

Summary of Discovery Projects Proposals for Funding to Commence in 2007

New South Wales

Macquarie University

DP0770300 A/Prof K Cheng; Dr R Wehner

Approved Project Title **Evolution, learning, and the use of multiple cues in desert ant navigation**

2007 : \$90,000

2008 : \$83,000

2009 : \$77,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Administering Organisation Macquarie University

Project Summary

This research on desert ants benefits Australia by fostering an international collaboration with one of the best European scientists, training students, and increasing knowledge about Australia's unique fauna, helping us to appreciate and better manage our fragile desert environments. With this international link, students working on this and related projects benefit intellectually from mingling with an international community of scientists. Understanding insect behaviour also has benefits for robotics. Work on desert ants has already resulted in robotic applications, and our outcomes concerning the optimal integration of multiple spatial cues are especially relevant.

DP0771385 Dr LM Davis; Dr SV Hanly; Prof AR Calderbank; Dr S Sirianunpiboon

Approved Project Title **Broadband to the bush: Polarization as a new resource in wireless cross-layer design**

2007 : \$153,000

2008 : \$150,000

2009 : \$148,000

Primary RFCD 2917 COMMUNICATIONS TECHNOLOGIES

Administering Organisation Macquarie University

Project Summary

'Broadband to the Bush' is a national priority - more than 1.6 million homes, small businesses and not-for-profit organizations in rural, regional, and remote Australia are set to benefit from broadband access to phone networks and the internet. The immediate challenges lie in overcoming poor download speeds and area coverage, as well as expensive access. This research will deliver cost and power-efficient receiver architectures to provide end-user utility, and will train postgraduate researchers across traditional discipline boundaries in mathematics and engineering. The project represents an important contribution to frontier technologies in information and communications technology for building and transforming Australian industries.

DP0772518 Dr R Dowling; A/Prof PM McGuirk; Dr R Atkinson

Approved Project Title **Privatising neighbourhoods? Governance and social life in master-planned residential estates**

2007 : \$87,000

2008 : \$97,000

Primary RFCD 3704 HUMAN GEOGRAPHY

Administering Organisation Macquarie University

Project Summary

Australian residential neighbourhoods are changing in the face of growing privatisation and privatism, with major implications for the strength of the social and economic fabric of cities. Master planned residential estates are emblematic of this change. This project empirically investigates the extent and nature of privatisation and privatism in these new residential environments. It will provide a rigorous analysis necessary to growing national debates about creating and sustaining urban social cohesion, and on the importance of social ties between people for producing a more prosperous Australia.

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DP0772665 Dr JP Evans

Approved Project Title **Vulnerability of the Murray-Darling basin hydrometeorology to human modification**

2007 : \$143,000
2008 : \$140,000
2009 : \$125,000
2010 : \$125,000
2011 : \$125,000

Primary RFCD 2605 HYDROLOGY

ARF Dr JP Evans

Administering Organisation Macquarie University

Project Summary

The Murray-Darling Basin (MDB) provides 40 per cent of Australia's agricultural production. Some 1,500,000 hectares use irrigation for agriculture and year-to-year variations in productivity highlights a basin that is vulnerable to changes resulting from human activity. This proposal builds an integrated modelling system of the MDB to understand its hydrology and meteorology in the context of human modification to climate and to land use in the basin. The improved understanding of the MDB will allow science-aware policy developments that reduce the vulnerability of agriculture and water resources within the basin to future changes caused through human activity.

DP0770902 Prof EM Goldys; Prof Z Gryczynski; Prof I Gryczynski

Approved Project Title **Plasmon nanobiosensor for whole blood analysis**

2007 : \$110,000
2008 : \$100,000
2009 : \$100,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Organisation Macquarie University

Project Summary

The new method will be able to detect specific disease markers or to identify subtle differences in protein content in complex dense analytes such as blood and other body fluids, of practical utility in diagnostic and clinical situations. It will also be relevant in other areas such as medical diagnostics of viral diseases, and for unsolved environmental monitoring problems such as the presence of specific microorganisms in industrial waste. Owing to their design simplicity and low cost of components, the devices developed in this program will lend themselves well to the development of new commercial technologies for Australia.

DP0773060 Dr F Guo; Prof GJ Hugo; Prof X Yuan

Approved Project Title **Rural Migrant Labour in Large Chinese Cities**

2007 : \$121,000
2008 : \$37,000
2009 : \$79,000

Primary RFCD 3705 DEMOGRAPHY

Administering Organisation Macquarie University

Project Summary

China's economic and political significance globally, especially in the Asia-Pacific region, can hardly be exaggerated. China is increasing rapidly in its importance to Australia as a trading partner, source of immigrants and tourists and as a power in Australia's region of influence. The rapid growth of Chinese cities is a critical element in its striking social and economic development and a deeper understanding of this will contribute to Australia enhancing economic, social and political linkages with China. It also will develop Australian capacity with respect to Chinese research and develop strong academic linkages with China.

Summary of Discovery Projects Proposals for Funding to Commence in 2007

DP0772276 Dr M Hughes-Warrington; Dr I Tregenza; Prof D Boucher; Dr S Helgeby

Approved Project Title **The Empire of New Idealism?: Civilisation and Australian New Idealism, 1850-1950**

2007 : \$79,166

2008 : \$70,514

2009 : \$76,967

2010 : \$74,590

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation Macquarie University

Project Summary

Philosophies, like people and commodities, travel the globe. This project traces the movement of British 'New Idealist' philosophy to Australia in the mid-nineteenth century, its transformation into 'Australian New idealism', and return to Britain. It shows how the hopes of these first Australian philosophers for a global community overlapped with politicians and policy makers, and uncovers their shaping role in the formulation of many social policies that remain with us today. It places Australian history and research at the heart of a new global vision of New Idealist studies and offers scholars, policy makers and educators the necessary background to more fully articulate Australian understandings of citizenship and civilisation.

DP0772705 Prof SN Lieu; Dr LD Eccles; Dr J Markley

Approved Project Title **The impact of cultural contact between China and the Ancient Mediterranean World**

2007 : \$82,001

2008 : \$69,001

2009 : \$82,001

2010 : \$69,001

Primary RFCD 4202 LITERATURE STUDIES

APD Dr J Markley

Administering Organisation Macquarie University

Project Summary

The project which is part of a large international project aims to investigate the evidence for cultural contact between Rome and China and draws on material which has not been properly studied. Some of this material is of great artistic value (esp. Manichaeon manuscripts) and has already attracted the attention of national media (newspapers, radio and TV). The project will help strengthen research ties between the Social Science Academy of China and the Australian Academy of the Humanities. It will also heighten academic interest among ethnic groups: Chinese, Assyrian, Turkish and Iranian in cross-cultural contacts through exhibitions.

DP0772517 Dr XJ Nelson; A/Prof CS Evans; A/Prof DC O'Carroll

Approved Project Title **Visual processing in a unique modular system - how can a simple cognitive architecture be used to solve complex visual tasks?**

2007 : \$70,001

2008 : \$70,001

2009 : \$70,001

2010 : \$70,001

Primary RFCD 3207 NEUROSCIENCES

APD Dr XJ Nelson

Administering Organisation Macquarie University

Project Summary

The proposed interdisciplinary study of the visual system of jumping spiders will provide novel insights into how a simple cognitive architecture can be used to solve complex visual tasks. This will be the first comprehensive study of motion sensitivity in a spider. The insights obtained will be important for the development of artificial intelligence systems. We will provide a stimulating environment to train a postdoctoral fellow with state-of-art skills ranging from single-cell neurophysiology through to using 3D animation for sophisticated behavioural assays. The proposed work is a hot topic and will attract considerable attention, raise the profile of Australian science, and support postgraduate students.

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DP0770929 Prof SY O'Reilly; Prof WL Griffin; Dr NJ Pearson; Dr O Alard; Prof Dr K Regenauer-Lieb; Prof S Grand; Prof S Chung; Prof J Cottin; Dr R Herrington; Prof Dr M Scambelluri; Prof Dr E Rampone; A/Prof T Stachel; Prof X Xu

Approved Project Title **Earth's Internal System: deep processes and crustal consequences**

2007 : \$230,000

2008 : \$230,000

2009 : \$230,000

Primary RFCD 2601 GEOLOGY

Administering Organisation Macquarie University

Project Summary

Outcomes will include significant new information about the structure and formation of the Earth's crust and the underlying mantle. An improved framework for interpreting the architecture of Australia and other continents will be directly relevant to exploration for world-class economic deposits, the Earth resources on which society depends. Innovations in geochemical technology and in the integration of information from geochemistry, geophysics and geodynamics will maintain our high international profile in research relevant to National Priority 1.6 (Developing Deep Earth Resources). The project and its interaction with the minerals industry will provide advanced Postgraduate training in a field critical to Australia's future.

DP0771114 A/Prof ML Spongberg; Dr C Tuite

Approved Project Title **Women Writers and the Production of British History 1763-1886**

2007 : \$68,763

2008 : \$51,832

2009 : \$64,735

Primary RFCD 4301 HISTORICAL STUDIES

Administering Organisation Macquarie University

Project Summary

This project addresses the critical neglect of women who engaged in writing history in Britain during the nineteenth century. It will demonstrate the importance of women writers in the construction of a national identity in Britain and will seek to understand how women engaged with nationalist history-making and used various forms of historical writing to explore their heritage. The social and political issues that occupied women as writers of history remain pertinent today in relation to how societies generate public memory and the nature of the relationship between political exclusion and historical writing.

DP0771252 Prof RH Street; Prof MS Johnson; Dr SG Lack; A/Prof DR Verity

Approved Project Title **Cohomology enhanced: an application of enriched and higher categories**

2007 : \$94,000

2008 : \$92,000

2009 : \$90,000

Primary RFCD 2301 MATHEMATICS

Administering Organisation Macquarie University

Project Summary

Motivated by the needs of physicists, computer scientists, and colleagues in other similar fields, mathematicians study highly complicated structures which are typically hard to understand completely in concrete terms. Cohomology is an invaluable technical tool which allows data to be extracted from these complex structures. This project will involve a radical expansion in scope of the amount and type of data so extracted. This is made possible by the most recent advances in higher-dimensional category theory.

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DP0771610 Prof SP Turner
Approved Project Title **Mantle Melting Dynamics and the Influence of Recycled Components**
2007 : \$90,000
2008 : \$90,000
2009 : \$95,000
Primary RFCD 2601 GEOLOGY
Administering Organisation Macquarie University

Project Summary

This proposal is directly concerned with the continuing aim of building a sustainable Australia through knowledge of deep earth resources. The more we know about the processes of melting and melt and fluid migration the better we will be able to inform models for resource exploration and volcanic hazard mitigation. Uranium series isotopes are relevant to the very recent history of the planet (< 350 000 years) - time scales which are often overlooked. Application to mantle melting as described in this proposal may also have direct application to gold exploration in the Manus basin and elsewhere. It is to these techniques we must look if we are to understand the immediate past as a clue to the immediate future of our planet.

DP0772493 Prof V Varadharajan; Prof CJ Mitchell
Approved Project Title **Techniques for the Design of Trust Enhanced Secure Distributed Applications**
2007 : \$75,000
2008 : \$72,000
2009 : \$70,000
Primary RFCD 2805 DATA FORMAT
Administering Organisation Macquarie University

Project Summary

Security and trusted systems for on-line services and information infrastructures are now of paramount importance. Secure trustworthy computing applications have become a strategic necessity for businesses, governments and individuals in the ever-increasing digital world. It is critically important for Australia to develop technologies to anticipate and respond to security threats to its industry and society. The outcomes of this research will result in secure and trustworthy computing technologies that will enable the design of trust enhanced secure applications and trusted platforms, which will help to achieve secure e-commerce applications and on-line services, and trusted interactions between users over the Internet.

DP0770743 Dr SA Wilson; Dr GA Meagher
Approved Project Title **Constituencies for welfare: Public responses to Australia's 'new welfare state'**
2007 : \$52,000
2008 : \$20,000
Primary RFCD 3701 SOCIOLOGY
Administering Organisation Macquarie University

Project Summary

The main national and community benefits fall within Research Priority 2: Promoting and Maintaining Good Health, and particularly 'Strengthening Australia's social and economic fabric'. Australia's welfare state helps maintain the social fabric, but its performance depends on citizens' confidence in the purposes and outcomes of welfare. This project investigates how well Australians understand recent welfare changes, and measures their confidence in policy directions. The project will produce fresh research into the public's response to the Australian government's largest area of fiscal responsibility, provide new analytical and data tools for policymakers, and strengthen Australia's international profile in research into welfare reform.

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DP0771612 A/Prof J Yang; Prof MP Papazoglou

Approved Project Title **A Formal Framework for Developing and Managing Adaptable Service Oriented Business Collaboration**

2007 : \$75,000

2008 : \$70,000

2009 : \$65,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Organisation Macquarie University

Project Summary

Business collaboration and integration 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 collaboration area. The project outcomes in the form of framework, formal models and specifications will provide generic solutions that are applicable to many Australian and international companies involved in business process development and management in particular and e-business technologies in general.