to dynamic excitation and to concrete shrinkage and creep. Hitherto, unified formulations for the structural behaviour of these members have not been properly developed. The proposal seeks to build on a previous ARC DP of the investigator that produces significant results for static loading, by developing a sophisticated methodology to handle non-static dynamic loading and for shrinkage and creep. It will develop advanced mathematical tools to enable the safe and efficient design of a multiplicity of structures that is of benefit to on and offshore Australian technology.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771300** Dr T Britz

**Approved Project Title** **Chromatic polynomials, random graphs, and error-correcting codes: a unified approach to graph colouring problems**

**2007 :** \$82,518  
**2008 :** \$78,698  
**2009 :** \$80,850

**Primary RFCD** 2301 MATHEMATICS

APD Dr T Britz

**Administering Organisation** The University of New South Wales

### Project Summary

Through a unified approach involving cutting-edge results on chromatic polynomials, random graphs, matroids, and error-correcting codes, this project will establish the foundations for a rigorous mathematical framework for attempting to provide a short, transparent and illuminating solution to the Four Colour Problem. The project will support developments in computer science and statistical mechanics and is likely to have flow-on effects in real-world disciplines such as network communication. This project will also strengthen Australia's international presence in discrete mathematics and will further strengthen ties between Australian and international mathematicians.

**DP0770818** Dr V Bulmus; Prof TP Davis; A/Prof M Kavallaris; Dr HD Maynard

**Approved Project Title** **Development and Evaluation of Well-Defined Polymer-RNA Conjugates as Improved Therapeutics**

**2007 :** \$105,000  
**2008 :** \$105,000  
**2009 :** \$185,000  
**2010 :** \$105,000

**Primary RFCD** 2505 MACROMOLECULAR CHEMISTRY

**Administering Organisation** The University of New South Wales

### Project Summary

Gene-based drugs offer an enormous potential to treat a wide range of diseases including, but not limited to, AIDS, hepatitis, and cancer. However, effective delivery of these drugs in body is needed to convert their therapeutic potential to clinically applicable treatments. Our multidisciplinary team will aim to develop novel, polymer-gene hybrid materials for efficient delivery of gene based therapeutics. Development of such advanced drug delivery systems will significantly enhance Australia's power in biotechnology. Development and/or formation of new materials and strategies to improve the health quality of Australians, is an important anticipated outcome of this innovative project.

**DP0770044** Prof DP Cahill

**Approved Project Title** **Religion and Political Transformation: A Transnational Study of South American Independence, 1750-1840**

**2007 :** \$92,994  
**2008 :** \$59,517  
**2009 :** \$57,517

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The University of New South Wales

### Project Summary

This pathbreaking international research project strongly contributes to the internationalisation of Australian humanities and social science research. It ensures Australia's substantial participation in seminal intellectual debates during the approaching bicentenaries of the birth of modernity in Spain and Latin America. It guarantees that Australia will not become just a consumer of overseas research in this field. It renews Australia's intellectual and cultural capital in Iberian and Latin American Studies at a crucial moment of generational change. It contributes to an understanding of the generic links between religious radicalism and political violence in an age of fast-moving, global transformation.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770523** Dr C Chou; Dr S Kanhere; Dr N Bulusu

**Approved Project Title** **Participatory Wireless Sensor Networks**

**2007 :** \$58,000

**2008 :** \$58,000

**2009 :** \$56,000

**Primary RFCD** 2801 INFORMATION SYSTEMS

**Administering Organisation** The University of New South Wales

### Project Summary

The investment in the Participatory Wireless Sensor Network (PWSN) research will ensure that Australia stays in the forefront of this innovative and disruptive technology. Since the PWSN concept leverages on the existing communication and sensing infrastructure, the entry cost for developing new business opportunities on it is low. There are ample opportunities for local companies (e.g. Internet service providers, mobile phone carriers and wireless service providers) and start-up companies to create innovative services on PWSN for both the Australian and overseas markets.

**DP0774434** Prof W Chua; A/Prof JA Baxter; Dr N Sawabe

**Approved Project Title** **Strategizing and Management Accounting Control: Comparing and Contrasting Australian and Japanese Practices**

**2007 :** \$35,000

**2008 :** \$46,000

**2009 :** \$44,000

**Primary RFCD** 3501 ACCOUNTING, AUDITING AND ACCOUNTABILITY

**Administering Organisation** The University of New South Wales

### Project Summary

Organisations invest significant resources in the development of formal strategic plans, as well as management accounting control systems (MACS) to facilitate their implementation. Yet we know very little about the practices connecting MACS to the realisation of organisational strategies. This study intends to examine these practices by using field research to compare and contrast practices in Australian and Japanese organisations. Such research will contribute to the national benefit by highlighting 'best' practice in relation to the use of MACS in achieving strategic goals/change, contributing to an innovative Australian business culture.

**DP0771340** Dr MP Davenport; Dr SJ Turner; Dr V Venturi; Dr DC Douek

**Approved Project Title** **Understanding the T cell repertoire in health and disease**

**2007 :** \$140,000

**2008 :** \$132,000

**2009 :** \$124,000

**Primary RFCD** 3202 IMMUNOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

Immune recognition of viruses usually involves a large number of different 'killer T cells' that kill cells infected by virus. However, during prolonged infection or in the elderly the number of different killer T cells that recognise the virus is greatly reduced. This reduction in the diversity of the immune response allows the virus to avoid immune recognition, and leads to more severe infection. We aim to understand how diversity is generated in the immune response, and how it becomes narrowed with age or prolonged infection. This information can be used to design vaccines for persistent infections such as HIV, and to improve immune control of infection in the elderly.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771770** Dr G Edmond  
**Approved Project Title** **Just truth? An empirical study of expert evidence**  
**2007 :** \$20,000  
**2008 :** \$20,000  
**2009 :** \$45,000  
**2010 :** \$20,000  
**Primary RFCD** 3706 HISTORY AND PHILOSOPHY OF SCIENCE AND MEDICINE  
**Administering Organisation** The University of New South Wales

### Project Summary

Though a ubiquitous feature of contemporary legal and regulatory practice, expert evidence continues to create administrative and socio-economic problems. Expert evidence can add to the length, cost and complexity of litigation and has been linked to the failure of tort law, the withdrawal of insurance coverage, legal mistakes and notorious miscarriages of justice. This project will examine how expert knowledge is developed and used in and around legal settings. It will identify means of improving the provision and evaluation of expert advice in order to enhance the social legitimacy of our legal institutions and facilitate commercial innovation and productivity.

**DP0772153** Dr LJ Foster; Dr A Lauto  
**Approved Project Title** **Development of a Light-Activated Bioadhesive for Low Temperature Tissue Repair**  
**2007 :** \$120,000  
**2008 :** \$100,000  
**2009 :** \$90,000  
**Primary RFCD** 2915 BIOMEDICAL ENGINEERING  
**Administering Organisation** The University of New South Wales

### Project Summary

While sutures currently represent the gold standard for wound closure, their fundamental technology has changed little in thousands of years. Surgical sealants and energy based closure devices are expected to increasingly replace or complement sutures, improving tissue closure and wound healing. The innovative research in this proposal will develop the next generation of surgical bioadhesive technology and claim a stake in the estimated US\$ 4 billion market. The project outcomes will enhance Australia's reputation in the biomedical field and will have world-wide social and health care benefits by ultimately allowing better functional healing through bioadhesives that can be effectively applied rapidly and consistently.

**DP0769997** Dr J Franklin; Em/Prof DM Armstrong  
**Approved Project Title** **Mathematics, the science of real structure: an Australian realist philosophy of mathematics**  
**2007 :** \$40,000  
**2008 :** \$35,000  
**2009 :** \$35,000  
**Primary RFCD** 4401 PHILOSOPHY  
**Administering Organisation** The University of New South Wales

### Project Summary

The project will strengthen the already strong Australian philosophical tradition of realism, extending it into philosophy of mathematics. It will develop a robust alternative to the nominalism, Platonism and idealism that dominate northern-hemisphere philosophizing about mathematics, an alternative that is in tune with how mathematicians really apply mathematics. Australian philosophy will thus be strengthened in general, giving it a greater attractiveness to the many overseas visitors and students who already appreciate its unique strengths. The nature of the project will also lead to closer ties and interdisciplinary work between philosophers and mathematicians.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771569** A/Prof R Freestone; Dr C Garnaut; Dr AJ Brown-May; Dr S Petrow; A/Prof J Gregory; Dr CJ McConville

**Approved Project Title** **Rediscovering historical contributions in environmental planning: Australia's Town Planning Associations**

**2007 :** \$90,559

**2008 :** \$74,209

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The University of New South Wales

### Project Summary

This study will provide an alternative history of Australian urban planning that will document at a national level how non-government organisations contributed positively and creatively to the evolution of modern environmental planning from the 20th century. It will support the strengthening of Australia's social and economic fabric by discovering through original historical research how previous generations have productively and creatively contributed to decisions affecting general environmental well-being. It will contribute an historical perspective to current debates on the need for more collaborative planning.

**DP0770289** Dr G Froyland; Prof Dr M Dellnitz; Mrs AM Treguier

**Approved Project Title** **A Dynamical Systems Approach to Mapping Southern Ocean Circulation Pathways**

**2007 :** \$100,000

**2008 :** \$95,000

**2009 :** \$90,000

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The University of New South Wales

### Project Summary

Climate change can be expected to have complex, long-term consequences for Australia's biodiversity, for our agricultural and marine production systems, and for regional communities. The Southern Ocean is a critical driver of global climate, connecting the three major oceanic basins. Using sophisticated mathematics to analyse state-of-the-art global ocean models, this project will create a detailed picture of hitherto invisible Southern Ocean circulation 'pathways'. The newly discovered pathways will greatly enhance our understanding of the Southern Ocean circulation, lead to improved coupled climate models, and increase our ability to predict future climate change and threats to marine populations.

**DP0771172** A/Prof A Game; A/Prof AW Metcalfe

**Approved Project Title** **The social theory of the gift; implications for volunteering, charity and community giving**

**2007 :** \$70,000

**2008 :** \$40,000

**Primary RFCD** 4402 RELIGION AND RELIGIOUS TRADITIONS

**Administering Organisation** The University of New South Wales

### Project Summary

This study will encourage debate about the value of generosity. We expect to find that when people give wholeheartedly to the community they become able to receive what the community has to offer. It is this give-and-take that makes life fulfilling. By studying fulfilment that comes from work in the areas of health, charity, hospitality and care, we will encourage vocations in these areas. By investigating the gift of respect, we will encourage debate about the virtues of civility.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774417** Prof BJ Gillam  
**Approved Project Title** **Stereoscopic edge and surface perception**

**2007 :** \$81,000  
**2008 :** \$81,000  
**2009 :** \$84,000

**Primary RFCD** 3801 PSYCHOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

Our seemingly effortless ability to perceive our environment and the objects within it are only possible because of the effectiveness and complexity of visual information processing in the brain; especially stereoscopic processing which gives a graphic sense of three-dimensionality of long-standing interest to scientists, artists and engineers/computer scientists trying to simulate stereo information. This proposal will pursue some novel ideas about how we perceive slant and curvature from stereopsis and how we allow for distance in interpreting interocular image differences. It is relevant to artificial intelligence, visual guidance, virtual reality and medical and military image interpretation.

**DP0772356** A/Prof JJ Gooding; Dr K Gaus

**Approved Project Title** **Surface Chemistry meets Cell Biology: Molecular Level Control of Surface Architecture for Cell Adhesion and Migration**

**2007 :** \$130,000  
**2008 :** \$120,000  
**2009 :** \$120,000

**Primary RFCD** 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

**Administering Organisation** The University of New South Wales

### Project Summary

Biotechnological applications such as tissue engineering, bone supports, implantable materials, cell assays and biosensors all require detailed knowledge of how cells interact with their environment. The proposed research aims to provide this knowledge by developing unique modified surfaces to investigate white blood cell migration and adhesion. Additional expected outcome will contribute to our understanding of the many fundamental cellular processes such as cell growth, differentiation and cell death as well as the molecular basis of diseases such as inflammation, cancer, cardiovascular diseases and wound healing. This research program will establish Australia as a leading force in this new research field.

**DP0770660** Dr S Hand; Prof M Archer

**Approved Project Title** **Unravelling the last great Gondwanan mystery: the first land vertebrate fauna from the Tertiary of New Zealand**

**2007 :** \$182,902  
**2008 :** \$171,000  
**2009 :** \$160,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

**Administering Organisation** The University of New South Wales

### Project Summary

This project will dramatically increase knowledge about Australia's and New Zealand's shared biodiversity and the history of trans-Tasman dispersals. By comparing Australian and New Zealand fossil records, it will be possible to assess the speed at which evolving vertebrates of one landmass invade another, as well as the biotic consequences of such events, and provide data important for predicting and responding to future potentially-damaging events of this kind. Developing understanding about the timing and intensity of antipodean faunal response to past climate change will improve ability to anticipate and manage processes that threaten ecosystem resilience in both lands.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770212** Ms E Harris; Dr C McMahon; Prof G Vimpani; Dr S Matthey; A/Prof SB Dockett; A/Prof RW Perry; Dr TM Anderson; Adj/Prof VA Schmied

**Approved Project Title** **Early childhood sustained home visiting: outcomes at 4 years and the transition to school**

**2007 :** \$58,000  
**2008 :** \$93,700  
**2009 :** \$100,200  
**2010 :** \$50,000  
**2011 :** \$151,000

**Primary RFCD** 3702 SOCIAL WORK

**Administering Organisation** The University of New South Wales

### Project Summary

The Commonwealth has been committed to developing a national agenda for early childhood, with a strong focus on development and use of Australian-relevant evidence, an outcomes focus, a focus on vulnerable communities, families and children, and strengths-based approaches. This agenda is also reflected in the key research priority areas of the Commonwealth Government. The proposed study is a critical next step in the development of an Australian evidence base for professional home visiting: a key strategy for the delivery of services to promote the health and development of young Australians. The findings of this study will have significant implications for the development of early childhood policy and strategy throughout Australia.

**DP0770292** A/Prof BK Hayes; Dr BR Newell; Prof GL Murphy

**Approved Project Title** **'As-if thinking': an experimental analysis of human reasoning and decision-making**

**2007 :** \$62,000  
**2008 :** \$71,000  
**2009 :** \$75,000  
**2010 :** \$63,000

**Primary RFCD** 3801 PSYCHOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

The failure to respond adequately to the havoc wreaked by Hurricane Katrina in 2005 highlighted the difficulty of sequential decision-making. Responses to such emergencies require detailed contingency plans, necessitating a consideration of all possible outcomes of a situation regardless of their objective probability. This project takes an innovative approach to the experimental analysis of human reasoning and decision-making, with the aim of identifying the mechanisms, factors, and boundary conditions affecting inferences and decisions about uncertain alternatives. The research will inform planning for Australia's readiness to respond to unpredictable events with uncertain outcomes and enhance the reputation of Australian science.

**DP0772548** Dr TD Hoang; Prof AV Savkin

**Approved Project Title** **Robust State Estimation of Complex Multi-Object Systems**

**2007 :** \$117,000  
**2008 :** \$117,000  
**2009 :** \$117,000

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The University of New South Wales

### Project Summary

Conceptual advances will be made in the area of robust state estimation of complex systems. New design rules will be developed and published in the top international journals and major international conferences. The main benefit of this project will be its direct applications to industrial control problems in the military equipment and manufacturing industries, bio-engineering, and automobile industry. We also build a world class research group at the University of New South Wales to focus attention on multi-object state estimation. There will be increased capacity for contract research, international collaboration with leading researchers in the area and high quality Ph.D. graduates in the field of Systems and Control.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774615** Dr A Ignjatovic; Prof J Henkel; Mr A Janapsatya

**Approved Project Title** **Algorithms for Memory Management and Memory Design in Embedded Systems**

**2007 :** \$86,000

**2008 :** \$84,000

**2009 :** \$82,000

**Primary RFCD** 2916 COMPUTER HARDWARE

**Administering Organisation** The University of New South Wales

### Project Summary

Given the importance of embedded systems technology, Australia must secure a place among significant innovators in the field of embedded systems design. Our research aims at novel algorithmic solutions for customization and resource management for embedded processors. Thus, besides generating intellectual property, our research can be fully commercialized in Australia, because it does not require complex and expensive technologies and other resources available only to the world's largest corporations. In addition, during our research a number of undergraduate and graduate students will get a chance to get training in the cutting edge embedded systems design, optimization and testing.

**DP0770148** A/Prof V Jeyakumar; Prof MA Thera

**Approved Project Title** **Quadratic Support Function Technique to Solving Hard Global Nonconvex Optimization Problems**

**2007 :** \$84,000

**2008 :** \$82,000

**2009 :** \$80,000

**Primary RFCD** 2301 MATHEMATICS

**Administering Organisation** The University of New South Wales

### Project Summary

Optimization techniques are becoming increasingly beneficial to modern Australian society in areas such as manufacturing and commerce by improving technical and management decisions. The proposed research is expected to produce enhanced optimization techniques that can be applied to solve a wider range of important problems too complex to be currently solved. The proposed research also represents an international collaboration which will improve Australia's ability to participate effectively in international research and innovation and to produce globally competitive mathematical technologies

**DP0771953** Prof VJ Johnson

**Approved Project Title** **A study of Indigenous art in settled Australia**

**2007 :** \$63,000

**2008 :** \$61,000

**2009 :** \$62,000

**Primary RFCD** 3799 OTHER STUDIES IN HUMAN SOCIETY

**Administering Organisation** The University of New South Wales

### Project Summary

This project will assemble the first comprehensive data on Indigenous artists who operate outside the areas of Central and Northern Australia generally regarded as the heartlands of Indigenous arts. Its findings may have implications for Indigenous arts funding policies but will be primarily concerned with the task of mapping the artistic landscape of the nation. Apart from the benefits for the participants, for Indigenous and Australian art scholarship, and for more soundly based Indigenous arts industry research, the project will help dismantle entrenched attitudes in non-Indigenous Australia against Indigenous people in 'non-remote' Australian society.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772864** Dr SJ Khan

**Approved Project Title** **The use of chiral pharmaceutical compounds to characterise sewage treatment processes and sewage contamination of surface waters**

**2007 :** \$55,000  
**2008 :** \$30,000  
**2009 :** \$30,000

**Primary RFCD** 2911 ENVIRONMENTAL ENGINEERING

**Administering Organisation** The University of New South Wales

### Project Summary

Contamination by poorly treated and untreated sewage can severely degrade the quality of Australian surface waters. However, the behaviour of organic chemicals during conventional sewage treatment processes remains poorly understood. Furthermore, raw sewage pollution is generally not distinguishable from properly discharged treated sewage effluent by current analytical methods. The proposed research will provide a chemical marker for characterising treatment processes and identifying untreated sewage pollution. This will help to identify sources of such pollution so that they may be corrected. A principal outcome of the research will be the improved ability to protect Australia's valuable surface waters from sewage pollution.

**DP0770711** Prof SL Kjelleberg; Dr SA Rice; Dr D McDougald; Dr C Matz; A/Prof M Givskov; Asst Prof HF Yildiz; Prof DH Bartlett

**Approved Project Title** **Roles for quorum sensing and biofilm formation by *Vibrio cholerae* in resistance to protozoan grazing**

**2007 :** \$115,236  
**2008 :** \$106,958  
**2009 :** \$112,908

**Primary RFCD** 2703 MICROBIOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

This research will benefit Australia through an increased fundamental understanding of how our model bacterium, *Vibrio cholerae*, survives in the environment. This could lead to the development of strategies that control bacterial biofilms, a significant medical and industrial concern. This project will also be of benefit through the training of postgraduate students in environmental microbiology and is expected to result in the publication and presentation of data in quality journals and conferences, which increases the profile of Australian science.

**DP0770878** Dr FY Kuo

**Approved Project Title** **Innovative Methods for Very High Dimensional Problems**

**2007 :** \$141,826  
**2008 :** \$139,761  
**2009 :** \$122,893  
**2010 :** \$122,893  
**2011 :** \$122,893

**Primary RFCD** 2301 MATHEMATICS

QEII Dr FY Kuo

**Administering Organisation** The University of New South Wales

### Project Summary

Real world problems tend to involve an enormous number of variables. This "curse of dimensionality" poses great difficulty in application areas such as statistics, finance, economics, and physics. These high dimensional problems are not confined to Australia, and there is great demand worldwide for effective and efficient methods to tackle these problems. The novel methods developed here will lead to improvements in prevailing computational technologies, which will help to enhance Australia's reputation as a leading scientific innovator. The international collaborations will increase the research output of the country, build up the knowledge base in the discipline, draw international interest, and initiate linkages.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772577** Dr SP Lailvaux

**Approved Project Title** **Exposing genetic quality: whole-organism performance and life-history trade-offs under genetic and phenotypic stress in the field cricket *Teleogryllus commodus***

**2007 :** \$85,000

**2008 :** \$85,000

**2009 :** \$85,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

APD Dr SP Lailvaux

**Administering Organisation** The University of New South Wales

### Project Summary

This project will provide fundamental knowledge by answering several important evolutionary questions concerning the relationship between performance and reproductive fitness, and in doing so will pave the way for future integration between traditionally separate disciplines. If funded, the project will enhance Australia's reputation for integrative evolutionary research, and will contribute to the training of young scientists in this and related areas. Finally, the proposed work will provide important information to conservationists and animal breeders on the potential effects of inbreeding, and on factors affecting the spread of invasive species.

**DP0772343** Dr GB Levey

**Approved Project Title** **Autonomy, Liberalism and the Right to Culture**

**2007 :** \$32,584

**2008 :** \$40,000

**2009 :** \$23,000

**Primary RFCD** 3601 POLITICAL SCIENCE

**Administering Organisation** The University of New South Wales

### Project Summary

The question of whether or on what terms cultural diversity may be reconciled with liberal citizenship and national identity is among the most pressing issues confronting liberal democracies today. Australia, long committed to multiculturalism, faces this challenge daily in its law- and policy-making. This project tackles this question by offering a new way of thinking about the place and import of the core liberal value of individual autonomy. Now under considerable attack in political theory and from some groups for being "too sectarian", the project defends the importance of autonomy to liberal citizenship, while elaborating its moral and political implications for liberals and cultural minorities alike.

**DP0772487** Dr F Magrabi

**Approved Project Title** **Engineering safe decision support systems for healthcare**

**2007 :** \$74,887

**2008 :** \$82,521

**2009 :** \$85,781

**Primary RFCD** 2801 INFORMATION SYSTEMS

**Administering Organisation** The University of New South Wales

### Project Summary

System safety is critical to the success of large-scale computerisation being undertaken to improve the quality of health services delivery worldwide. The research program will develop innovative tools and methods to improve the safety of clinical information systems. The focus on electronic prescribing systems will ensure that the outcomes of this research will have immediate impact on reducing medication errors which are a significant public health issue both nationally and internationally.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774587** Dr AA Maklakov  
**Approved Project Title** **The role of sexual conflict in the evolution of lifespan and ageing**  
**2007 :** \$80,000  
**2008 :** \$80,000  
**2009 :** \$80,000  
**Primary RFCD** 2707 ECOLOGY AND EVOLUTION  
APD Dr AA Maklakov  
**Administering Organisation** The University of New South Wales

### Project Summary

Despite the central importance of ageing in our own lives, our understanding of the evolution of ageing is still incomplete. Reproductive interests of males and females often diverge, resulting in sexual conflict which may in turn drive the evolution of rapid ageing. I will use experimental evolution to investigate the role of sexual conflict in the evolution of age-specific mortality, reproductive ageing and lifespan in the seed beetle *Callosobruchus maculatus*. This study will reveal the role of sexual interactions and reproduction in the ageing process and result in the development of important new resources for resolving the genetic basis of deteriorative ageing.

**DP0772946** Dr AP Micolich; A/Prof AR Hamilton; Dr U Zuelicke; Prof RP Taylor; Dr Y Hirayama  
**Approved Project Title** **Engineering Ultra-low Disorder Semiconductor Quantum Nanostructures**  
**2007 :** \$388,030  
**2008 :** \$371,030  
**2009 :** \$328,030  
**2010 :** \$130,030  
**2011 :** \$100,030  
**Primary RFCD** 2402 THEORETICAL AND CONDENSED MATTER PHYSICS  
APF A/Prof AR Hamilton  
**Administering Organisation** The University of New South Wales

### Project Summary

The multi-trillion dollar semiconductor industry drives the explosive growth in information technology that we have witnessed over the past 25 years. This proposal will provide a significant breakthrough by develop a new class of ultra low disorder 'quantum dot transistors' that will be of benefit to Australia's ongoing efforts in semiconductor nanotechnology and quantum information science, allowing us to play a role in the future development of nanoscale and quantum electronics. This research program will bring together Australian researchers and students to work with leading international universities in the USA and New Zealand, and a leading Japanese industrial research facility - Nippon Telegraph and Telecommunications.

**DP0771055** Prof JH Middleton; Prof WK Melville  
**Approved Project Title** **Hydrodynamics and Mixing around Coral Reefs**  
**2007 :** \$100,000  
**2008 :** \$90,000  
**2009 :** \$90,000  
**Primary RFCD** 2911 ENVIRONMENTAL ENGINEERING  
**Administering Organisation** The University of New South Wales

### Project Summary

The Great Barrier Reef is one of Australia's great natural resources, an international environmental icon and a major contributor to the tourist industry in Queensland. The issues we will address are aligned with GBRMPA strategic priorities concerning effects on the ecology of climate change. This research will help delineate the physical processes responsible for the most serious potential impacts, which are of importance to management strategies to be determined by GBRMPA. Other policy related issues range from sewage dispersal from coastal communities to marine accidents and fuel spills. Informed management strategies are crucial to successful future reef management.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774395** Dr CJ Mitchell; Prof PF Lovibond  
**Approved Project Title** **Testing a cooperative model of human associative learning**  
**2007 :** \$68,500  
**2008 :** \$77,000  
**2009 :** \$79,500  
**Primary RFCD** 3801 PSYCHOLOGY  
**Administering Organisation** The University of New South Wales

### Project Summary

Understanding how we learn about causal relationships in our environment is a fundamental aspect of psychology and is critical to adaptive behaviour. In this project, we propose a novel cognitive model of learning to replace the traditional reflexive Pavlovian model that has dominated the area for 80 years. The project will lend new vitality to the debate on learning and help to maintain Australia's reputation as a leader in this research area worldwide. In addition, the understanding of learning mechanisms is central to our understanding of neuroscience, clinical disorders and a wide range of applications such as education and advertising/marketing. clinical issues.

**DP0774582** Prof F Moshirian; Dr PK Pham; Dr D Li; A/Prof M Zhong  
**Approved Project Title** **News Arrival and Stock Market Trading: An Investigation of Investor Reactions to Information**  
**2007 :** \$60,000  
**2008 :** \$20,000  
**2009 :** \$20,000  
**Primary RFCD** 3503 BANKING, FINANCE AND INVESTMENT  
**Administering Organisation** The University of New South Wales

### Project Summary

The Australian Stock Exchange (ASX) is an important vehicle for attracting a large amount of capital into Australia and hence its efficiency, transparency and orderliness are important to induce even more active stock market participation from local investors, and to make the ASX more competitive against other investment destinations such as Tokyo, Hong Kong, Singapore and Shanghai. This project will provide evidence that can promote better understanding of the impact of information flows on volatility, price discovery and trading activity. Using data that include ASX-mandated information releases, the results of this project will be highly useful and relevant to the ASX in its quest to become a more efficient stock market.

**DP0771416** Prof PR Munroe; A/Prof MM Hyland  
**Approved Project Title** **Interfacial Structures in Thermal Spray Coatings**  
**2007 :** \$100,000  
**2008 :** \$90,000  
**2009 :** \$90,000  
**Primary RFCD** 2914 MATERIALS ENGINEERING  
**Administering Organisation** The University of New South Wales

### Project Summary

The use of coatings on the surfaces of components provides high levels of resistance to mechanical damage, corrosion, oxidation or thermal degradation. As a result, coated components exhibit increased lifetimes and reliability. However, the durability of such components is still crucially limited by the quality of the coating. An improved understanding of the bonding mechanisms that occur during the deposition of such coatings, prepared through thermal spray methods, will provide improvements in coating structure and thus, component performance and lifetime. This will benefit a wide range of manufacturing industries that use such coatings.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774107** Dr A Munster; Dr AK Murphie; Prof B Massumi; Dr A MacKenzie

**Approved Project Title** **Dynamic media: innovative social and artistic developments in new media in Australia, Britain, Canada and Scandinavia since 1990.**

**2007 :** \$75,000

**2008 :** \$66,000

**2009 :** \$37,000

**2010 :** \$47,000

**Primary RFCD** 4203 CULTURAL STUDIES

**Administering Organisation** The University of New South Wales

### Project Summary

This study will foreground strengths and remedy weaknesses in Australian new media arts and innovative social uses of new media. By studying the international strategies for social use of dynamic media, this study will provide information for Australians to more extensively implement dynamic media within a social context. It will highlight the innovation of Australian artists and researchers in the development of dynamic media and position these internationally. A major long-term benefit of this study will be an online database that will both profile and be accessible to Australian artists, arts organizations, new media researchers and social innovators.

**DP0773661** Dr MJ Naylor

**Approved Project Title** **The role of the transcription factor Runx2 during mammary gland development and lactation**

**2007 :** \$90,000

**2008 :** \$88,000

**2009 :** \$85,000

**Primary RFCD** 2701 BIOCHEMISTRY AND CELL BIOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

This proposal will further our understanding of mammary gland development and lactation and the mechanisms controlling mammary cell fate decisions such as differentiation. Regulation of cell fate lies at the core of most aspects of cell biology from normal development to dysfunction such as cancer. The knowledge gleaned from this project also has the potential to make economic gains for Australia by increasing the profitability and ensuring the sustainability of both the dairy and meat industries. Better understanding of the mechanisms controlling mammary epithelial cell differentiation should enable augmentation of lactation such as increasing milk protein content, using marker assisted selection (of targets such as Runx2) in cattle.

**DP0772656** Dr A O'Brien

**Approved Project Title** **Religion, welfare and problem populations in Australia, 1788-2006.**

**2007 :** \$20,000

**2008 :** \$22,000

**2009 :** \$32,294

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The University of New South Wales

### Project Summary

Given that faith-based welfare providers have become more important in the welfare sector in recent years, it is important that their origins, similarities and differences are fully understood, especially as religious practice is easily stereotyped in the media. This project's historical focus will give policy makers and field workers a sense of perspective in dealing with contemporary problems. In revealing the varying effectiveness of religious groups to assist participation in the past, it will assist people to make informed and positive choices and thus strengthen the contemporary social and economic fabric.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771059** Prof O Ostrovski; Prof DL Trimm

**Approved Project Title** **Alternative technology for titanium tetrachloride: production and chlorination of titanium oxycarbonitride**

**2007 :** \$200,000  
**2008 :** \$180,000  
**2009 :** \$170,000  
**2010 :** \$150,000  
**2011 :** \$100,000

**Primary RFCD** 2913 METALLURGY  
APF Prof O Ostrovski

**Administering Organisation** The University of New South Wales

### Project Summary

The proposed project targets alternative cost-efficient technology for titanium tetrachloride, which is an intermediate product in production of titanium metal and titania pigment. More efficient technology for processing of titanium minerals will strengthen the position of Australia in the titanium industry at a global level. It has a potential to enhance Australia capacity to exploit niche markets for titanium dioxide white pigment and titanium metal, enabling Australia to capitalise on its huge mineral sands resource, rich in ilmenite and rutile. The project will also contribute to the theory of metallurgical processes, particularly to the gas-solid reactions in the reduction, carburisation, nitridation and chlorination processes.

**DP0772933** Prof PR Patton

**Approved Project Title** **Constructivism and Conceptual Mobility in Political Philosophy**

**2007 :** \$38,294  
**2008 :** \$38,294  
**2009 :** \$38,294

**Primary RFCD** 4401 PHILOSOPHY

**Administering Organisation** The University of New South Wales

### Project Summary

This analysis of the theory of political concepts is important in contemporary Australian debates over the meaning of justice, democracy and sovereignty. This project will enhance the increasing self-awareness and theoretical sophistication of Australian public culture. Case studies of justice, democracy and sovereignty will directly engage with issues at the forefront of international debates in political philosophy. They will contribute to the international renown of Australian philosophical research and improve the quality of the local research environment for graduate students in philosophy and political theory.

**DP0771619** Dr JA Phillips

**Approved Project Title** **Community and identity in post-war European philosophy**

**2007 :** \$102,153  
**2008 :** \$101,540  
**2009 :** \$96,614  
**2010 :** \$96,614  
**2011 :** \$96,614

**Primary RFCD** 4401 PHILOSOPHY  
ARF Dr JA Phillips

**Administering Organisation** The University of New South Wales

### Project Summary

This project will evaluate the political notions of community and identity in post-war European philosophy. Recent developments in international political relations have challenged accepted Western understandings of politics as the business of nation states. This project contends that there is much to be learnt in this regard from post-war European political philosophy. A notion of community has been developed that is irreducible to a politics of identity and the anonymity of the global. In exploring this notion, the project aims to expand the intellectual instruments available to academic and public discussion in Australia.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774511** Dr E Postma

**Approved Project Title** **The genetic basis of differentiation: Towards a predictive understanding of evolution in the wild**

**2007 :** \$75,000

**2008 :** \$75,000

**2009 :** \$84,000

**Primary RFCD** 2702 GENETICS

**Administering Organisation** The University of New South Wales

### Project Summary

Given that Australia cannot escape the effects of, among others, climate change and habitat deterioration, the question of how this is going to impact Australia's unique flora and fauna is an important one. Since extinction is the final consequence of the inability to adapt with sufficient speed to changing environmental conditions, this raises the issue of how well we understand the processes underlying evolutionary adaptation. This project will provide insight into the process of population divergence and the role of genetics therein, and will enhance our understanding of the effects of environmental change, habitat fragmentation and population bottlenecks on population viability and Australia's biodiversity in general.

**DP0774282** Dr T Preiss

**Approved Project Title** **Determining the sequence of events during eukaryotic translation initiation**

**2007 :** \$70,000

**2008 :** \$85,000

**2009 :** \$80,000

**Primary RFCD** 2702 GENETICS

**Administering Organisation** The University of New South Wales

### Project Summary

Multiple benefits will arise from a more complete understanding of translation initiation. It is a frequent target for mechanisms that control gene expression and its dys-regulation is associated with human disease. For example, this is evident in cancer biology, since altered translation is a frequent cause of tumorigenesis. Translation is of universal importance for cellular function and knowledge of how it works is central to modern life sciences and its application to medical and biotechnological problems. Finally, a better understanding of yeast cellular biology is of benefit to the food and biotechnology sector of industry.

**DP0770889** Dr SR Pryke

**Approved Project Title** **Alternative life-history strategies in the evolution of colour polymorphism**

**2007 :** \$150,000

**2008 :** \$145,000

**2009 :** \$127,000

**Primary RFCD** 2707 ECOLOGY AND EVOLUTION

APD Dr SR Pryke

**Administering Organisation** The University of New South Wales

### Project Summary

Theoreticians have long recognised the value of colour polymorphic systems for providing a window into the evolution of genetic diversity, adaptations and even speciation. However, few species display appropriate discrete polymorphisms, and as such, there is little empirical evidence to support these ideas. Using a series of innovative experiments and a unique bird displaying three discrete head colours, I will test these theories, producing results which will have a major international impact. Understanding the interaction of environmental and genetic diversity in the highly endangered Gouldian finch also offers an opportunity to provide insight into how declining wild populations can be effectively managed.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774106** A/Prof MF Rahman; A/Prof C Grantham; Prof T Jahns

**Approved Project Title** **An Integrated Starter Alternator for Automobiles using a New Wide Speed Range Interior Permanent Magnet Motor and a Matrix Z-Source Converter**

**2007 :** \$96,000  
**2008 :** \$95,000  
**2009 :** \$90,000

**Primary RFCD** 2909 ELECTRICAL AND ELECTRONIC ENGINEERING

**Administering Organisation** The University of New South Wales

### Project Summary

The projected growth of power demand and efficiency of future automobiles calls for a suitable integrated starter-alternator (ISA) to be developed. While interim solutions have been offered, a true ISA is still considered to be more than five years away. Considering the huge worldwide market, an ISA developed in Australia is expected to benefit the large Australian automobile industry significantly. The CIs has strong links with local developers and suppliers of power semiconductors and motors, who have participated in the recent developments already carried out. A proven ISA developed locally should be a boon for these industries.

**DP0773388** Prof WG Randolph; Dr RC Bunker; Dr BH Judd

**Approved Project Title** **The Demand for Higher Density Housing in Sydney and Melbourne**

**2007 :** \$236,000  
**2008 :** \$91,000

**Primary RFCD** 3101 ARCHITECTURE AND URBAN ENVIRONMENT

**Administering Organisation** The University of New South Wales

### Project Summary

The research will support the development of more socially sustainable approaches to the planning of higher density housing in Australian cities. The project will improve our understanding of the processes driving higher density urban change (and therefore the risks of such development), inform better land use outcomes, assist in reducing potential community conflict over development proposals, and enhance wider social sustainability of urban areas, thereby strengthening the social fabric of Australian cities. The research will also add to academic debates surrounding the benefits (or non-benefits) of building higher density cities and on the structure of spatially segmented urban housing markets.

**DP0770719** A/Prof PK Ray; A/Prof R Bhar; Dr N Parameswaran; A/Prof R Jamieson; Dr LM Lewis

**Approved Project Title** **Managing E-Business using Ontology-Based Multi-Agent Systems (OBMAS)**

**2007 :** \$95,000  
**2008 :** \$55,000  
**2009 :** \$80,000

**Primary RFCD** 3502 BUSINESS AND MANAGEMENT

**Administering Organisation** The University of New South Wales

### Project Summary

In view of some notorious corporate failures affecting large number of innocent investors, financial services (in which Australia is a major exporter) regulations need the cooperation of people from diverse organisations and geographical locations. This cooperation needs to be supported by sophisticated tools, such as intelligent agents. This requires a common understanding (not available now) of terminologies and processes (semantics) of management within and across organisations. This project aims to demonstrate a new approach to solving the problem, and its validation in the important area of financial management, significant for Australia's financial industry. The proposed methodology is expected to benefit all sectors of e-business.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770415** A/Prof HA Riesen  
**Approved Project Title** **Highly efficient X-ray storage phosphor for medical and scientific imaging**  
**2007 :** \$90,000  
**2008 :** \$90,000  
**2009 :** \$90,000  
**Primary RFCD** 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)  
**Administering Organisation** The University of New South Wales

### Project Summary

X-rays are invaluable in medical diagnostics. For example, they are widely used in breast screening programs. However, they can cause cancer even at low doses. Consequently there is a global effort to reduce the X-ray dose by exploring more efficient imaging technologies. The present proposal seeks to exploit our recent discovery of a highly efficient storage phosphor that has the potential to facilitate substantial X-ray dose reduction; this is of greatest significance to the general population. Also, the phosphor facilitates higher resolution images, a feature that is highly important in scientific imaging. This project may lead to substantial revenue streams for the nation because it taps into a global multibillion dollar industry.

**DP0773929** Prof C Rizos; Prof DA Grejner-Brzezinska; Dr GW Roberts  
**Approved Project Title** **A combined inertial, satellite & terrestrial signal navigation device for high accuracy positioning & orientation of underground imaging systems**  
**2007 :** \$115,000  
**2008 :** \$115,000  
**2009 :** \$110,000  
**Primary RFCD** 2910 GEOMATIC ENGINEERING  
**Administering Organisation** The University of New South Wales

### Project Summary

The 'holy grail' of the mapping community is ubiquitous, cm-level accuracy positioning/orientation in all outdoor environments with a minimum installed infrastructure and operational complexity. There is currently no system able to address such needs. The integration of an Australian-developed technology within the standard GPS/inertial navigation configuration would be a truly ground-breaking achievement. This would represent a significant enhancement of Australia's capacity to develop high-value navigation products and services, and the proposed project outcomes align closely with National Research Priority 3, and address the 'Frontier Technologies and Smart Information Use' priority goals.

**DP0774473** Dr JA Roberts; Prof F Vivaldi  
**Approved Project Title** **Signatures of Order, Chaos and Symmetry in Algebraic Dynamics**  
**2007 :** \$95,000  
**2008 :** \$90,000  
**2009 :** \$85,000  
**Primary RFCD** 2301 MATHEMATICS  
**Administering Organisation** The University of New South Wales

### Project Summary

The project in the breakthrough science of algebraic dynamics will help inform and sustain both algebraic number theory and dynamical systems in Australia. Thus far, Australia is not well represented in this cutting edge international area, and international research prominence and teaching benefits will flow from the pioneering and innovative topics to be addressed. The research incorporates the synergy of an existing highly-productive international collaboration and creates possibilities for many more such linkages. It affords Australia a strategic opportunity to considerably increase its profile in the algebraic dynamics community, particularly in the Pacific region.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770752** Dr M Roces  
**Approved Project Title** **A study of recent social movements in the Philippines**  
**2007 :** \$56,204  
**2008 :** \$32,294  
**2009 :** \$30,000  
**Primary RFCD** 4301 HISTORICAL STUDIES  
**Administering Organisation** The University of New South Wales

### Project Summary

This project seeks to understand the nature and development of social movements in the Philippines since the 1970s. The Philippines is an important Australian neighbour; a point endorsed by the 2005 agreement of cooperation between the Australian Federal Police and the Philippine government. And yet, it is far too little studied in this country where there are very few specialists. Australia needs to understand the Philippines better as it will continue to be an important ally. How the tenets of an activist group in Southeast Asia are transmitted to other potential members is necessary to Australian understandings of regional social movements, and this in turn is vital to political interactions, to NGO work, and to multicultural interactions.

**DP0774080** Dr AF Russell  
**Approved Project Title** **Quantifying the costs and benefits of cooperative behaviour in birds: An experimental test of the group augmentation hypothesis**  
**2007 :** \$90,000  
**2008 :** \$88,000  
**2009 :** \$85,000  
**Primary RFCD** 2707 ECOLOGY AND EVOLUTION  
**Administering Organisation** The University of New South Wales

### Project Summary

Cooperation is seen as a hallmark of human evolution, but is common throughout the animal kingdom. Indeed, our greatest appreciation of the factors associated with family living and cooperation comes from animal research. My project uses novel approaches to address questions about the role of kinship and energetic costs of cooperation in the evolution of cooperation and family living. My study species is a highly charismatic, desert-living cooperative Australian bird, the chestnut-crowned babbler. This study will add significantly to our understanding of the evolution of social behaviour and the extended family. The results will be of international significance and make an impact in scientific journals and through the media

**DP0774100** Prof V Sahajwalla; Dr R Khanna  
**Approved Project Title** **Recycling Alumina-Carbon Refractory Waste in Steelmaking: Fundamental understanding of impurities during refractory/steel interactions**  
**2007 :** \$100,000  
**2008 :** \$90,000  
**2009 :** \$90,000  
**Primary RFCD** 2913 METALLURGY  
**Administering Organisation** The University of New South Wales

### Project Summary

This project will deliver the technical advances for critical aspects of the recycling of waste refractories as raw materials in steelmaking. The novel and recycled refractories that we will develop will lead to reductions in waste generation through reduced wear, resulting in significant economic and environmental benefits. Optimising the characteristics of these refractories will result in longer refractory life, reduced downtime, and increased product quality. These advances will result in significant advantages for the steel industry.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774248** Prof PR Schofield; Dr E Gordon; Dr C Dobson-Stone

**Approved Project Title** Identification of genetic polymorphisms of synaptically expressed genes that contribute to variation in normal brain function

**2007 :** \$90,000

**2008 :** \$88,000

**2009 :** \$85,000

**Primary RFCD** 2702 GENETICS

**Administering Organisation** The University of New South Wales

### Project Summary

This project focuses on understanding brain functions. Brain and mind disorders are by far the largest contributors to the burden of disability, far exceeding any other disorder. This research will contribute to knowledge through addressing the national research priority promoting and maintaining good health. The research outcomes will form the scientific knowledge base essential for the translation of the project into public benefit through their application in development of new testing paradigms for a range of brain and mind disorders.

**DP0774591** Dr P Schrijvers

**Approved Project Title** Air war and collateral damage: The fate of Antwerp, Belgium, 1943-45

**2007 :** \$52,294

**2008 :** \$20,000

**2009 :** \$52,294

**Primary RFCD** 4301 HISTORICAL STUDIES

**Administering Organisation** The University of New South Wales

### Project Summary

Operations in the Gulf and Balkans have caused collateral damage to receive much scrutiny from the Australian press and public opinion. The project aims at contributing to a better informed public discourse on the phenomenon by putting the issue of decision making and human repercussions in historical perspective. What gives the project still more relevance is that Australia's forces were involved over Antwerp sixty years ago as they are in the Gulf today. The project may thus contribute also to heightened Australian awareness of the need to balance security objectives abroad with minimizing civilian casualties so as to protect political capital.

**DP0772938** Dr WP Sijp

**Approved Project Title** What controls the shift from a hot house climate to a cold house climate: the Eocene/Oligocene climate transition and greenhouse warming

**2007 :** \$81,030

**2008 :** \$81,030

**2009 :** \$81,030

**Primary RFCD** 2606 ATMOSPHERIC SCIENCES

APD Dr WP Sijp

**Administering Organisation** The University of New South Wales

### Project Summary

This study contributes to putting Australia on the map as a centre of excellence in the study of past climates as well as in global warming research. It aims at a greater understanding of the dynamics of past warm climate states. This could ultimately lead to a better knowledge of the formation of the ancient deposits that we mine in Australia today. Furthermore, the study of these past warm climates tells us something about current global warming as both involve increased levels of carbon in the atmosphere. The impact of climate change on Australia is likely to be large. Our study of past warm climates helps to gain an understanding of the mechanisms behind climate change and help quantify the risks of climate change posed to Australia.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771208** Dr JR Smith; Prof JA Wolfe

**Approved Project Title** **A study of vocal tract resonances in the singing voice to develop tools for teaching singing**

**2007 :** \$90,000

**2008 :** \$90,000

**2009 :** \$85,000

**Primary RFCD** 4101 PERFORMING ARTS

**Administering Organisation** The University of New South Wales

### Project Summary

The voice is our oldest and most widely used musical instrument, but it is incompletely understood because of the difficulty of studying the vocal tract precisely during singing. We shall determine the main techniques used by singers to control and to adapt the acoustic resonances of their vocal tracts. This advance in understanding will enhance Australia's scientific reputation in an area of wide public interest. Further, when combined with developments of our novel techniques to operate in real time, it will provide a new tool for students of singing to adjust their resonances and prevent damage to the vocal tract. We shall publish our work not only in the top scientific journals, but also on our popular, multi-award winning web site.

**DP0773476** Prof PD Steinberg; Dr MW Taylor

**Approved Project Title** **Bacterial disease and bleaching of chemically defended marine algae**

**2007 :** \$108,000

**2008 :** \$105,000

**2009 :** \$100,000

**Primary RFCD** 2703 MICROBIOLOGY

APD Dr MW Taylor

**Administering Organisation** The University of New South Wales

### Project Summary

Disease has emerged as a major factor in the ecology and management of natural marine communities. Moreover, the impact of disease in marine ecosystems is linked to environmental changes such as global warming. Much of the research in this area has focused on tropical systems (coral reefs). However, in temperate reef systems seaweeds are the major habitat formers. This proposal investigates how environmental factors (temperature, UV) mediate bacterial disease of seaweeds, key temperate organisms. The proposal thus addresses National Research Priority 1: An Environmentally Sustainable Australia, and in particular the Priority Goals 'Sustainable use of Australia's biodiversity' and 'Responding to climate change and variability'.

**DP0771155** Dr M Stenzel

**Approved Project Title** **Multivalent drug delivery carrier for the targeted delivery of platinum anticancer agents to hepatocytes**

**2007 :** \$91,000

**2008 :** \$91,000

**2009 :** \$91,000

**Primary RFCD** 2505 MACROMOLECULAR CHEMISTRY

**Administering Organisation** The University of New South Wales

### Project Summary

Hepatocellular carcinoma (HCC) is often treated with chemotherapy using cytotoxic drugs. This systemic treatment results in the distribution of the drug throughout the body. Employing a polymer particle as a drug carrier for these drugs ensures a temporal control of the release and therefore supply of the drug within the body. By attaching carbohydrate moieties onto the surface of the polymer particle the drug carrier can specifically be recognized by cell receptors, thus allowing a targeted delivery of the drug to the desired area in the body. A range of carbohydrate-based drug carriers will be synthesized and tested towards their interaction with hepatocytes to allow optimisation of this drug carrier system.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771859** Dr C Suter; Prof DI Martin  
**Approved Project Title** **An epigenetic basis for foetal programming**

**2007 :** \$88,000  
**2008 :** \$88,000  
**2009 :** \$85,000

**Primary RFCD** 2702 GENETICS

**Administering Organisation** The University of New South Wales

### Project Summary

The social and economic impact of adult-onset diseases such as diabetes, hypertension and atherosclerosis is increasing. Evidence indicates that a mother's nutrition influences the risk of her children developing some diseases later in life. This proposal aims to elucidate the mechanism underlying this phenomenon. By understanding the mechanism through which maternal nutrition affects disease risk, we may make it possible to design early diagnosis and intervention strategies. Our work may suggest intervention strategies - such as supplementation of at-risk mothers with key molecules such as methyl donors - during foetal and early postnatal life, which could be key to preventing premature morbidity and mortality.

**DP0772961** Prof M Taft

**Approved Project Title** **The relationship between lexical processing strategies and adult reading proficiency.**

**2007 :** \$67,000  
**2008 :** \$73,000  
**2009 :** \$76,000

**Primary RFCD** 3801 PSYCHOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

By examining the basis for variation in reading proficiency amongst university students, the proposed research has the potential to inform reading improvement programs for secondary and tertiary students. It is clearly important for Australia to optimise the reading skills of its adult population, and the aim of the project is to establish the cognitive mechanisms required for such optimisation. In addition, the theoretical insights provided by the research will help maintain Australia's strong presence and reputation in the area of reading research.

**DP0774447** A/Prof DS Taubman; Dr V Sivaraman

**Approved Project Title** **A New Paradigm for the Representation and Distribution of High Dimensional Multimedia Content**

**2007 :** \$85,000  
**2008 :** \$80,000  
**2009 :** \$75,000

**Primary RFCD** 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

**Administering Organisation** The University of New South Wales

### Project Summary

The proposed project involves cutting edge research in a field of great international significance. The most obvious benefits will be international acclaim and the potential to patent, develop and ultimately export technology and systems for the distribution of high dimensional multimedia content. Outcomes from the project may support the growth of surveillance and networking equipment industries within Australia. One application considered explicitly within the project is the demonstration of a new surveillance oriented approach to both distance education and pre-recorded educational content, based upon dense multimedia sampling and our proposed paradigm for efficient distribution to interactive clients.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0772977** A/Prof MR Teesson; Prof JG Andrews; Ms L Vogl

**Approved Project Title** **Fear, sadness and alcohol in adolescence: A test of innovative curriculum models to prevent adverse outcomes.**

**2007 :** \$90,000

**2008 :** \$90,000

**2009 :** \$90,000

**Primary RFCD** 3212 PUBLIC HEALTH AND HEALTH SERVICES

APD Ms L Vogl

**Administering Organisation** The University of New South Wales

### Project Summary

Lack of mastery over fear, sadness and alcohol use are risk factors for the common forms of mental ill health. When fully developed, anxiety, depressive and substance use disorders account for three quarters of the disability attributed to mental disorders. While prevention strategies exist, none are universally feasible. Climate schools represents a utility that is acceptable, fits within the school syllabus, is effective, and is scaleable to meet the needs of all schools in Australia. If it reduces the target risk factors by 10-20%, a minimal estimate based on the pilot work, then it will be a most cost effective contribution to promoting and maintaining the good health of the community.

**DP0774000** Dr CG Tinney

**Approved Project Title** **The Science of Exoplanets - Finding & Understanding our Planetary Neighbours**

**2007 :** \$301,061

**2008 :** \$300,061

**2009 :** \$292,061

**2010 :** \$154,061

**2011 :** \$154,061

**Primary RFCD** 2401 ASTRONOMICAL SCIENCES

APF Dr CG Tinney

**Administering Organisation** The University of New South Wales

### Project Summary

There can be few questions more fundamental to humanity, and more capable of engaging young Australians in science and technology, than to ask "Are we alone in the Universe?". The discovery of planetary systems orbiting other stars now enables us to realistically address this fundamental question in the years ahead. A critical component of this global endeavour will be determining 'How common are Earth-like planets orbiting nearby stars?'. This project will establish the nation's leading research group in this field and employ the world's leading astronomical facilities to place Australia at the forefront of the international race to answer these fundamental questions.

**DP0770118** Dr IL Turner; Dr G Masselink; Dr PE Russell

**Approved Project Title** **Wave-by-wave bed-level changes at the beachface of gravel and sand beaches**

**2007 :** \$104,000

**2008 :** \$103,000

**2009 :** \$97,000

**Primary RFCD** 2601 GEOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

Australia's coastline is one of this country's greatest natural, cultural and economic resources. Recent experiences internationally have shown that in a changing climate, coastal erosion is a real and growing threat to the present-day sustainability of our coasts. Innovative instrumentation developed by our team now enables fundamental erosion and accretion processes to be quantified for the first time. Working within the framework of two collaborative, fully-integrated, international research programs commencing in 2007 and 2008, this study will place Australia at the forefront of break-through coastal research, leading to rapid advances in the scientific, engineering and operational understanding and modelling of coastal change.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0771432** Dr N Valanoor; Prof PR Munroe; Dr TC Petersen; Dr H Kohlstedt

**Approved Project Title** **Ferroelectric - ferromagnetic tunnel junctions**

**2007 :** \$70,000  
**2008 :** \$150,000  
**2009 :** \$110,000  
**2010 :** \$90,000

**Primary RFGD** 2914 MATERIALS ENGINEERING

**Administering Organisation** The University of New South Wales

### Project Summary

Ferroelectric and ferromagnetic materials have attracted significant attention and exhibited potential in many applications such as storage memories, solid-state light sources and a range of smart chemical and biological sensors. This proposal seeks to investigate the behaviour of these materials in ultra-thin film form, where imposed geometrical constraints produce novel combinations of ferroelectric and magnetic properties. The fundamental understanding of the behaviour of these materials will help us develop new material systems with exciting possibilities in the design of advanced devices and sensors.

**DP0774268** A/Prof WH von Hippel; Dr JD Henry

**Approved Project Title** **Ageing, Inhibition, and Social Control - steps towards improving the lives of older adults**

**2007 :** \$82,500  
**2008 :** \$88,000  
**2009 :** \$86,000

**Primary RFGD** 3801 PSYCHOLOGY

**Administering Organisation** The University of New South Wales

### Project Summary

Australia is faced with an ageing population, and thus an increasingly important national goal is ageing well and ageing productively. The proposed research will extend our preliminary findings on ageing and social inappropriateness to provide a clearer picture of when and why this occurs, and among whom. The proposed research will also examine the mental and physical health consequences of social inappropriateness longitudinally. If cognitive losses do lead to social losses, with attendant negative health consequences, by gaining a clearer understanding of this problem, the proposed research will take an important step in improving the lives of older adults.

**DP0772053** Dr T Waters

**Approved Project Title** **Reactivity and Spectroscopy of Gas Phase Metal Oxide Cluster Ions: Structure-Reactivity Correlations and Fundamental Insights into Heterogeneous Catalysis**

**2007 :** \$92,030  
**2008 :** \$87,030  
**2009 :** \$84,030

**Primary RFGD** 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

APD Dr T Waters

**Administering Organisation** The University of New South Wales

### Project Summary

This project will make use of world class ARC funded instrumentation to carry out breakthrough science. The research will contribute fundamental insights into chemical bond activation relevant to industrial catalytic processes important to national manufacturing industries. These insights will improve the efficiency and selectivity of catalytic processes and lead to increased profitability and/or a reduction in unwanted side products and pollution. The project will train young scientists in important experimental and theoretical chemical techniques, and will enhance and contribute to Australia's international research profile.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0774554** Ms L Weber

**Approved Project Title** **Policing Migration in Australia: an analysis of onshore migration policing networks.**

**2007 :** \$59,976

**2008 :** \$89,635

**Primary RFCD** 3904 LAW ENFORCEMENT

**Administering Organisation** The University of New South Wales

### Project Summary

Recent events concerning the wrongful detention and deportation of Australian citizens have drawn attention to the significant impact of the enforcement of immigration controls within Australian communities. However, this dimension of law enforcement has received little or no attention from academic researchers. An improved understanding of the nature and dynamics of migration policing will provide social benefits through the promotion of good relations with ethnic minority communities and the accountable exercise of statutory powers. This understanding is crucial if institutions of social regulation are to adapt to the challenges of policing a society which is not only multicultural but also increasingly globally interconnected.

**DP0774213** Dr W Wen; A/Prof A Xia; Prof PS Sachdev; Dr JT Ratnanather

**Approved Project Title** **Quantifying cortical thickness and white matter hyperintensity volumes and determining their relationship on Magnetic Resonance Imaging in ageing brains**

**2007 :** \$100,000

**2008 :** \$95,000

**2009 :** \$90,000

**Primary RFCD** 2915 BIOMEDICAL ENGINEERING

**Administering Organisation** The University of New South Wales

### Project Summary

Australia's population is ageing, with a significant projected increase in the number of people aged over 65 and 85. Mental health and quality of life for this ageing population have become an increasingly important issue. This project directly addresses the National Research Priority 2 in the terms of ageing well, ageing productively. Accurately measuring the distribution of brain structural changes is an effective way of differentiating normal ageing from various pathological conditions reflecting the underlying pathology. The project has access to an unprecedented large sample of longitudinal Magnetic Resonance Imaging and health/clinical data and will produce a set of algorithms to examine this issue and put Australia at the forefront of such research.

**DP0771620** Dr DP Wilson

**Approved Project Title** **Allocating scarce HIV/AIDS antiretroviral drugs in resource-constrained countries: using modelling to develop tools and analyse consequences of ethics and HIV-epidemiology**

**2007 :** \$34,000

**2008 :** \$39,000

**2009 :** \$36,000

**Primary RFCD** 3212 PUBLIC HEALTH AND HEALTH SERVICES

**Administering Organisation** The University of New South Wales

### Project Summary

This project will benefit communities in some of the poorest countries of the world, suffering greatly from the HIV/AIDS epidemic. This research is important and timely for these nations in deciding how to distribute the limited treatment in an ethical manner to address treatment principles of these countries. However, the methods developed can also be applied to other diseases in different regions and people, such as Australian aborigines to increase their quality of health. Specifically, an epidemic of Chlamydia is widespread amongst the aboriginal communities of Australia's Northern Territory. Tools developed in this project will be easily adaptable to address control measures for Chlamydia among this population.

## Summary of Discovery Projects Proposals for Funding to Commence in 2007

**DP0770424** Dr Y Zhang

**Approved Project Title** Development of room temperature diluted magnetic semiconductors for spintronics devices application

**2007 :** \$155,148  
**2008 :** \$100,148  
**2009 :** \$101,148

**Primary RFCD** 2914 MATERIALS ENGINEERING

APD Dr Y Zhang

**Administering Organisation** The University of New South Wales

### Project Summary

Semiconductor spintronics is very likely to have a significant impact on future generations of devices. Until recently, Australian research groups have played a minor role in the field. The proposed program will lead to new discoveries or fundamental advances within semiconductor spintronics or have substantial impact on the progress in this field. The accomplishments of this project can greatly increase the scientific understanding of diluted magnetic semiconductors and expand Australia's knowledge base in research in these materials. This program can also be an education platform to provide a number of scientific talents for Australia by intensively training high quality postgraduates at the international level.