

Summary of Discovery Projects Applications for Funding to Commence in 2006

Queensland

Queensland University of Technology

DP0663774 Dr DP Arnold; Dr J McMurtrie

Approved Project Title **New vistas in porphyrin chemistry via metal-catalyzed couplings with hydrazine derivatives**

2006 : \$65,000

2007 : \$57,000

2008 : \$56,000

Primary RFCD 2503 ORGANIC CHEMISTRY

Administering Institution Queensland University of Technology

Project Summary

This project will address basic scientific questions and develop new substances for use in molecular electronics and cancer therapy. We will make and study entirely new molecules derived from porphyrins, which in Nature have vital roles in photosynthesis, oxygen transport and enzyme catalysis. This breakthrough research will reveal knowledge vital to the advancement of fundamental chemical science and also offer excellent training in cutting edge research for young Australian scientists. In addition, porphyrin-like substances are used in cancer diagnosis and treatment and have properties essential for the next generation of nanoelectronic devices, and this project is aimed at these eventual outcomes.

DP0665697 Prof B Boashash; Prof PB Colditz

Approved Project Title **Multi-Channel Time-Frequency Analysis for EEG Neonatal Seizure Characterization**

2006 : \$78,000

2007 : \$80,000

2008 : \$82,000

Primary RFCD 2802 ARTIFICIAL INTELLIGENCE AND SIGNAL AND IMAGE PROCESSING

Administering Institution Queensland University of Technology

Project Summary

This project researches new signal processing methodologies for a multi-channel characterization of seizures for use in diagnosing newborn brain dysfunctions. The outcomes will result in important immediate clinical benefits for sick newborn babies and will fundamentally facilitate research progress in the development of neuroprotectants and anticonvulsants. The success of this project will contribute in minimizing the social financial costs by diagnosing brain disorders in the initial stage of life and preventing further damage. This has the potential to result in a standard diagnostic equipment in neonatal intensive care units and medical research centres.

DP0666065 A/Prof CA Boyd; Dr JM Gonzalez Nieto; Prof K Paterson

Approved Project Title **Cryptographic Protocols from Pairings: Proofs and Designs**

2006 : \$88,000

2007 : \$63,000

2008 : \$65,000

Primary RFCD 2805 DATA FORMAT

Administering Institution Queensland University of Technology

Project Summary

Modern society has become critically dependent on information and communications infrastructures. At the same time, the development of e-commerce is being slowed by lack of confidence in its security. By providing increased assurance and enhanced cryptographic security protocols this research will improve the dependability of the nation's information and communications infrastructure, as well as encourage the growth of e-commerce. Through the expertise and experience gained with this project, Australia's excellence in information security research will be reinforced. The training of PhD and Honours students will provide a much needed source of highly trained information security professionals.

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DP0664191 Dr J Brownlee; Dr D Berthelsen; Prof GM Boulton-Lewis

Approved Project Title **Enhancing quality in long day care: Investigating professional beliefs and practices of child care workers**

2006 : \$69,000

2007 : \$60,000

2008 : \$67,000

Primary RFCD 3303 PROFESSIONAL DEVELOPMENT OF TEACHERS

Administering Institution Queensland University of Technology

Project Summary

The Commonwealth Government's National Agenda for Early Childhood recognises the importance of quality of staff in children's services to ensure overall program quality. This research focuses on the vocational training for child care workers. It advances knowledge about how contextual and personal factors contribute to the development of epistemological beliefs about teaching in early education that enables child care workers to become more critical and reflective practitioners. The research recognises the directions of the National Strategy for Vocational Education and Training, 2004 -2010 which emphasise that vocational education needs to provide skills and knowledge which enhance employability and lifelong learning.

DP0664847 Prof D Butler; A/Prof MA Farrell; Dr B Mathews; Dr K Walsh

Approved Project Title **Teachers Reporting Child Sexual Abuse: Towards Evidence-based Reform of Law, Policy and Practice**

2006 : \$90,000

2007 : \$70,000

2008 : \$90,000

Primary RFCD 3901 LAW

Administering Institution Queensland University of Technology

Project Summary

Every year, thousands of Australian children are sexually abused. This causes lifelong psychological, social and economic cost to victims. It also undermines Australia's social fabric, and costs the nation hundreds of millions of dollars annually. Early intervention promotes enhanced health and life outcomes for abused children, and teachers are well-placed to contribute to early reporting of child sexual abuse. This research promotes children's healthy start to life by being the first inquiry to identify the most effective legal and practical strategies for requiring and enabling teachers to accurately report child sexual abuse. It adds further economic and social benefit by finding ways to reduce inaccurate reports of child sexual abuse.

DP0666521 Prof WJ Caelli; Prof SG Coronas; Dr AJ McCullagh

Approved Project Title **The Use of Information and Cryptographic Technology to Restrict Competition**

2006 : \$84,846

2007 : \$84,846

Primary RFCD 3901 LAW

Administering Institution Queensland University of Technology

Project Summary

This project will deliver the following benefits:

- Improve the understanding of how security technologies can be misapplied to restrict competition;
- Development of an early warning mechanism to assist regulators in determining when anti-competitive behaviour is occurring through the use of security technologies;
- provide assistance to the Australian Government, and thus the Australian economy, by developing an international framework that can be promoted to Australia's major trading partners to achieve a harmonisation of complimentary competitive regulation.
- The provision of criteria for consideration by Australian industry in developing new products that may incorporate security technologies

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DP0666616 Prof P Davidsson; A/Prof PR Steffens; Prof PD Reynolds; A/Prof SD Sarasvathy

Approved Project Title **Comprehensive Australian Study of Entrepreneurial Emergence (CAUSEE)**

2006 : \$165,000

2007 : \$90,000

2008 : \$100,000

2009 : \$100,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

Administering Institution Queensland University of Technology

Project Summary

New business creation is a major source of new jobs and an important component of our nation's innovation system. The project will permanently transform the understanding of business creation in Australia. In contribution to NRP 3, high-technology new ventures will be over-sampled and given particular attention. The research is part of a strategy to create a world class research centre in entrepreneurship (as CI 1 previously had a key role in doing in Sweden). Frontier knowledge in this area contributes to 'promoting an innovation culture and economy' and facilitates 'maximizing Australia's benefits from investments in research, particularly related to commercialisation of 'Breakthrough science' and 'Frontier technologies'.

DP0665546 Dr PM Giffard; Dr M Turner; Dr TP Walsh

Approved Project Title **Cystine flux and hydrogen peroxide breakdown in reuteri group lactobacilli**

2006 : \$97,000

2007 : \$85,000

2008 : \$85,000

Primary RFCD 2701 BIOCHEMISTRY AND CELL BIOLOGY

Administering Institution Queensland University of Technology

Project Summary

We have discovered, and aim to fully dissect a novel function of reuteri group lactobacilli. These microbes inhabit the surfaces of the gastrointestinal and reproductive tracts of humans and are also used as probiotics, and in the dairy industry. This function mediates the production and breakdown of large amounts of hydrogen peroxide, cystine and thiols. These are highly bioactive and affect human cells and other bacteria at the surfaces of the gastrointestinal and reproductive tracts, and thiols are also flavourants in dairy products. Our research will inform the rational development of probiotics, the management and treatment of unpleasant conditions such as Crohn's disease and bacterial vaginosis, and innovation in dairy fermentations.

DP0663854 Prof GN Hearn; Prof Dr S Lehmann; Dr B Adkins; Mr M Foth

Approved Project Title **New Media in the Urban Village: Mapping Communicative Ecologies and Socio-Economic Innovation in Emerging Inner-City Residential Developments**

2006 : \$112,000

2007 : \$84,000

2008 : \$90,000

Primary RFCD 4001 JOURNALISM, COMMUNICATION AND MEDIA

APD Mr M Foth

Administering Institution Queensland University of Technology

Project Summary

This study will deliver a better understanding of the factors that stimulate an innovation culture in local communities. It will develop knowledge of how social, cultural, educational, economic capital can be of service in encouraging public consultation, civic engagement and debate, and assist Australians to be creative and innovative in everyday life. Understanding the opportunities of social networks will help Australians negotiate the complex web of daily choices, access a greater social safety net, participate in the socio-cultural and socio-economic life in their city. This will lead to greater social inclusion, fair access to and smart use of local information and services, urban sustainability and healthier local economies.

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DP0665633 A/Prof KM Mallan; A/Prof P Singh

Approved Project Title **Growing up in networked spaces: Tech-savvy youth constructing identities and forming social relations in online and offline worlds**

2006 : \$70,000

2007 : \$60,000

2008 : \$60,000

Primary RFCD 3301 EDUCATION STUDIES

Administering Institution Queensland University of Technology

Project Summary

This study's focus on online and offline worlds raises significant issues that relate directly to youth's participation in Australia's global knowledge-based economy, particularly youth's engagement with online technologies, and their experiences as consumers and producers of cultural materials and practices. The project's concern with significant aspects of youth growing up in a world characterised by change is highly relevant for its impact on their social wellbeing and identity formation. Schools, tertiary institutions and national youth agencies will benefit from the results of this study in terms of how they understand youth's changing identities in these new times and new spaces.

DP0667168 Prof KL Mengersen

Approved Project Title **Doing Bayesian Statistics Better: an Inter-Disciplinary Perspective for Improving Models, Priors, Design and Applications**

2006 : \$94,000

2007 : \$84,000

2008 : \$87,000

Primary RFCD 2302 STATISTICS

Administering Institution Queensland University of Technology

Project Summary

Through improving methods for data analysis and design, this project increases the capability of individuals, communities and governments to make correct decisions based on data, leading to immeasurable human, social and financial benefits. It will also directly enhance Australia's international research reputation, promote inter-disciplinary links, promote research by women in a non-traditional area, keep intellectual property within Australia, train quality undergraduates and postgraduates, and contribute to public good through its focus on applications in key national priorities: health, environment and genetics.

DP0663282 Prof MJ Pearcy; Dr CJ Adam; Adj/Prof JH Evans; Dr GN Askin

Approved Project Title **Patient-specific biomechanical modelling for improved treatment of spinal deformity**

2006 : \$140,000

2007 : \$100,000

2008 : \$100,000

Primary RFCD 2915 BIOMEDICAL ENGINEERING

Administering Institution Queensland University of Technology

Project Summary

Spinal deformities negatively affect social acceptance, physical and mental wellbeing in children and adolescents. The direct costs of spinal deformity surgery are approximately \$30 million per year in Australia, yet poor treatment outcomes due to post-operative complications incur a much higher cost as patients with persistent pain and disability face a lifetime of dependency and reduced ability to work. The patient-specific biomechanical modelling techniques developed in this project will reduce complications and improve correction for Australian children who undergo spinal deformity surgery. Better treatment outcomes will ensure quality of life, health and productivity for spinal deformity patients throughout their entire lives.

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DP0666578 Dr B Pini

Approved Project Title Farm Women, Networks and ICTs

2006 : \$62,740
2007 : \$40,000
2008 : \$68,188

Primary RFCD 3799 OTHER STUDIES IN HUMAN SOCIETY

Administering Institution Queensland University of Technology

Project Summary

Considerable national funds have been spent on bringing rural Australians online. In the previous year over half of those living in non-metropolitan Australia accessed the internet. However, little is known about how new technologies are being integrated into the daily lives of rural people. This research moves from quantifying technology take-up in rural Australia and describing the possibilities of what new technologies may offer rural people, to analysing and critiquing the extent to which these possibilities are being realised. It will inform policy on rural and regional technology access and use.

DP0665480 Prof Dr M Rosemann; A/Prof AH ter Hofstede; Dr M Dumas-Menjivar; Prof Dr WM van der Aalst; Asst Prof M zur Muehlen

Approved Project Title Next-Generation Reference Process Models

2006 : \$110,000
2007 : \$85,000
2008 : \$87,000

Primary RFCD 2801 INFORMATION SYSTEMS

Administering Institution Queensland University of Technology

Project Summary

Business process modelling is a key tool for organisations striving to create efficiencies by leveraging their IT infrastructure. This project will develop techniques for increasing the productivity of business process analysts by allowing them to reuse as much as possible existing models rather than systematically designing new ones from scratch. Specifically, the project will develop and validate a language for designing highly configurable process models. This language will enable superior approaches to business process modelling and hence smarter use of information. This will place Australia at the forefront of developments in business process management: a crucial technology in today's global, dynamic and heterogeneous environments.

DP0666910 Dr TA Steinberg; Dr T Tesfamichael; Dr WN Martens; Dr H Zhou

Approved Project Title Experimental and theoretical study of the formation of nanomaterials under reduced gravity conditions

2006 : \$60,000
2007 : \$40,000
2008 : \$40,000

Primary RFCD 2918 INTERDISCIPLINARY ENGINEERING

Administering Institution Queensland University of Technology

Project Summary

This work will investigate the formation of nanomaterials and model this process to provide the skills to develop better nanocomposite materials. A better understanding of the process and the effect gravity has on it provides better control of this industrially significant process allowing enhanced process optimisation and product design. The results are directly relevant to many organisations currently studying nanomaterials. The work provides important results in a frontier technologies which will help the building and transforming of Australian industries with applications in energy conversion, water purification, quantum semi-conductors, optical materials, films for material separation and fuel cells.

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DP0666254 A/Prof K Thorpe; Dr SJ Danby; Prof DA Hay; Dr EA Stewart

Approved Project Title **Compromised or competent? A longitudinal study of twin children's social competencies friendships and behavioural adjustment**

2006 : \$110,000

2007 : \$90,000

2008 : \$85,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution Queensland University of Technology

Project Summary

Twins are a significant and increasing proportion of the school population. This study of twins, transition to school and friendship will advance knowledge in young children's social and emotional health, the national priority area Promoting and maintaining good health. It informs the early childhood education community (particularly policy makers, educators and parents) about twin children's transition to school with a particular focus on social competence. It will address many key outcomes, identified by Commonwealth Department of Family and Community Services, as priorities for the Early Years. The findings will have direct relevance for parents, educators, health professionals and policy-makers.

DP0662802 Dr K Unsworth; Dr CM Mason; Dr O Epitropaki

Approved Project Title **Self-Leadership towards Innovation & Well-Being**

2006 : \$60,941

2007 : \$40,000

2008 : \$25,000

Primary RFCD 3801 PSYCHOLOGY

Administering Institution Queensland University of Technology

Project Summary

Innovation and well-being in the workplace are of paramount importance in maintaining Australia's social and economic environment. Self-leadership training provides employees with strategies to build confidence and resilience, identify opportunities in the environment, deriving greater meaning and enjoyment from work. Self-leadership training has already been shown to improve performance; this project extends self-leadership research by testing the effects of self-leadership training on employee innovation and well-being. It also elucidates the psychological processes underlying improvements in innovation and well-being. The project addresses ARC Research Priorities 2 and 3 and contributes to Australia's social and economic advancement.

DP0663312 Dr GE Webb; Dr R Bolhar; Dr M Preda; Dr K Grey

Approved Project Title **Trace element geochemistry of microbialites: towards an independent record of biogenicity, microbial communities, and seawater chemistry**

2006 : \$70,000

2007 : \$55,000

2008 : \$32,000

Primary RFCD 2601 GEOLOGY

Administering Institution Queensland University of Technology

Project Summary

A vast amount of Australia's mineral wealth is held in rocks of Precambrian age, yet those rocks are notoriously difficult to date and correlate owing to the rarity of fossils. Successful discrimination of different microbialites using biochemically sensitive trace elements will provide a firm basis and rationale for stromatolite biostratigraphy and greatly increase our ability to understand the geological evolution and distribution of Precambrian rocks and resources. Additionally, a better understanding of the information content of stromatolites will yield considerable insight into the origin of life on Earth and its relationship to Earth's evolving chemistry and environment.

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DP0666266 A/Prof RC Wolff; Prof AS Hurn; Prof Dr W Härdle; Prof AJ Lawrance; Prof WK Li; Dr KA Lindsay

Approved Project Title **Understanding and Modelling Weather Derivatives in Australia for the Purpose of their Accurate Pricing: a Statistical and Econometric Investigation**

2006 : \$70,000

2007 : \$60,000

2008 : \$70,000

Primary RFCD 3404 ECONOMETRICS

Administering Institution Queensland University of Technology

Project Summary

Australia suffers some of the most adverse and extreme weather globally. Its government and industries, especially agriculture and electricity, stand to benefit from improved understanding of weather derivatives and capability to price them accurately. Tailored to Australian weather scenarios, weather derivatives will be tools to manage local risk factors, and increase global competitiveness by hedging against competitors' good weather-related advantage. The US weather derivative market, capitalised at over US\$7.5b, began just 7 years ago; there is no organised Australian market. This project's smart techniques for improving pricing accuracy will support the development and vigorous growth of a local market.

DP0663207 A/Prof JM Wood; A/Prof LM Hickson; A/Prof A Chaparro

Approved Project Title **Sensory impairments and driving: can older drivers cope with distracters?**

2006 : \$100,000

2007 : \$70,000

2008 : \$70,000

Primary RFCD 3209 OPTOMETRY

Administering Institution Queensland University of Technology

Project Summary

This research adopts a multi-disciplinary approach to investigate the problems of older drivers, and drivers in general. The research will provide a clear understanding of how visual and auditory distracters impact upon the driving behaviour and safety of individuals with vision and hearing impairment and those experiencing age-related declines in cognitive skills. The research is highly significant in terms of improving our understanding of how sensory impairment and age-related changes impact upon driving performance, the impact of an increasingly complex driving and in-vehicle environment and will provide tangible benefits for the road safety of the wider community.